Fr. Conceicao Rodrigues College of Engineering
Fr. Agnel Ashram, Bandstand, Bandra (West), Mumbai – 50.

2.6.2. Attainment of Programme outcomes and course outcomes are evaluated by the Institution.

Index

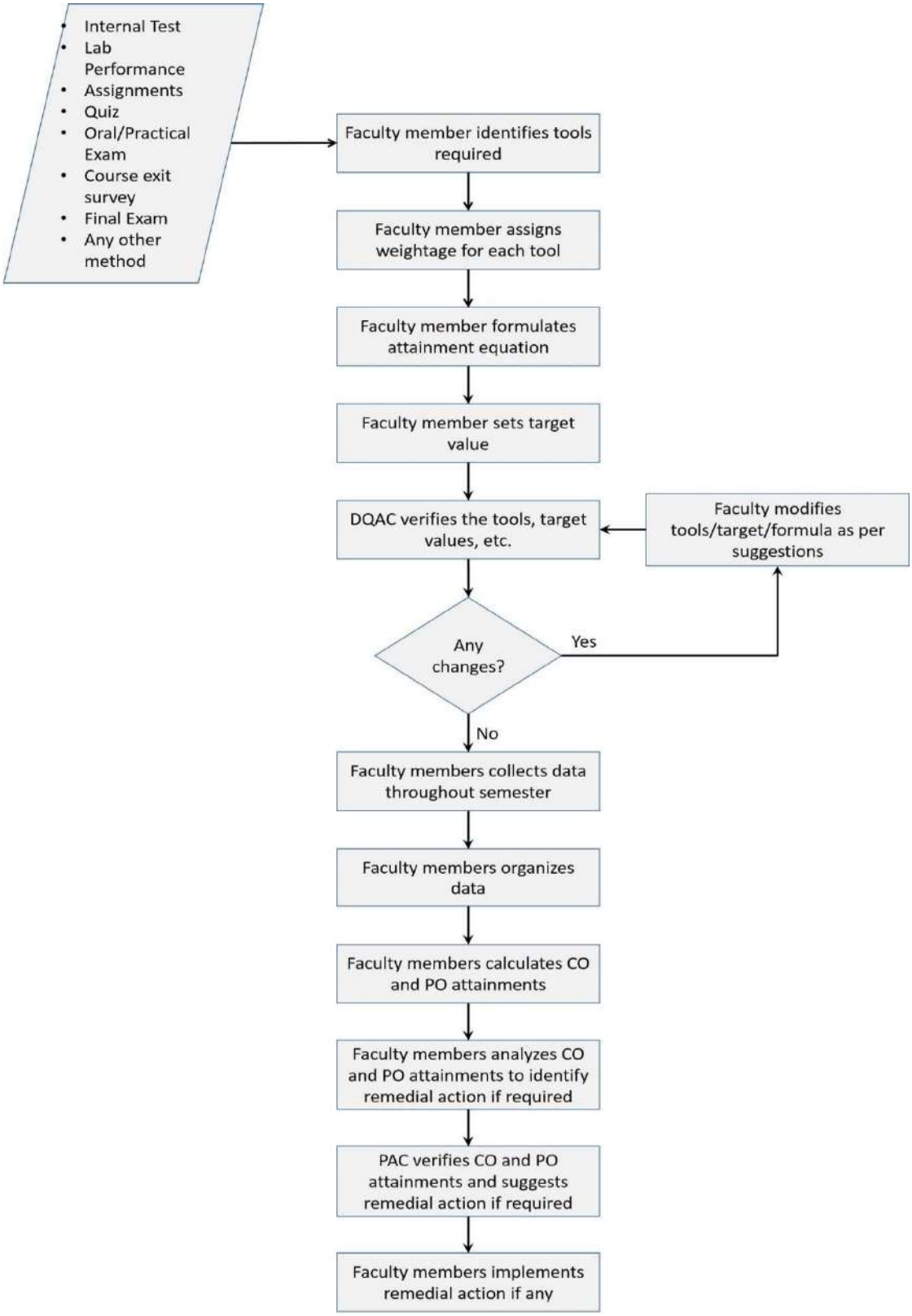
Following are the processes followed by our institution for attainment of Programme outcomes and course outcomes**.**

Process to Measure CO attainment

Faculty member identifies tools required to measure CO attainment for each CO.

- Faculty member assigns weightage for each tool.
- Faculty member formulates equation to calculate attainment.
- Faculty member sets target level for CO attainment.
- DQAC verifies the method/tools/target value of CO attainment calculation and suggests tools, target values, etc. if required.
- Based on feedback from DQAC, faculty member makes appropriate changes.
- Faculty member collects the data throughout semester as per the tools selected for measuring CO attainment.
- Faculty member organizes data.
- Faculty member calculates CO and PO attainments for said course.
- Faculty member analyzes CO attainment to identify remedial actions if necessary.
- DQAC verifies attainment and suggests remedial action.
- Faculty member implements remedial measures during following year to improve CO attainment or sets new target value.

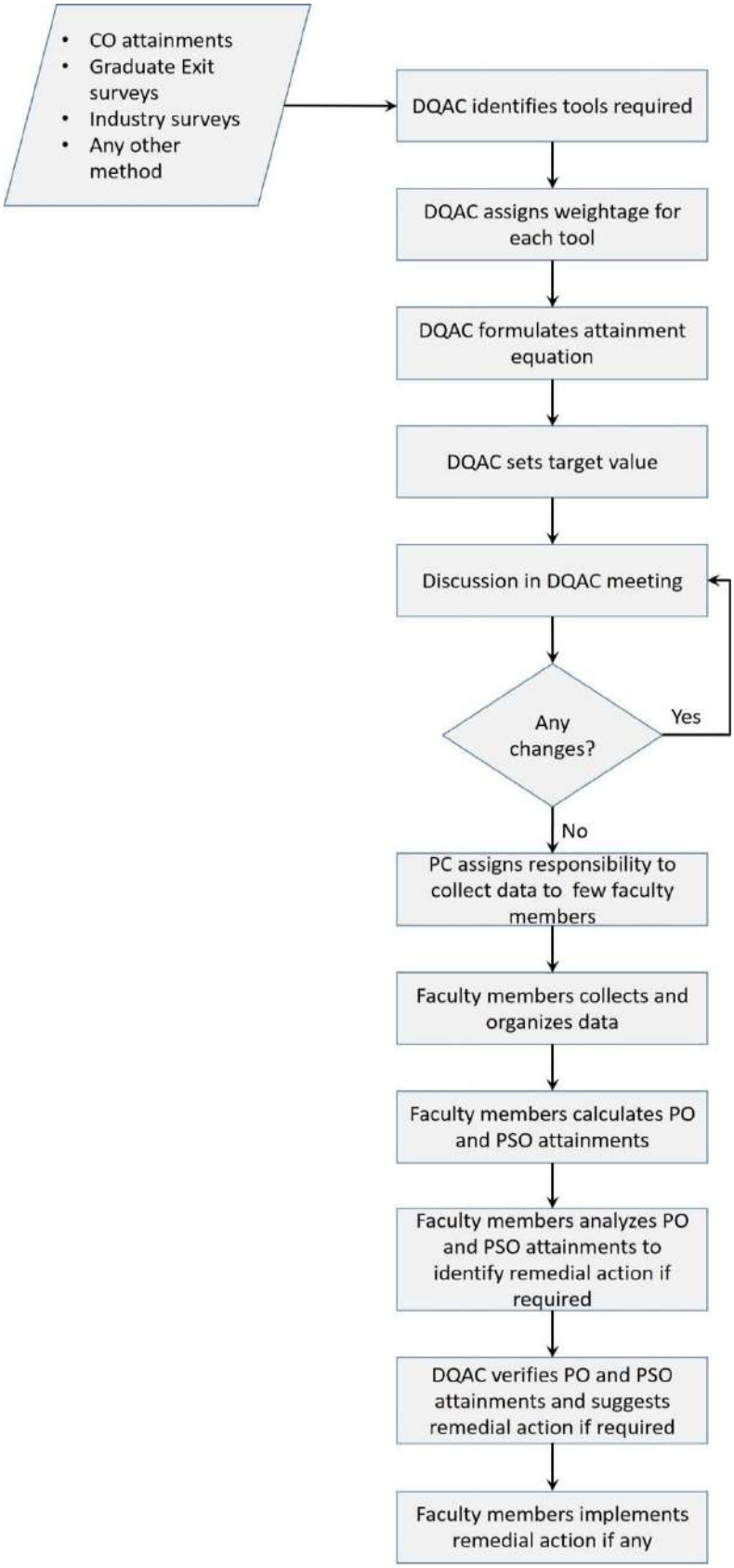
Flowchart representing process to calculate CO attainment



Process to Measure PO/PSO attainment

- DQAC identifies tools required to measure PO and PSO attainment for each PO and PSO.
- DQAC assigns weightage for each tool depending type of data, etc.
- DQAC formulates equation to calculate attainment.
- DQAC sets target level for PO and PSO attainment.
- DQAC finalizes the method/tools/target value of PO and PSO attainment calculation.
- PC assigns responsibility to few faculty members to collect data and designates one of the faculty member as coordinator.
- Respective faculty member collects the data at the end of semester/year as per the tools selected for measuring PO and PSO attainment.
- Respective faculty member organizes data.
- Coordinator calculates consolidated PO and PSO attainments.
- Coordinator analyzes PO and PSO attainments.
- DQAC verifies attainment and suggests remedial action.
- DQAC ensures implementation of remedial measures to improve PO and PSO attainment at department level or sets new target value during next academic year.

Flowchart representing process to calculate PO/PSO attainment



FR. Conceicao Rodrigues College Of Engineering
Department of Computer Engineering
S.E. (Computer) (semester IV)
(2022-2023)

Branch: Computer Engineering
Semester:IV semester **Year: 2022-2023**

Course Title: Analysis of Algorithms (CSC402)	**SEE: 3 Hours-Theory & Oral Examination**
Total contact Hours: 36 Hours	**Duration of SEE: 3 Hrs**
SEE Marks: 80 (Theory) + 20 (IA)	
Lesson Plan Author: Prajakta Dhamanskar (Div. A)	**Date:** 18/02/2023
Checked By:	**Date:** 18/2/23

Course Outcomes and Assessment Plan

Prerequisite: Data structure concepts, Discrete structures	
Course Objectives:	
1	To provide mathematical approaches for Analysis of Algorithms
2	To understand and solve problems using various algorithmic approaches
3	To analyze algorithms using various methods
Course Outcomes: At the end of the course learner will be able to	
1	Analyze the running time and space complexity of algorithms.
2	Describe, apply and analyze the complexity of divide and conquer strategy.
3	Describe, apply and analyze the complexity of greedy strategy.
4	Describe, apply and analyze the complexity of dynamic programming strategy.
5	Explain and apply backtracking, branch and bound.
6	Explain and apply string matching techniques.

Syllabus:

Module		Detailed Contents	Hours
1		**Introduction**	8
	1.1	Performance analysis, space, and time complexity Growth of function, Big-Oh, Omega Theta notation Mathematical bac.kground for algorithm analysis. Complexity class: Definition of P, NP, NP-Hard, NP-Complete Analysis of selection sort, insertion sort.	
	1.2	Recurrences: The substitution method, Recursion tree method, Master method	
2		**Divide and Conquer Approach**	6
	2.1	General method, Merge sort, Quick sort, Finding minimum and maximum algorithms and their Analysis, Analysis of Binary search.	
3		**Greedy Method Approach**	6

	3.1	General Method, Single source shortest path: Dijkstra Algorithm Fractional Knapsack problem, Job sequencing with deadlines, Minimum cost spanning trees: Kruskal and Prim's algorithms	
4		**Dynamic Programming Approach**	9
	4.1	General Method, Multistage graphs, Single source shortest path: Bellman Ford Algorithm All pair shortest path: Floyd Warshall Algorithm, Assembly-line scheduling Problem0/1 knapsack Problem, Travelling Salesperson problem, Longest common subsequence	
5		**Backtracking and Branch and bound**	6
	5.1	General Method, Backtracking: N-queen problem, Sum of subsets, Graph coloring	
	5.2	Branch and Bound: Travelling Salesperson Problem, 15 Puzzle problem	
6		**String Matching Algorithms**	4
	6.1	The Naïve string-matching algorithm, The Rabin Karp algorithm, The Knuth-Morris-Pratt algorithm	

Textbooks:	
1	T. H. Cormen, C.E. Leiserson, R. L. Rivest, and C. Stein, "Introduction to algorithms", 2nd Edition, PHI Publication 2005.
2	Ellis Horowitz, Sartaj Sahni, S. Rajsekaran. "Fundamentals of computer algorithms" University Press.

References:	
1	Sanjoy Dasgupta, Christos Papadimitriou, Umesh Vazirani, "Algorithms", Tata McGraw- Hill Edition.
2	S. K. Basu, "Design Methods and Analysis of Algorithm", PHI

Course Outcomes:

Upon completion of this course students will be able to:

CSC 402.1 :Analyze the running time and space complexity of algorithms. **(Analyze)**
CSC 402.2 : Analyze the complexity of divide and conquer strategy. **(Analyze)**
CSC 402.3 : Analyze the complexity of greedy strategy. **(Analyze)**
CSC 402.4 : Analyze the complexity of dynamic programming strategy. **(Analyze)**
CSC 402.5 : Analyze backtracking, branch and bound strategy. **(Analyze)**
CSC 402.6 : Analyze string matching techniques. **(Analyze)**

Mapping of CO and PO/PSO

Relationship of course outcomes with program outcomes: Indicate 1 (low importance), 2 (Moderate Importance) or 3 (High Importance) in respective mapping cell.

Program Specific Outcomes (PSOs)

Student will have ability to

PSO1: Develop Artificial Intelligence and Machine Learning based systems.

PSO2: Apply cyber security mechanisms to ensure the protection of Information Technology assets.

	PO1 (Engg Know)	PO2 (Ana)	PO3 (De sign)	PO4 (inve stiga)	PO5 (tools)	PO6 (engg Soci)	PO7 (Env)	PO8 (Eth)	PO9 (ind Team)	PO10 (comm.)	PO11 (PM)	PO12 (life Long)
CSC402.1	3	3		1	1				1			
CSC402.2	3	3	1	1	1				1			
CSC402.3	3	3	1	1	1				1			
CSC402.4	3	3	1	1	1				1			
CSC402.5	3	3	1	1	1				1			
CSC402.6	3	3		1	1				1			
Course To PO	3	3	1	1	1				1			

CO	PSO1	PSO2
CSC402.1	1	1
CSC402.2	1	1
CSC402.3	1	1
CSC402.4	1	1
CSC402.5	1	1
CSC402.6	1	1
Course to PSO	1	1

Mapping Justification:

Course Outcome	BL	Competency	Performance Indicator	PO	Mapping
CSC402.1	4	1.3 Demonstrate competence in engineering fundamentals	1.3.1 Apply engineering fundamentals	PO1	3
		1.4 Demonstrate competence in specialized engineering knowledge to the program	1.4.1 Apply theory and principles of Computer Science and engineering to solve an engineering problem		
		2.3 Demonstrate an ability to formulate and interpret a model	2.3.1 Able to apply computer engineering principles to formulate modules of a system with required applicability and performance.	PO2	3
		2.4 Demonstrate an ability to execute a solution process and analyze results	2.4.1 Applies engineering mathematics to implement the solution.		
		4.1 Demonstrate an ability to conduct investigations of technical issues consistent with their level of knowledge and understanding	4.1.2. Able to choose appropriate procedure/algorithm, dataset and test cases	PO4	1
			4.1.3 Able to choose appropriate hardware/software tools to conduct the experiment.		
		5.1 Demonstrate an ability to identify/create modern engineering tools, techniques and resources	5.1.1 Identify modern engineering tools, techniques and resources for engineering activities	PO5	1
		9.2 Demonstrate effective individual and team operations-- communication, problem- solving, conflict resolution and leadership skills	9.2.1 Demonstrate effective communication, problem-solving, conflict resolution and leadership skills	PO9	1
CSC402.2	4	1.3 Demonstrate competence in engineering fundamentals	1.3.1 Apply engineering fundamentals	PO1	3
		1.4 Demonstrate competence in specialized engineering knowledge to the program	1.4.1 Apply theory and principles of Computer Science and engineering to solve an engineering problem		
		2.3 Demonstrate an ability to formulate and interpret a model	2.3.1 Able to apply computer engineering principles to formulate modules of a system with required applicability and performance.	PO2	3

		2.4 Demonstrate an ability to execute a solution process and analyze results	2.4.1 Applies engineering mathematics to implement the solution.		
		3.2 Demonstrate an ability to generate a diverse set of alternative design solutions	3.2.1 Explore design alternatives	PO3	1
		4.1 Demonstrate an ability to conduct investigations of technical issues consistent with their level of knowledge and understanding	4.1.2. Able to choose appropriate procedure/algorithm, dataset and test cases	PO4	1
			4.1.3 Able to choose appropriate hardware/software tools to conduct the experiment.		
		5.1 Demonstrate an ability to identify/create modern engineering tools, techniques and resources	5.1.1 Identify modern engineering tools, techniques and resources for engineering activities	PO5	1
		9.2 Demonstrate effective individual and team operations-- communication, problem- solving, conflict resolution and leadership skills	9.2.1 Demonstrate effective communication, problem-solving, conflict resolution and leadership skills	PO9	1
CSC402.3	4	1.3 Demonstrate competence in engineering fundamentals	1.3.1 Apply engineering fundamentals	PO1	3
		1.4 Demonstrate competence in specialized engineering knowledge to the program	1.4.1 Apply theory and principles of Computer Science and engineering to solve an engineering problem		
		2.3 Demonstrate an ability to formulate and interpret a model	2.3.1 Able to apply computer engineering principles to formulate modules of a system with required applicability and performance.	PO2	3
		2.4 Demonstrate an ability to execute a solution process and analyze results	2.4.1 Applies engineering mathematics to implement the solution.		
		3.2 Demonstrate an ability to generate a diverse set of alternative design solutions	3.2.1 Explore design alternatives	PO3	1
		4.1 Demonstrate an ability to conduct investigations of technical issues consistent with their level of knowledge and understanding	4.1.2. Able to choose appropriate procedure/algorithm, dataset and test cases	PO4	1
			4.1.3 Able to choose appropriate hardware/software tools to conduct the experiment.		

		5.1 Demonstrate an ability to identify/create modern engineering tools, techniques and resources	5.1.1 Identify modern engineering tools, techniques and resources for engineering activities	PO5	1
		9.2 Demonstrate effective individual and team operations-- communication, problem- solving, conflict resolution and leadership skills	9.2.1 Demonstrate effective communication, problem-solving, conflict resolution and leadership skills	PO9	1
CSC402.4	4	1.3 Demonstrate competence in engineering fundamentals	1.3.1 Apply engineering fundamentals	PO1	3
		1.4 Demonstrate competence in specialized engineering knowledge to the program	1.4.1 Apply theory and principles of Computer Science and engineering to solve an engineering problem		
		2.3 Demonstrate an ability to formulate and interpret a model	2.3.1 Able to apply computer engineering principles to formulate modules of a system with required applicability and performance.	PO2	3
		2.4 Demonstrate an ability to execute a solution process and analyze results	2.4.1 Applies engineering mathematics to implement the solution.		
		3.2 Demonstrate an ability to generate a diverse set of alternative design solutions	3.2.1 Explore design alternatives	PO3	1
		4.1 Demonstrate an ability to conduct investigations of technical issues consistent with their level of knowledge and understanding	4.1.2. Able to choose appropriate procedure/algorithm, dataset and test cases	PO4	1
			4.1.3 Able to choose appropriate hardware/software tools to conduct the experiment.		
		5.1 Demonstrate an ability to identify/create modern engineering tools, techniques and resources	5.1.1 Identify modern engineering tools, techniques and resources for engineering activities	PO5	1
		9.2 Demonstrate effective individual and team operations-- communication, problem- solving, conflict resolution and leadership skills	9.2.1 Demonstrate effective communication, problem-solving, conflict resolution and leadership skills	PO9	1
		1.3 Demonstrate competence	1.3.1 Apply engineering	PO1	3

CSC402.5	4	in engineering fundamentals	fundamentals		
		1.4 Demonstrate competence in specialized engineering knowledge to the program	1.4.1 Apply theory and principles of Computer Science and engineering to solve an engineering problem		
		2.3 Demonstrate an ability to formulate and interpret a model	2.3.1 Able to apply computer engineering principles to formulate modules of a system with required applicability and performance.	PO2	3
		2.4 Demonstrate an ability to execute a solution process and analyze results	2.4.1 Applies engineering mathematics to implement the solution.		
		3.2 Demonstrate an ability to generate a diverse set of alternative design solutions	3.2.1 Explore design alternatives	PO3	1
		4.1 Demonstrate an ability to conduct investigations of technical issues consistent with their level of knowledge and understanding	4.1.2. Able to choose appropriate procedure/algorithm, dataset and test cases	PO4	1
			4.1.3 Able to choose appropriate hardware/software tools to conduct the experiment.		
		5.1 Demonstrate an ability to identify/create modern engineering tools, techniques and resources	5.1.1 Identify modern engineering tools, techniques and resources for engineering activities	PO5	1
		9.2 Demonstrate effective individual and team operations-- communication, problem- solving, conflict resolution and leadership skills	9.2.1 Demonstrate effective communication, problem-solving, conflict resolution and leadership skills	PO9	1
CSC402.6		1.3 Demonstrate competence in engineering fundamentals	1.3.1 Apply engineering fundamentals	PO1	3
		1.4 Demonstrate competence in specialized engineering knowledge to the program	1.4.1 Apply theory and principles of Computer Science and engineering to solve an engineering problem		
		2.3 Demonstrate an ability to formulate and interpret a model	2.3.1 Able to apply computer engineering principles to formulate modules of a system with required applicability and performance.	PO2	3
		2.4 Demonstrate an ability to execute a solution process	2.4.1 Applies engineering mathematics to implement the		

		and analyze results	solution.		
		4.1 Demonstrate an ability to conduct investigations of technical issues consistent with their level of knowledge and understanding	4.1.2. Able to choose appropriate procedure/algorithm, dataset and test cases	PO4	1
			4.1.3 Able to choose appropriate hardware/software tools to conduct the experiment.		
		5.1 Demonstrate an ability to identify/create modern engineering tools, techniques and resources	5.1.1 Identify modern engineering tools, techniques and resources for engineering activities	PO5	1
		9.2 Demonstrate effective individual and team operations-- communication, problem- solving, conflict resolution and leadership skills	9.2.1 Demonstrate effective communication, problem-solving, conflict resolution and leadership skills	PO9	1

CO Measurement Weightages for Tools:

	Assessment Tool Direct (weightage: 80%)				**Assessment Tool Indirect(weightage=20%**
CO	Test 1/2	Assignment 1/2	Quiz	SEE (T)	Course Exit Survey
CSC402.1	Test 1 20%	Assignment 1 10%	10%	60%	100%
CSC402.2	Test 1 20%	Assignment 1 10%	10%	60%	100%
CSC402.3	Test 1 20%	Assignment 1 10%	10%	60%	100%
CSC402.4	Test 2 20%	Assignment 2 10%	10%	60%	100%
CSC402.5	Test 2 20%	Assignment 2 10%	10%	60%	100%
CSC402.6	Test 2 20%	Assignment 2 10%	10%	60%	100%

CO Assessment Tools:

CSC402.1: Direct Methods(80%): Unit Test 1 + Assignment 1+Quiz+SEE(T)

CO1dm = 0.2T +0.1Assignment+0.1Quiz +0.6SEE(T)

InDirect Methods(20%): Course exit survey

CO1idm

CSC402.1 = 0.8*CO1dm + 0.2* CO1idm

Target Level 2.5

CSC402.2:Direct Methods(80%): Unit Test 1 + Assignment 1+Quiz+SEE(T)

CO2dm = 0.2T +0.1Assignment+0.1Quiz +0.6SEE(T)

InDirect Methods(20%): Course exit survey

CO2idm

CSC402.2 = 0.8*CO2dm + 0.2* CO2idm

Target Level 2.6

CSC402.3: Direct Methods(80%): Unit Test 1 + Assignment 1+Quiz+SEE(T)

CO3dm = 0.2T +0.1Assignment+0.1Quiz +0.6SEE(T)

InDirect Methods(20%): Course exit survey

CO3idm

CSC402.3 = 0.8*CO3dm + 0.2* CO3idm

Target Level 2.6

CSC404.4: Direct Methods(80%): Unit Test 2 + Assignment 2+Quiz+SEE(T)

CO4dm = 0.2T +0.1Assignment+0.1Quiz +0.6SEE(T)

InDirect Methods(20%): Course exit survey

CO4idm

CSC402.4 = 0.8*CO4dm + 0.2* CO4idm

Target Level 2.6

CSC404.5: Direct Methods(80%): Unit Test 2 + Assignment 2+Quiz+SEE(T)

CO5dm = 0.2T +0.1Assignment+0.1Quiz +0.6SEE(T)

InDirect Methods(20%): Course exit survey

CO5idm

CSC402.5 = 0.8*CO5dm + 0.2* CO5idm

Target Level 2.6

CSC404.6: Direct Methods(80%): Unit Test 2 + Assignment 2+Quiz+SEE(T)

CO6dm = 0.2T +0.1Assignment+0.1Quiz +0.6SEE(T)

InDirect Methods(20%): Course exit survey

CO6idm

CSC402.6 = 0.8*CO6dm + 0.2* CO6idm

Target Level 2.5

18/4/2023

Course Level Gap (If any):

Content beyond Syllabus:

Lecture Plan

Module 1: Introduction to Analysis of Algorithms

No.	Date		Topic	Hrs	Content Delivery Method	Remark
	Planned	Actual				
1	09-01-2023	09-01-2023	Introduction to analysis of algorithms: Introduction to subject and fundamentals of algorithms. What is meant by an efficient algorithm?	12	Chalk and board	
2	11-1-2023	11-01-2023	Efficiency of algorithms, Time and Space Complexities Fundamentals		Chalk and board	
3	12-1-2023	12-01-2023	Calculation of time complexity for code samples		Chalk and board	
4	16-1-2023	12-01-2023	Calculation of time complexity for code samples continued		Chalk and board	
5	18-1-2023	16-01-2023	Asymptotic notation big, Omega, Theta definition		Chalk and board	
6	19-1-2023	18-01-2023	Asymptotic notations examples prove that kind of sums		Chalk and board	
7	23-1-2023	18-01-2023	properties of Asymptotic notation, best worst and average case analysis of linear search and Binary search ,writing recurrence equation		Chalk and board	
8	25-1-2023	19-01-2023	back substitution method of solving recurrence		Chalk and board	
9	30-1-2023	23-01-2023	recursion tree method		Chalk and board	
10	01-02-2023	25-01-2023	Space complexity for iterative and recursive programs		Chalk and board	
11	02-02-2023	30-01-2023	Masters method		Chalk and board	
12	06-02-2023	23-01-2023 (Lab)	Analysis of Insertion sort, Selection Sort and Optimized Bubble sort.		Chalk and board	
Module 2: Divide and Conquer Approach						
13	8-2-2023	01-02-2023	Merge Sort	4	Chalk and board	

14	9-2-2023	02-02-2023	Merge sort time and space complexity		Chalk and board	
15	13-2-2023	06-02-2023	Quick Sort algorithm, Time and Space complexity		Chalk and board	
16	16-2-2023	08-02-2023	Randomized Quick Sort, Min Max Algorithm		Chalk and board	
Module 3: Greedy Method						
17	20-2-2023	09-02-2023	General Method, Fractional Knapsack Problem	4	chalk and board, PPT.	
18	22-2-2023	13-02-2023	Job Sequencing with deadline		Chalk and board	
19	23-2-2023	15-02-2023	MST- Prims, MST – Kruskal		Chalk and board	
20	1-3-2023	16-02-2023	Dijkstra's Shortest Path Algorithm (SSSP)		Chalk and board, Visualization using Animation Video.	
Module 4: Dynamic Programming						
21	2-3-2023	20-02-2023	General Method, 0/1 Knapsack	7	Chalk and board , Lab performanc e	
22	6-3-2023	23-02-2023	All pair shortest Path(Floyd Warshall Algo)		Chalk and board	
23	9-3-2023	23-02-2023	Single Source Shortest Path (Bellman Ford)		Chalk and board ,	
24	13-3-2023	8-3-2023	MultiStage Graph		Chalk and board	
25	15-3-2023	13-3-2023	Traveling Salesman Problem		Chalk and board	
26	16-3-2023	13-3-2023	Longest common subsequence		PPT	
27	20-3-2023	15-03-2023	Assembly line scheduling, Examples on Assembly line scheduling		Chalk and board	
Module 4: Backtracking and branch and bound2						

28	23-3-2023	15-03-2023	General Method of backtracking, n queen problem, Introduction to graph coloring	5	Chalk and board	
29	27-3-2023	16-03-2023	Graph Coloring program and state space tree construction, Examples for practice.		Chalk and board	
30	29-03-2023	18-03-2023	Sum of Subsets introduction, problem solving. Sum of subset program		Chalk and board	
31	3-4-2023	23-03-2023	General Method of branch and bound, 8 puzzle problem		Chalk and board	
32	5-4-2023	27-03-2023	15 puzzle problem, Traveling Salesman Problem		Chalk and board	
Module 5: String Matching algorithms						
33	6-4-2023	3-4-2023	Naïve String Matching, Rabin Karp Algo	4	Chalk and board	
34	10-4-2023	6-04-2023	KMP Algo prefix and suffix concept		Chalk and board	
35	12-4-2023	10-4-2023	program on KMP algo		Chalk and board	
36	13-4-2023	12-04-2023	Revision and Doubt Solving		Chalk and board	
37	20-4-2023	15-04-2023	Revision and Doubt Solving		Chalk and board	
Remedial Lectures						
38	03/05/2023	03/05/2023				
39						

Text Books:

1. **T. H. Cormen, C.E. Leiserson, R. L. Rivest, and C. Stein, "Introduction to algorithms", 2nd Edition, PHI Publication 2005.**
2. **Ellis Horowitz, Sartaj Sahni, S. Rajsekaran. "Fundamentals of computer algorithms" University Press.**

Reference Books:

1. **Sanjoy Dasgupta, Christos Papadimitriou, Umesh Vazirani, "Algorithms", Tata McGraw-Hill Edition.**
2. **S. K. Basu, "Design Methods and Analysis of Algorithm", PHI**

Web References:

1. **https://nptel.ac.in/courses/106/106/106106131/**
2. **https://swayam.gov.in/nd1_noc19_cs47/preview**
3. **https://www.coursera.org/specializations/algorithms**
4. **https://www.mooc-list.com/tags/algorithms**

FR. Conceicao Rodrigues College Of Engineering
Department of Computer Engineering
S.E. (Computer) (semester IV)
(2022-2023)

Branch: Computer Engineering **Year: 2022-2023**
Course Title: Analysis of Algorithms (CSC402) **Semester:IV semester**

Course Outcomes Target:

CSC 303.1	Analyze the running time and space complexity of algorithms.	Target level: 2.5
CSC 303.2	Analyze the complexity of divide and conquer strategy.	Target level: 2.5
CSC 303.3	Analyze the complexity of greedy strategy.	Target level: 2.7
CSC 303.4	Analyze the complexity of dynamic programming strategy.	Target level: 2.8
CSC 303.5	Analyze backtracking, branch and bound strategy.	Target level: 2.8
CSC 303.6	Analyze string matching techniques.	Target level: 2.8

CO Attainment of latest three years

CO	Course Outcomes	2022-23	2021-22	2020-21
CSC 303.1	Analyze the running time and space complexity of algorithms.	2.36	2.68	2.2
CSC 303.2	Analyze the complexity of divide and conquer strategy.	2.36	2.52	2.36
CSC 303.3	Analyze the complexity of greedy strategy.	2.84	2.52	2.36
CSC 303.4	Analyze the complexity of dynamic programming strategy.	2.84	2.52	2.36
CSC 303.5	Analyze backtracking, branch and bound strategy.	2.84	2.52	2.36
CSC 303.6	Analyze string matching techniques.	2.52	2.44	2.36

Practical Plan

Branch: Computer Engineering
Semester: IV

Year: 2022-23

Course Title: **Analysis of Algorithms (CSL401)**	SEE: 2 Hours – Practical
Total Contact Hours: 20 Hours	
Practical Plan Author: **Prajakta Dhamanskar (Div. A)**	Date:
Checked By:	Date: 18/2/2023

Prerequisites: Basic knowledge of programming and data structure

Course Outcomes (CO):

On successful completion of course learner will be able to:

CSL401.1 Implement the algorithms using different approaches.
CSL401.2 Analyze the complexities of various algorithms.
CSL401.3 Compare the complexity of the algorithms for specific problems.

List of Experiments

Sr. No.	TITLE	Mapped Co
1	WAP to implement Modified bubble sort, Insertion sort, Selection sort and derive its complexity.	CSC401.1 CSC401.2
2	WAP to implement Linear search and binary search and derive its time complexity.	CSC401.1 CSC401.2
3	WAP to implement Quick sort, randomized quick sort and derive its complexity.	CSC401.1 CSC401.2
4	WAP to implement Merge sort and derive its complexity.	CSC401.1 CSC401.2
5	WAP to implement MinMax Algorithm using Divide and Conquer.	CSC401.1 CSC401.2
6	WAP to implement fractional knapsack using greedy methods.	CSC401.1 CSC401.2
7*	WAP to implement Job Sequencing with Deadlines using greedy methods.	CSC401.1 CSC401.2
8	WAP to implement Dijkstra's Shortest Path algorithm using greedy methods.	CSC401.1 CSC401.2
9	WAP to implement 0/1 knapsack using dynamic programming.	CSC401.1 CSC401.2
10	WAP to implement Bellman Ford Algorithm using Dynamic Programming.	CSC401.1 CSC401.2
11	WAP to implement Floyd Warshall algorithm.	CSC401.1 CSC401.2

12	WAP to implement Longest Common Subsequence using Dynamic Programming.	CSC401.1 CSC401.2
13	WAP to implement the N queen problem using a backtracking approach.	CSC401.1 CSC401.2
14	WAP to implement sum of subset problem using backtracking approach	CSC401.1 CSC401.2
15	WAP to implement Naive String Matching and KMP String Matching Algorithm	CSC401.1 CSC401.2
	Newly Added Experiments	
7*	WAP to implement Job Sequencing with Deadlines using greedy methods.	CSC401.1 CSC401.2

CO-PO Mapping: (BL – Blooms Taxonomy, C – Competency, PI – Performance Indicator)

CO	BL	C	PI	PO	Mapping
CSL401.1	3	1.4 Demonstrate competence in specialized engineering knowledge to the program.	1.4.1 Apply theory and principles of Computer Science and engineering to solve an engineering problem.	PO1	1
		2.3 Demonstrate an ability to formulate and interpret a model.	2.3.1 Able to apply computer engineering principles to formulate modules of a system with required applicability and performance.	PO2	1
		2.4 Demonstrate an ability to execute a solution process and analyze results.	2.4.1 Applies engineering mathematics to implement the solution.	PO2	1
CSL401.2	4	1.4 Demonstrate competence in specialized engineering knowledge to the program.	1.4.1 Apply theory and principles of Computer Science and engineering to solve an engineering problem.	PO1	1
		2.3 Demonstrate an ability to formulate and interpret a model.	2.3.1 Able to apply computer engineering principles to formulate modules of a system with required applicability and performance.	PO2	1
		2.4 Demonstrate an ability to execute a solution process and	2.4.1 Applies engineering mathematics to implement the solution.	PO2	1

		analyze results.			
CSL401.3	2	1.4 Demonstrate competence in specialized engineering knowledge to the program.	1.4.1 Apply theory and principles of Computer Science and engineering to solve an engineering problem.	PO1	1
		2.2 Demonstrate an ability to formulate a solution plan and methodology for an engineering problem	2.2.4 Compare and contrast alternative solution/methods to select the best method.	PO1	1

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CSL401.1	1	1										
CSL401.2	1	1										
CSL401.3	1	1										

	PSO1	PSO2
CSL401.1	--	--
CSL401.2	--	--
CSL401.3	--	--

CO Measurement Weightages for Tools:

Course Outcomes	*Direct Methods (80%)*				*Indirect Method (20%)*
	Lab Performance	Post Lab Questions	Quizzes	End Sem Exam	Course exit survey
CSL401.1	30%	10%	10%	50%	100%
CSL401.2	30%	10%	10%	50%	100%
CSL401.3	30%	10%	10%	50%	100%

Attainment:

CSL401.1:

Direct Method

$A_{CSL401.1D} = 0.3 * Lab\ Performance + 0.1 * Post\ Lab + 0.1 * Quizzes + 0.6 * SEE\_O/Pr$

Final Attainment: $A_{CSL401.1} = 0.8 * A_{CSL401.1D} + 0.2 * A_{CSL401.1I}$

CSL401.2:

Direct Method

$A_{CSL401.2D} = 0.3 * Lab\ Performance + 0.1 * Post\ Lab + 0.1 * Quizzes + 0.6 * SEE\_O/Pr$

Final Attainment: $A_{CSL401.2} = 0.8 * A_{CSL401.2D} + 0.2 * A_{CSL401.2I}$

CSL401.3:

Direct Method

$A_{CSL401.3D} = 0.3 * Lab\ Performance + 0.1 * Post\ Lab + 0.1 * Quizzes + 0.6 * SEE\_O/Pr$

Final Attainment: $A_{CSL401.3} = 0.8 * A_{CSL401.3D} + 0.2 * A_{CSL401.3I}$

Practical Session Plan

Batch	*Dates*		*Remarks*
	Planned	*Actual*	
Experiment No. 1 WAP to implement Modified bubble sort, Insertion sort, Selection sort and derive its complexity.			
A	23/01/2023	23/01/2023	
D	25/01/2023	25/01/2023	
B	02/02/2023	02/02/2023	
C	27/01/2023	27/01/2023	
Experiment No. 2 WAP to implement Linear search and binary search and derive its time complexity.			
A	30/01/2023	30/01/2023	
D	01/02/2023	01/02/2023	
B	02/02/2023	02/02/2023	
C	03/02/2023	03/02/2023	
Experiment No. 3 WAP to implement Quick sort, randomized quick sort and derive its complexity			
A	06/02/2023	06/02/2023	
D	08/02/2023	08/02/2023	
B	09/02/2023	09/02/2023	
C	10/02/2023	10/02/2023	
Experiment No. 4 WAP to implement Merge sort and derive its complexity.			
A	13/02/2023	13/02/2023	
D	08/02/2023	08/02/2023	
B	16/02/2023	16/02/2023	
C	17/02/2023	17/02/2023	
Experiment No.5 WAP to implement the MinMax algorithm using greedy methods.			
A	13/02/2023	13/02/2023	
D	08/02/2023	08/02/2023	

B	16/02/2023	16/02/2023	
C	17/02/2023	17/02/2023	

Experiment No.6
WAP to implement fractional knapsack using greedy methods.

A	20/02/2023	20/02/2023	
D	22/02/2023	22/02/2023	
B	23/02/2023	23/02/2023	
C.	24/02/2023	24/02/2023	

Experiment No. 7
WAP to implement Job Sequencing with Deadlines using greedy methods.

A	20/02/2023	20/02/2023	
D	22/02/2023	22/02/2023	
B	23/02/2023	23/02/2023	
C	24/02/2023	24/02/2023	

Experiment No. 8
WAP to implement Dijkstra's Shortest Path algorithm using greedy methods.

A	06/03/2023	06/03/2023	
D	08/03/2023	08/03/2023	
B	09/03/2023	09/03/2023	
C	10/03/2023	10/03/2023	

Experiment No. 9
WAP to implement 0-1 Knapsack using Dynamic Programming.

A	13/03/2023	13/3/23	
D	15/03/2023	15/3/23	
B	16/03/2023	16/3/23	
C	17/03/2023	17/3/23	

Experiment No. 10
WAP to implement Bellman Ford Algorithm using Dynamic Programming.

A	20/03/2023	20/3/23	
D	15/03/2023	15/3/23	
B	23/03/2023	23/3/23	
C	24/03/2023	24/3/23	

Experiment No. 11
WAP to implement Floyd Warshall Algorithm using Dynamic Programming

A	20/03/2023	20/3/23	
D	15/03/2023	15/3/23	

B	23/03/2023	23/3/23	
C	24/03/2023	24/3/23	

Experiment No. 12

WAP to implement Longest Common Subsequence using Dynamic Programming

A	27/03/2023	27/3/23	
D	29/03/2023	29/3/23 online at home	
B	30/03/2023	30/03/23	
C	31/03/2023	24/3/23	

Experiment No. 13

WAP to implement N-Queen problem using back tracking approach.

A	27/03/2023	27/3/23	
D	29/03/2023	29/3/23 online at home	
B	30/03/2023	30/03/23	
C	31/03/2023	31/03/23 online at home	

Experiment No. 14

WAP to implement Sum of Subsets problem using back tracking approach.

A	03/04/2023	3/4/23	
D	05/04/2023	5/4/23	
B	06/04/2023	6/4/23	
C	07/04/2023	7/4/23 online at home	

Experiment No. 15

WAP to implement Naive String Matching and KMP String Matching algorithm.

A	10/04/2023	10/4/23	
D	12/04/2023	12/4/23	
B	13/04/2023	13/4/23	
C	07/04/2023	7/4/23 Oolim at home	

Verified by:

Programme Coordinator

Subject Expert

Evaluation Scheme

CIE Scheme

Internal Assessment: 20 (Average of two tests)

Internal Assessment Scheme

Module		Lecture Hours	No. of questions in			No. of questions in SEE
			Test 1	Test 2	Test 3*	
1	Introduction	8	01 (10 marks)	-	--	
2	Divide and Conquer Approach	6	01 (5 Marks)	-	--	
3	Greedy Method Approach	6	01 (5 Marks)	-	--	
4	Dynamic Programming Approach	9		01 (15 Marks)	--	
5	Backtracking and Branch and bound	6	-	01 (5 Marks)	--	
6	String Matching Algorithms	4	-	01 (5 Marks)	--	

Note: Four to six questions will be set in the Test paper

Verified by:	
Programme Coordinator	Subject Expert

FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING, BANDRA (WEST)

Branch : Computer Engineering

Class: SE, IV Sem

Sub: Analysis of Algorithms CSC402

Term : Jan 2023 TO May 2023

Faculty Incharge: Prajakta Dhamanskar

	Analysis of Algorithms CSC402- (C212) SE COMPS A & B	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CSC402.1	Analyze the running time and space complexity of algorithms.	3	3		1	1				1				1	1	2.36
CSC402.2	Analyze the complexity of divide and conquer strategy.	3	3	1	1	1				1				1	1	2.36
CSC402.3	Analyze the complexity of greedy strategy.	3	3	1	1	1				1				1	1	2.84
CSC402.4	Analyze the complexity of dynamic programming strategy.	3	3	1	1	1				1				1	1	2.84
CSC402.5	Analyze backtracking, branch and bound strategy.	3	3	1	1	1				1				1	1	2.84
CSC402.6	Analyze string matching techniques.	3	3		1	1				1				1	1	2.52
	TOTAL	18	18	4	6	6				6				6	6	
	CO-PO MATRIX	3	3	1	1.5	1.5				1				1	1	
	PO ATTAINMENT	2.6266	2.6266	2.72	2.626	2.626				2.626				2.626	2.626	

Kalpenas

FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING, BANDRA (WEST)

Branch : Computer Engineering

Class: SE, IV Sem

Sub: Analysis of Algorithms CSC402

Term : Jan 2023 TO May 2023

Faculty Incharge: Prajakta Dhamanskar

Target Level - CO1 Analyze the running time and space complexity of algorithms.	Weightage				No of students	Attainment (in %)	Attainment Level
UT 1 (Direct Method)							
60% of students will minimum score 60% marks	0.2			No. Of students scoring minimum 6 marks(out of 10) in Q.1 of UT1	21	29.57746	0
Assignment 1							
60% of students will minimum score 70% marks	0.2			No. Of students scoring minimum 7 marks(out of 10) in Assignment 1	50	70.52253	2
Quiz 1 (Direct Method)							
60% of students will minimum score 60% marks				No. Of students scoring minimum 6 marks(out of 10) in Quiz 1	22	30.98591	
Uni. End Semester Theory Examination							
60% of students will minimum score 60% marks	0.4			No. Of students scoring minimum 48 marks(out of 80)	58	81.69014	3
Uni. End Semester Oral Examination							
60% of students will minimum score 60% marks	0.2			No. Of students scoring minimum 15 marks(out of 25)	65	91.54929	3
(Indirect Method)				Total Students	71		
Course Exit Survey							
98% students strongly aggree and aggre	1			Total respondents of Course exit Survey: 62		98%	3
Target Level - percentages	Test	Assign	Quiz	End Sem(in percentage)			
	60 to 70	60 to 70	60 to 70	60 to 70	Low(1)		
	71-80	71-80	71-80	71-80	Moderate(2)		
	>80	>80	>80	>80	ubstantial(3)		
Attainment - Direct Method	2.2			0.2*Test1+0.2*assignment1+0.1*Quiz 1+0.25*End Sem Marks+0.25*Oral			
				2.2			
Overall Attainment	**2.36**			Overall Attainment=(0.8*Direct Method Attainment +0.2*Indirect Method Attainmer			

FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING, BANDRA (WEST)							
Branch : Computer Engineering							
Class: SE, IV Sem							
Sub: Analysis of Algorithms CSC402							
Term : Jan 2023 TO May 2023							
Faculty Incharge: Prajakta Dhamanskar							
Target Level - CO2 Analyze the complexity of divide and conquer strategy.	Weightage				No. of Students	Attainment (in %)	Level
UT 1 (Direct Method)							
60% of students will minimum score 60% marks	0.2			No. Of students scoring minimum 3 marks(out of 5) in Q.2 of UT1	22	30.985	0
Assignment 1 (Direct Method)							
60% of students will minimum score 60% marks	0.2			No. Of students scoring minimum 6 marks(out of 10) in Assignment 2	50	70.522	2
Uni. End Semester Theory Examination							
60% of students will minimum score 60% marks	0.3			No. Of students scoring minimum 48 marks(out of 80)	58	81.690	3
Uni. End Semester Oral Examination							
60% of students will minimum score 60% marks	0.3			No. Of students scoring minimum 15 marks(out of 25)	65	91.549	3
(Indirect Method)				Total Students	71		
Course Exit Survey							
98% students strongly aggree and aggre	1			Total respondents of Course exit Survey: 62		98%	3
Target Level - percentages	Test	Assign	Quiz	End Sem(in percentage)			
	60 to 70	60 to 70	60 to 70	60 to 70	Low(1)		
	71-80	71-80	71-80		Moderate(2)		
	>80	>80	>80	>80	Substantial(3)		
Attainment - Direct Method	2.2			0.2*Test1+0.2*assignment1+0.3*End Sem Marks+0.3*Oral			
				2.2			
Overall Attainment	2.36			**Overall Attainment=(0.8*Direct Method Attainment +0.2*Indirect Method Att**			

FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING, BANDRA (WEST)							
Branch : Computer Engineering							
Class: SE, IV Sem							
Sub: Analysis of Algorithms CSC402							
Term : Jan 2023 TO May 2023							
Faculty Incharge: Prajakta Dhamanskar							
Target Level - CO3 Analyze the complexity of greedy strategy.	Weigh tage				No. of Students	Attainment (in %)	Level
UT 1 (Direct Method)							
60% of students will minimum score 60% marks	0.2			No. Of students scoring minimum 3 marks(out of 5) in Q.3 of UT1	64	90.140845	3
Assignment 1 (Direct Method)							
60% of students will minimum score 60% marks	0.2			No. Of students scoring minimum 6 marks(out of 10) in Assignment 1	50	70.5225	2
Uni. End Semester Theory Examination							
60% of students will minimum score 60% marks	0.3			No. Of students scoring minimum 48 marks(out of 80)	58	81.690140	3
Uni. End Semester Oral Examination							
60% of students will minimum score 60% marks	0.3			No. Of students scoring minimum 15 marks(out of 25)	65	91.549295	3
(Indirect Method)					71		
Course Exit Survey							
98% students strongly aggree and aggree	1			Total respondents of Course exit Survey: .62		98%	3
Target Level - percentages	Test	Assign	Quiz	End Sem(in percentage)			
	60 to 70	60 to 70	60 to 70	60 to 70	Low(1)		
	71-80	71-80	71-80	71-80	Moderate(2)		
	>90	>90	>90	>90	Substantial(3)		
Attainment - Direct Method	2.8			0.2*Test1+0.2*assignment1+0.3*End Sem Marks+0.3*Oral			
				2.8			
Overall Attainment	**2.84**			**Overall Attainment=(0.8*Direct Method Attainment +0.2*Indirect Method Attainment)**			

FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING, BANDRA (WEST)

Branch : Computer Engineering

Class: SE, IV Sem

Sub: Analysis of Algorithms CSC402

Term : Jan 2023 TO May 2023

Faculty Incharge: Prajakta Dhamanskar

Target Level - CO4 Analyze the complexity of dynamic programming strategy.	Weightage				No. of Students	Attainment (in %)	Level
UT 2 (Direct Method)							
60% of students will minimum score 60% marks	0.2			No. Of students scoring minimum 6 marks(out of 10) in Q.1 of UT2	52	73.2394	2
Assignment 2 (Direct Method)							
60% of students will minimum score 70% marks	0.2			No. Of students scoring minimum 7 marks(out of 10) in Assignment 2	65	91.5492	3
Uni. End Semester Theory Examination							
60% of students will minimum score 60% marks	0.3			No. Of students scoring minimum 48 marks(out of 80)	58	81.6901	3
Uni. End Semester Oral Examination							
60% of students will minimum score 60% marks	0.3			No. Of students scoring minimum 15 marks(out of 25)	65	91.5492	3
(Indirect Method)				Total Students	71		
Course Exit Survey							
98% students strongly aggree and aggree	1			Total respondents of Course exit Survey: 62		98%	3
Target Level - percentages	Test	Assign	Quiz	End Sem(in percentage)			
	60 to 70	60 to 70	60 to 70	60 to 70	Low(1)		
	71-80	71-80	71-80	71-80	Moderate(2)		
	>80	>90	>90	>90	Substantial(3)		
Attainment - Direct Method	2.8			0.25*Test2+0.25*assignment2+0.25*End Sem Marks+0.25*Oral			
				2.8			
Overall Attainment	2.84			**Overall Attainment=(0.8*Direct Method Attainment +0.2*Indirect Method Attainment)**			

FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING, BANDRA (WEST)

Branch : Computer Engineering

Class: SE, IV Sem

Sub: Analysis of Algorithms CSC402

Term : Jan 2023 TO May 2023

Faculty Incharge: Prajakta Dhamanskar

Target Level - CO5 Analyze backtracking, branch and bound strategy.	Weightage				No. of Students	Attainment (in %)	Level
UT 2 (Direct Method)							
60% of students will minimum score 60% marks	0.2			No. Of students scoring minimum 3 marks(out of 5) in Q.2 of UT2	40	56.3380	2
Assignment 2 (Direct Method)							
60% of students will minimum score 70% marks	0.2			No. Of students scoring minimum 7 marks(out of 10) in Assignment 2	65	91.5492	3
Uni. End Semester Theory Examination							
60% of students will minimum score 60% marks	0.3			No. Of students scoring minimum 48 marks(out of 80)	58	81.6901	3
Uni. End Semester Oral Examination							
60% of students will minimum score 60% marks	0.3			No. Of students scoring minimum 15 marks(out of 25)	65	91.5492	3
(Indirect Method)				Total Students	71		
Course Exit Survey							
98% students strongly aggree and aggree	1			Total respondents of Course exit Survey: 62		98%	3
Target Level - percentages	Test	Assign	Quiz	End Sem(in percentage)			
	60 to 70	60 to 70	60 to 70	60 to 70	Low(1)		
	71-80	71-80	71-80	71-80	Moderate(2)		
	>80	>90	>90	>90	Substantial(3)		
Attainment - Direct Method	2.8			0.2*Test1+0.2*assignment1+0.3*End Sem Marks+0.3*Oral			
				2.8			
Overall Attainment	2.84			**Overall Attainment=(0.8*Direct Method Attainment +0.2*Indirect Method Attainment)**			

FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING, BANDRA (WEST)

Branch : Computer Engineering

Class: SE, IV Sem

Sub: Analysis of Algorithms CSC402

Term : Jan 2023 TO May 2023

Faculty Incharge: Prajakta Dhamanskar

Target Level - CO6 Analyze string matching techniques.	Weigh tage				No. of Students	Attain ment (in %)	Level
UT 2 (Direct Method)							
60% of students will minimum score 60% marks	0.2			No. Of students scoring minimum 3 marks(out of 5) in Q.3 of UT2	18	25.352	0
Assignment 2 (Direct Method)							
60% of students will minimum score 70% marks	0.2			No. Of students scoring minimum 7 marks(out of 10) in Assignment 2	65	91.549	3
Uni. End Semester Theory Examination							
60% of students will minimum score 60% marks	0.3			No. Of students scoring minimum 48 marks(out of 80)	58	81.690	3
Uni. End Semester Oral Examination							
60% of students will minimum score 60% marks	0.3			No. Of students scoring minimum 15 marks(out of 25)	65	91.549	3
(Indirect Method)				Total Students	71		
Course Exit Survey							
98% students strongly aggree and aggree	1			Total respondents of Course exit Survey: 62		98%	3
Target Level - percentages	Test	Assign	Quiz	End Sem(in percentage)			
	60 to 70	60 to 70	60 to 70	60 to 70	Low(1)		
	71-80	71-80	71-80	71-80	Moderate(2)		
	>80	>90	>90	>90	Substantial(3)		
Attainment - Direct Method	2.4			0.25*Test1+0.25*assignment1+0.25*End Sem Marks+0.25*Oral			
				2.4			
Overall Attainment	2.52			**Overall Attainment=(0.8*Direct Method Attainment +0.2*Indirect Method Attainment)**			

FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING, BANDRA (WEST)

Branch : Computer Engineering

Class: SE, IV Sem

Sub: Analysis of Algorithms Lab CSL401

Term : Jan 2023 TO May 2023

rge: Prajakta Dhamanskar

LO	CO Statements	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	CO Attainment	Target
CSL401.1	**Implement the algorithms using different app**	3	3	3	1	1				1				1	1	2.36	2.5
CSL401.2	**Analyze the complexities of various algorithr**	3	3	3	1	1				1				1	1	2.36	2.5
CSL401.3	**Compare the complexity of the algorithms for specific problems.**	3	3	3	1	1				1				1	1	1.96	2.5
	TOTAL	9	9	9	3	3				3				3	3		
	CO-PO MATRIX	3	3	3	1	1				1				1	1		
	PO ATTAINMENT	2.22	2.226	2.22	2.226	2.226				2.226				2.226	2.226		

FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING, BANDRA (WEST)							
Branch : Computer Engineering							
Class: SE, IV Sem							
Sub: Analysis of Algorithms CSC402							
Term : Jan 2023 TO May 2023							
Faculty Incharge: Prajakta Dhamanskar							
Target Level - LO1 Implement the algorithms using different approaches.	Weightage				**No of students**	Attainment (in %)	Attainment Level
Lab Work (Direct Method)							
60% of students will minimum score 60% marks	0.2			No. Of students scoring minimum 6 marks(out of 10) in Lab	68	95.774	3
Post Lab Questions (Direct Method)							
60% of students will minimum score 70% marks	0.2			No. Of students scoring minimum 1.4 marks(out of 2) in PostLab	36	50.704	0
Quiz 1 (Direct Method)							
60% of students will minimum score 60% marks	0.1			No. Of students scoring minimum 6 marks(out of 10) in Quiz 1, 2, 3 and 4	43.25	60.915	1
Uni. End Semester Prtactical Examination							
60% of students will minimum score 60% marks	0.5			No. Of students scoring minimum 15 marks(out of 25)	65	91.549	3
(Indirect Method)				Total Students	71		
Course Exit Survey							
98% students strongly aggree and aggre	1			Total respondents of Course exit Survey: .62		98%	3
Target Level - percentages	Lab	Postlab	Quiz	End sem Practical Exam(in percentage)			
	60 to 70	60 to 70	60 to 70	60 to 70	Low(1)		
	71-80	71-80	71-80	71-80	Moderate(2)		
	>80	>80	>80	>80	Substantial(3)		
Attainment - Direct Method	2.2			0.2*Lab+0.2*Postlab+0.1*Quiz+0.5*End Sem Practical Exam			
				2.2			
Overall Attainment	2.36			**Overall Attainment=(0.8*Direct Method Attainment +0.2*Indirect Method Attainment)**			

FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING, BANDRA (WEST)

Branch : Computer Engineering

Class: SE, IV Sem

Sub: Analysis of Algorithms CSC402

Term : Jan 2023 TO May 2023

Faculty Incharge: Prajakta Dhamanskar

Target Level - LO2 Analyze the complexities of various algorithms.	Weightage				**No of students**	Attainment (in %)	Attainment Level
Lab Work (Direct Method)							
60% of students will minimum score 60% marks	0.2			No. Of students scoring minimum 105 marks(out of 150 for 15 experiments) in Lab	68	95.774	3
Post Lab Questions (Direct Method)							
60% of students will minimum score 70% marks	0.2			No. Of students scoring minimum 1.4 marks(out of 2) in PostLab	36	50.704	0
Quiz 1 (Direct Method)							
60% of students will minimum score 60% marks	0.1			No. Of students scoring minimum 6 marks(out of 10) in Quiz 1, 2, 3 and 4	43.25	60.915	1
Uni. End Semester Prtactical Examination							
60% of students will minimum score 60% marks	0.5			No. Of students scoring minimum 15 marks(out of 25)	65	91.549	3
(Indirect Method)				Total Students	71		
Course Exit Survey							
98% students strongly aggree and aggre	1			Total respondents of Course exit Survey: .62		98%	3
Target Level - percentages	Lab	Postlab	Quiz	End sem Practical Exam(in percentage)			
	60 to 7	60 to 70	60 to 70	60 to 70	Low(1)		
	71-80	71-80	71-80	71-80	Moderate(2)		
	>80	>80	>80	>80	Substantial(3)		
Attainment - Direct Method	2.2			0.2*Lab+0.2*Postlab+0.1*Quiz+0.5*End Sem Practical Exam			
				2.2			
Overall Attainment	2.36			**Overall Attainment=(0.8*Direct Method Attainment +0.2*Indirect Method Attainment)**			

FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING, BANDRA (WEST)

Branch : Computer Engineering

Class: SE, IV Sem

Sub: Analysis of Algorithms CSC402

Term : Jan 2023 TO May 2023

Faculty Incharge: Prajakta Dhamanskar

Target Level - LO3 Compare the complexity of the algorithms for specific problems.	Weightage				**No of students**	Attainment (in %)	Attainment Level
Post Lab Questions (Direct Method)							
60% of students will minimum score 70% marks	0.3			No. Of students scoring minimum 1.4 marks(out of 2) in PostLab of Exp 4 and 5	37	52.11	0
Quiz 1 (Direct Method)							
60% of students will minimum score 60% marks	0.2			No. Of students scoring minimum 6 marks(out of 10) in Quiz 1, 2, 3 and 4	43.25	60.91	1
Uni. End Semester Prtactical Examination							
60% of students will minimum score 60% marks	0.5			No. Of students scoring minimum 15 marks(out of 25)	65	91.54	3
(Indirect Method)				Total Students	71		
Course Exit Survey							
98% students strongly aggree and aggre	1			Total respondents of Course exit Survey: .62		98%	3
Target Level - percentages	Lab	Postlab	Quiz	End sem Practical Exam(in percentage)			
	60 to 7	60 to 70	60 to 7	60 to 70	Low(1)		
	71-80	71-80	71-80	71-80	Moderate(2)		
	>80	>80	>80	>80	Substantial(3)		
Attainment - Direct Method	1.7			0.2*Lab+0.2*Postlab+0.1*Quiz+0.5*End Sem Practical Exam			
				1.7			
Overall Attainment	1.96			**Overall Attainment=(0.8*Direct Method Attainment +0.2*Indirect Method Attainment)**			

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Father Agnel Ashram, Bandstand, Bandra-west, Mumbai-50
Department of Computer Engineering
CO-PO-Attainment of Computer Deartment (2022-23)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Engineering Mathematics - I (FEC101)	2.022666667													
Engineering Physics - I (FEC102)	3													
Engineering Chemistry - I (FEC103)	2.468													
Engineering Mechanics (FEC104)	2.636666667	2.731666667	2.699333333											
Basic Electrical & Electronics Engineering (FEC105)	2.6	2.54												
Engineering Mathematics-II FEC201	2.712													
Engineering Physics-II (FEC202)	3													
Engineering Chemistry -II (FEC203)	2.73													
Engineering Graphics (FEC204)	3	3	3							3				
C-Programming FEC205										3				
BASIC WORKSHOP PRACTICE 1 & 2 [FEL105 & FEL206]	2.9		2.9		2.9	2.9			2.9					
ENGINEERING MECHANICS LAB	2.89	2.89	2.89											
ENGINEERING GRAPHICS LABS	3	3	3		3					3				
Engineering Mathematics - III (CSC301) (C205) SE Computer A (2020-2021)	3													
Discrete Structures and Graph Theory CSC302 -(C205) SE COMPS A (2020-2021)	2.63	2.63		2.63								2.63	2.63	
Data Structures CSC303- (C203) SE COMPS A	2.47	2.7	2.76						2.76		2.76	2.76	2.47	2.47
Digital Logic and Computer Architectures(CSC304)-(C206) SE COMPS A	3	3	3		3								3	
Computer Graphics(CSC305) SE COMPS A	2.78	2.78	2.62		2.62			2.44	2.44	2.44	2.44	2.44	2.78	2.44
Object Oriented Programming Methodology (CSL304) -(C202) SE COMPS A	2.426666667		2.466666667						2.466667					
Mini Project CSM 301 SE COMPS A	2.84	2.84	2.68	3	2.68		3		2.84	2.68	2.8		2.84	2.84
Engineering Mathematics III (CSC301)- (C201) SE COMPS B	3													
Discrete Structures and Graph TheoryCSC302 -(C205) SE COMPS B	3	3	3									3		
Data Structures CSC303- (C203) SE COMPS B	2.7	2.84	2.84						2.84		2.84	2.84	2.7	2.7
Digital Logic and Computer Architectures(CSC304)-(C206) SE COMPS B	3	3	3		3								3	
Computer Graphics(CSC305) SE COMPS B	2.6	2.6	2.6	2.6	2.6					2.8		2.6	2.6	
Object Oriented Programming Methodology (CSL304) -(C202) SE COMPS B	2.426666667		2.466666667						2.466667					
Mini Project CSM 301 SE COMPS B	2.84	2.84	2.68	3	2.68		3		2.84	2.68	2.8		2.84	2.84
Engineering Mathematics -4 CSC401.1	3													
Analysis of Algorithms CSC402- (C212) SE COMPS A	2.26	2.25	2.12						2.12				2.26	2.26
Database Management System CSC403 -(C213) SE COMPS A	2.7		3	2.92	2.92		3		3				3	
Operating System CSC404 SE COMPS A	2.68	2.68	2.68	2.68	2.68				2.68				2.68	2.68
MICROPROCESSOR(CSC405)SE COMPS A	2.8325	2.843333333	2.765		2.8								2.8325	2.758	2.812
Open Source Technology Lab CSL405 SE COMPS A	2.553333333	2.543333333	2.516666667		2.4736	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.553333	2.55
CSM 401 MINI Project SE COMPS A	2.65	2.65	2.8	2.8	2.9			3	2.833333			1.325	2.075	2.65	0
Engineering Mathematics IV* (CSC401)-(C211) SE COMPS B	3													
Analysis of Algorithms CSC402- (C212) SE COMPS B	2.26	2.25	2.12						2.12					2.26	2.26
Database Management System CSC403 -(C213) SE COMPS B	2.568	2.58	2.58		2.72				2.592	2.477333	2.477333	2.477333	2.568	2.546667
Operating System CSC404 SE COMPS B (Mahendra)	2.68	2.68	2.68	2.68	2.68				2.68				2.68	2.68	
MICROPROCESSOR(CSC405)SE COMPS B	2.8325	2.843333333	2.765		2.8								2.8325	2.758	2.812
Open Source Technology Lab CSL405 SE COMPS B	2.553333333	2.543333333	2.516666667		2.4736	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.553333	2.55

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CO-PO-Attainment of Computer Deartment (2022-23)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CSM 401 MINI Project SE COMPS B (2020-21)	2.65	2.65	2.8	2.8	2.9			3	2.833333		2.825	2.825	2.65	2.8
Theoretical Computer science CSC501-(C301) TE COMPS A (2021-22)	2.85	2.85	2.86	2.66						2.8		2.8	2.85	2.85
Software Enggineering CSC502 TE COMPS A	2.83	2.83	2.84		2.84					2.8		2.8	2.84	2.82
Computer Network CSC503 TE COMPS A	2.896	2.94	2.9		2.9								2.896	
Data Warehousing and Mining CSC504 TE COMPS A	3	3	3		3				3	3		3	3	3
Probabilistic Graphical Model CSDLO5011 (Department level Elective) csdl501	3	3	3										3	3
Internet Programming CSDLO5012 (Department level Elective) CSDL502	3		3		3								3	
Professional Communication and Ethics-2 CSL504 TE COMPS A						3		3	3	3				
Mini Project A CSM 501 TE COMPS A	2.333333333	2.25	3		3			3	3	3	2.625	2.666667	3	3
Theoretical Computer science CSC501-(C301) TE COMPS B	2.8	2.8	2.85	2.6						2.8		2.75	2.75	2.85
Software Enggineering CSC502 TE COMPS B	2.45	2.575	2.5	2.376	2.12				2.384	2.59	2.6	2.6	2.384	2.384
Computer Network CSC503 TE COMPS B	2.555	2.523	2.465		2.685								2.56	2.55
Data Warehousing and Mining CSC504 TE COMPS B	2.733333333	2.74	2.733333333	2.733333	2.733333							2.733333	2.733333	
Professional Communication and Ethics-2 CSL504 TE COMPS B						3		3	3	3				
Mini Project A CSM 501 TE COMPS B	2.333333333	2.25	3		3			3	3	3	2.625	2.666667	3	3
System Programmimg and Compiler construction CSC 601 TE COMPS A	2.36	2.36	2.382857143		2.2				2.36			2.36	2.2	2.2
Cryptography and System Security CSC 602 TE COMPS A	2.93	2.88	2	2.84	2.68			3	2.87	2.87		2.87	2.88	2.91
Mobile Computing CSC603 TE COMPS A	2.37	2.64	2.64		2.58				2.52	2.52	2.52	2.52	2.37	2.52
Artificial Intelligence CSC 604 TE COMPS A	2.83	2.83	2.84		2.84					2.8		2.8	2.84	2.82
Cloud Computing CSL605 TE COMPS A	2.733333333	2.733333333	2.733333333	2.733333	2.733333							2.733333	2.733333	
Quantitative Analysis CSDLO6013 TE COMPS A & B CSDL601	2.35	2.4	3	3	3									
Internet of Things CSDLO6011 TE COMPS A & B CSDL602	2.75	2.75	2.75		2.75				2.75	2.75		2.75	2.75	2.75
Mini Project 2B CSM601 TE COMPS A	3	3	3		3			3	3	3	3	2.333333	3	3
System Programmimg and Compiler construction CSC 601 TE COMPS B	2.32	2.32	2.314285714		2.36				2.32			2.32	2.36	2.36
Cryptography and System Security CSC 602 TE COMPS B	2.9	2.68	1.95	3	2.52	2.63			3				2.72	2.55
Mobile Computing CSC603 TE COMPS B	2.76	2.9	3	2	2.79				2	3	3	3	2.76	3
Artificial Intelligence CSC 604 TE COMPS B	3	3	3										3	3
Cloud Computing CSL605 TE COMPS B	3	3	3	3	3							3	3	
Mini Project 2B CSM601 TE COMPS B	3	3	3		3			3	3	3	2.2	2.33		
Machine Learning CSC 701 BE COMPS A & B (2022-23)	2.64	2.65	2.63	2.67									2.64	2.5
Big Data Analytics CSC702 BE COMPS A & B	2.46	2.02	2.47	2.47	2.46		2.48						2.46	2.68
Management Information System (MIS) ILO7013(Institute level Elective) CSILO701 BE COMPS A & B	2.512	2.512				2.5		2.5				2.512		
CSDC7013: Natural Language Processing (Department level Elective) CSDC7013 BE COMPS A & B	2.59	2.58	2.58	2.5	2.58				2.5	2.5		2.5	2.59	
CSDC7022 : Block Chain (Department level Elective) CSDC7022 BE COMPS A & B	2.41	2.39	2.18		2.29			2.08	2.41	2.41	2.18	2.39	2.41	2.1
ILO7016 : Cybersecurity and Laws (Institute level Elective) ILO7016 BE COMPS A & B	1.9975					2.03667		1.76				1.9975		1.997
Project 1 CSP701 BE COMPS A & B	3	2.84	2.84	3	2.68	2.84	2.68	3	2.96	2.968	2.68	3	2.88	2.8
Distributed Computing CSC801 BE COMPS A & B	2.74	1.74	2.74	0										

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CSDC8013 : Applied Data Science (department Level Elective) BE COMPS A	2.49	2.369444444	2.315	2.423333	2.495							2.565	2.369444	
CSDC8023: Social Media Analytics (department Level Elective)- CSDC802 BE COMPS A & B	2.46	2.45	2.47	2.4	2.42	2.4	2.4			2.4		2.42	2.4	2.4
Project Management ILO8021(Institute Level Elective)- (JM) CSILO801) BE COMPS A & B		3	3	3		3					3	3	3	3
Finance Management ILO8022(Institute Level Elective) -CSILO802 (BSD) BE COMPS A & B	2.6	2.6	2.6	2.6	2.6						2.6	2.6		
Project II CSP801-(C415) BE COMPS A & B	3	3	3	3	2.84	2.68	2.68	2.92	2.92	2.92	3	2.92	2.87	2.87
SUM of Direct PO and PSO attainment	210.8761667	169.3077778	176.5298095	76.115999	130.92386	31.7866	24.04	46.5	99.206	86.005333	57.097333	116.410166	146.47677	106.952167
Count N (Subjects Mapped to each PO)	78	63	65	29	48	12	9	17	37	31	22	44	54	41
Average of direct PO and PSO attainmnet	**2.703540598**	**2.687425044**	**2.715843223**	**2.62468962**	**2.7275805**	**2.64888**	**2.67111**	**2.7352941**	**2.681243243**	**2.774365581**	**2.595333318**	**2.64568559**	**2.7125328**	**2.60858943**
Indirect PO Attainment (graduate Exit Survey)	3	3	3	3	3	3	3	3	3	3	3	3	3	1
Alumni Exit survey	3	2	2	1	1	2	1	2	3	3	3	3	1	1
Indirect PO attainmnet (Events)	2.523809524	2.557692308	2.55	2.375	2.2	2.18181	2.33333	2.2424242	2.30902439	2.120689655	2.206896552	2.24444444	2.16	2.07142857
Average Indirect PO & PSO attainment (Graduate Exit Survey & Alumni Exit Survey & Events)	**2.841269841**	**2.519230769**	**2.516666667**	**2.125**	**2.066666**	**2.39393**	**2.11111**	**2.4141414**	**2.769674797**	**2.706896552**	**2.735632184**	**2.74814814**	**2.0533333**	**1.35714285**
Average PO Attainment (0.8*Direct+0.2*Indirect)	**2.731086447**	**2.653786189**	**2.676007912**	**2.52475169**	**2.5953977**	**2.59789**	**2.55911**	**2.6710635**	**2.698929554**	**2.760871775**	**2.623393091**	**2.66617810**	**2.5806929**	**2.35830012**
Total Subjects : 82														

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Department of Electronics and Computer Engineering

B.E. (ECS) (Semester VII)

(2022-23)

Course outcomes & Assessment Plan

Subject: *Deep Learning*

Subject code: ECC DO701

Teacher-in-charge: Prof. Dipali Koshti

Academic Term: July – October 2022

Module No.	Unit No.	Contents	Hrs.
1		**Introduction**	05
	1.1	Biological neuron, Mc-Culloch Pitts Neuron, Perceptron, Perceptron Learning, Delta learning, Multilayer Perceptron: Linearly separable, linearly non-separable classes.	
	1.2	Deep Networks: Fundamentals, Brief History, Three Classes of Deep Learning Basic Terminologies of Deep Learning	
2		**Training, Optimization and regularization of Deep Neural Network**	08
	2.1	**Training Feedforward DNN:** Multi Layered Feed Forward Neural Network, Learning Factors, Activation functions: Tanh, Logistic, Linear, Softmax, ReLU, Leaky ReLU, Loss functions: Squared Error loss, Cross Entropy, Choosing output function and loss function	
	2.2	**Optimization:** Learning with backpropagation, Learning Parameters: Gradient Descent (GD), Stochastic and Mini Batch GD, Momentum Based GD, Nesterov Accelerated GD, AdaGrad, Adam, RMSProp	
	2.3	**Regularization:** Overview of Overfitting, Types of biases, Bias Variance Tradeoff Regularization Methods: L1, L2 regularization, Parameter sharing, Dropout, Weight Decay, Batch normalization, Early stopping, Data Augmentation, Adding noise to input and output.	
3		**Convolutional Neural Networks (CNN): Supervised Learning**	08
	3.1	Convolution Operation, Motivation, Basic structure of a convolutional neural network: Padding, strides, pooling, fully connected layers, interleaving between layers	
	3.2	Training a convolutional network: Backpropagation through convolution, Backpropagation as convolution with inverted filter, convolution/ backpropagation as matrix multiplication	

		Modern Deep Learning Architectures: LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet	
4		**Recurrent Neural Networks (RNN)**	06
	4.1	Sequence Learning Problem, Unfolding Computational graphs, Recurrent Neural Network, Bidirectional RNN, Back propagation Through Time (BTT), Vanishing and Exploding Gradients, Truncated BTT	
	4.2	Long Short Term Memory: Selective Read, Selective write, Selective Forget, Gated Recurrent Unit	
5		**Autoencoders: Unsupervised Learning**	06
	5.1	Introduction, Linear Autoencoder, Undercomplete Autoencoder, Overcomplete Autoencoders, Regularization in Autoencoders	
	5.2	Denoising Autoencoders, Sparse Autoencoders, Contractive Autoencoders	
6		**Recent Trends and Applications**	06
	6.1	Generative Adversarial Network (GAN): Architecture	
	6.2	Applications: Image Compression, Brain Tumour Detection, Fraud Detection, Expression identification.	
		Total	39

Text Books:

1. Ian Goodfellow and Yoshua Bengio and Aaron Courville. Deep Learning. An MIT Press book,2016.
2. Li Deng and Dong Yu, "Deep Learning Methods and Applications", now publishers Inc (30 June 2014)
3. Satish Kumar "Neural Networks A Classroom Approach" Tata McGraw-Hill.
4. J M Zurada "Introduction to Artificial Neural Systems", Jaico Publishing House
5. M. J. Kochenderfer, Tim A. Wheeler. "Algorithms for Optimization", MIt Press.

Reference Books:

1. Jon Krohn, Grant Beyleveld, Aglae Bassens, "Deep Learning Illustrated: A Visual, Interactive
2. Guide to Artificial Intelligence", Pearson Education.
3. Buduma, N. and Locascio, N., "Fundamentals of deep learning: Designing next-generation machine intelligence algorithms" 2017. O'Reilly Media, Inc.".
4. François Chollet, "Deep Learning with Python", Manning Publications, 2018.
5. Douwe Osinga. "Deep Learning Cookbook", O'REILLY, SPD Publishers, Delhi.
6. Simon Haykin, Neural Network- A Comprehensive Foundation- Prentice Hall International, Inc.

Course Objectives:

1. To develop mathematical concepts required for Deep Learning algorithms
2. To gain an in-depth understanding of training Deep Neural Networks.
3. To acquire knowledge of advanced concepts of Convolution Neural Networks, Autoencoders and Recurrent Neural Networks
4. To get familiarised with the recent trends in Deep Learning.

Course Outcomes:

After successful completion of the course, students will be able to:

CO	Statement	Bloom's level	Targe
DO701.1	Explain the basic knowledge of Neural Networks	2	2.5
DO701.2	Explain the process of training, optimization, and Regularization of Deep Neural Networks	2	2.5
DO701.3	Design supervised models for DNN	3	2.5
DO701.4	Design unsupervised model for DNN	3	2.5
DO701.5:	Select and apply a suitable DNN model for a given application	4	2.5

CO-PO-PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO 12	PSO1	PSO2
DO701.1	3													
DO701.2	3													
DO701.3	3	3	3	1	2								3	3
DO701.4	3	3	3	1	2								3	3
DO701.5	3	3	3	3	3				3	3		2	3	3

Provide a justification of PO to CO mapping

CO	PO	PI
DO701.1	PO1	1.1.1 Apply the knowledge of discrete structures, linear algebra, statistics, and numerical techniques to solve problems. 1.3.1 Apply engineering fundamentals. 1.4.1 Apply theory and principles of Electronics and/or computer science and engineering to solve an engineering problem.
DO701.2	PO1	1.1.2 Apply the knowledge of discrete structures, linear algebra, statistics, and numerical techniques to solve problems. 1.3.1 Apply engineering fundamentals 1.4.1 Apply theory and principles of Electronics and/or computer science and engineering to solve an engineering problem.
DO701.3	PO1	1.1.1 Apply the knowledge of discrete structures, linear algebra, statistics and numerical techniques to solve problems 1.1.2 Apply the concepts of probability, statistics and queuing theory in modeling ofcomputer-based system, data and network protocols. 1.4.1 Apply theory and principles of Electronics and/or computer science and engineering
	PO2	2.1.2 Identify Electronic Systems/components, variables, and parameters to solve the problems 2.1.3 Identify processes/modules/algorithms of a computer-based system and parameters to solve the problems 2.1.4 Identify mathematical algorithmic knowledge that applies to a given problem 2.2.4 Compare and contrast alternative solutions/methods to select the best methods

	PO3	3.1.1 Define a precise problem statement with objectives and scope. 3.2.1 Explore design alternatives. 3.2.2 Produce a variety of potential design solutions suited to meet functional requirements.
	PO4	4.1.2 Examine relevant methods, tools and techniques of experiment design, system calibration, data acquisition, analysis and presentation.
	PO5	5.1.1 Identify modern engineering tools, techniques and resources for engineering activities.
	PSO1	Students design and implement supervised DNN model for real – world application. They work on real-world datasets and apply DNN models to get the desired result.
	PSO2	In order to design the supervised DNN model they need to use modern technologies like TensorFlow. Keras , PyTorch and many more.
DO701.4	**PO1**	1.1.1 Apply the knowledge of discrete structures, linear algebra, statistics and numerical techniques to solve problems 1.1.2 Apply the concepts of probability, statistics and queuing theory in modeling of computer-based system, data and network protocols. 1.4.1 Apply theory and principles of Electronics and/or computer science and
	PO2	2.1.2 Identify Electronic Systems/components, variables, and parameters to solve the problems 2.1.3 Identify processes/modules/algorithms of a computer-based system and parameters to solve the problems 2.1.4 Identify mathematical algorithmic knowledge that applies to a given problem
	PO3	3.1.1 Define a precise problem statement with objectives and scope. 3.2.1 Explore design alternatives. 3.2.2 Produce a variety of potential design solutions suited to meet functional requirements.
	PO4	4.1.2 Examine relevant methods, tools and techniques of experiment design, system calibration, data acquisition, analysis and presentation.
	PO5	5.1.1 Identify modern engineering tools, techniques and resources for engineering activities
	PSO1	Students design and implement unsupervised DNN model for real – world application. They work on real-world datasets and apply DNN models to get the desired result.
	PSO2	In order to design the unsupervised DNN model they need to use modern technologies like TensorFlow. Keras , PyTorch and many more.
DO701.5	**PO1**	1.1.3 Apply the knowledge of discrete structures, linear algebra, statistics, and numerical techniques to solve problems. 1.3.1 Apply engineering fundamentals. 1.4.1 Apply theory and principles of Electronics and/or computer science and engineering to solve an engineering problem.

PO2	2.1.1 Articulate problem statements and identifies objectives 2.1.3 Identify processes/modules/algorithms of a computer-based system and parameters to solve the problems. 2.2.2 Identify, assemble and evaluate information and resources. 2.2.3 Identify existing solution/methods to solve the problem, including forming justified approximations and assumption 2.2.4 Compare and contrast alternative solution/methods to select the best methods.
PO3	3.1.3 Review state-of-the-art literature to synthesize system requirements. 3.2.1 Explore design alternatives. 3.4.1 Refine a conceptual design into a detailed design within the existing constraints (of the resources) 3.4.2 Generate information through appropriate tests to improve or revise the design
PO4	4.3.1 Use appropriate procedures, tools and techniques to collect and analyze data 4.3.2 Critically analyze data for trends and correlations, stating possible errors and limitations 4.3.3 Represent data (in tabular and/or graphical forms) so as to facilitate analysis and explanation of the data, and drawing of conclusions
PO5	5.1.1 Identify modern engineering tools, techniques and resources for engineering activities
PO9	9.1.1 Recognize a variety of working and learning preferences; appreciate the value of diversity on a team 9.3.1 Present results as a team, with smooth integration of contributions from all individual effort 9.2.1 Demonstrate effective communication, problem-solving, conflict resolution and leadership skills.
PO10	10.1.1 Read, understand and interpret technical and non-technical information 10.3.1 Create engineering-standard figures, reports and drawings to complement writing and presentations
PO12	12.3.1 Source and comprehend technical literature and other credible sources of information
PSO1	Students select a suitable real-world problem and provide a solution to it. They select a suitable DNN model by exploring various DNN models used in literature and implement it for real – world application using new technologies.
PSO2	In order to provide a feasible real-world solution, they need to use new technologies such as Keras, Pytorch, tensorflow.

CO Assessment Tools:

Course Outcome	*Direct Method (80%)*											*Indirect Method (20%)*
	Unit Tests		Assignments			Quizzes				Case study/Technical paper	End Sem Exam	Course exit survey
	1	2	1	2	3	1	2	3	4			
DO701.1	20%	--	10%	--	--	10%	--	--		--	60%	100%
DO701.2	20%	--	--	10%		--	10%	--		--	60%	100%
DO701.3	10%	10%	--	--	10%	--	--	10%		--	60%	100%
DO701.4	--	20%	--	--	10%	--	--	10%		--	60%	100%
DO701.5	20%	--	--	--		--	--	--	10%	10%	60%	100%

CO calculation= (0.8 *Direct method + 0.2*Indirect method)

Rubrics for Assignments:

Indicator	**Not satisfactory**	**Satisfactory**	**Good**	**Excellent**
Timeline (3)	More than two sessions late (0)	More than one session late (1)	One session late (2)	On time (3)
Depth of Understanding (4)	Unsatisfactory (1)	Superficial (2)	Satisfactory (3)	Adequate (4)
Completeness (3)	Not submitted (0)	Major topics are omitted or addressed minimally (1)	Most major and some minor points are covered and are accurate (2)	All major and minor points are covered and are accurate (3)

Curriculum Gap identified: (with action plan)

Transformers have revolutionized the way we process sequence–to–sequence data. Transformers are the next-generation deep neural networks and are successors of RNN and LSTM. It is essential that students have at least basic knowledge of transformer, and how to implement transformers to to solve real-world complex sequence–to–sequence problems.

Action plan:

To bridge the gap following actions have been planned.

1) Additional practicals based on Transformers will be taken in the laboratory.
2) Case study - Review 3 technical papers on any advanced topic (not covered in the syllabus) in deep learning and present the summary of it.

Modes of content delivery

Modes of Delivery	Brief description of content delivered
Class room lecture, PPT	1. Introduction 2. Optimization and Regularization 3. Convolution Neural Networks 4. Recurrent Neural networks 5. Encoders 6. GAN
Assignments	Assignment 1: Covering the basics of neural networks Assignment 2: Covering Deep network optimization and regularization Assignment 3: Covering design of supervised and unsupervised deep networks.
Quizzes	Quiz on each module
Study of Technical papers	Covering module 6 topics: Image compression, Expression identification, fraud detection
Informative videos	CNN, LeNET, AlexNET, VGGNet
Review and present technical papers	Image compression, Expression identification, fraud detection
Case study/Mini project	Content Beyond syllabus.

Lesson Plan

DEEP LEARNING

BE Electronics and Computer Science, Semester VII					
July- October 2022					
Deep Learning (DOC701)					
	Lecture	*3*			
	Practical	-			
	Tutorial	-			
		Hours	***Marks***		
	Theory examination	3	80		
	Internal Assessment	--	20		
	Practical Examination	--	--		
	Oral Examination	--	--		
	Term work	--	--		
	Total	--	100		
	Day		***Time***		
5					

Lecture No.	Date		Topic			
	Planned	**Actual**		**Content delivery**	**Refe**	**Remarks**
			Module1 : Introduction			
1	19-7-22	19-7-22	Introduction to the course, informing course objectives and plan, Biological neuron. Mc-Culloch-Pitt Model	Classroom Teaching PPT	3,4	
2	21-7-22	21-7-22	Perceptron, perceptron learning	Classroom Teaching PPT, Lab, **Virtual Lab**	3,4,17	
3	22-7-22	22-7-22	Delta learning	Classroom Teaching PPT,	13,4	
4	26-7-22	26-7-22	Multilayer perceptron	Classroom Teaching PPT, Lab, **Virtual Lab**	3,4,17	
5	28-7-22	28-7-22	Deep Networks	Classroom Teaching PPT	1,2	Quiz1, Ass1
			Module 2: Training, Optimization and regularization of Deep Neural Network			
6	29-7-22	29-7-22	Multi Layered Feed Forward Neural Network, Learning Factors,	Classroom Teaching PPT	1,2	
7	2-8-22	3-8-22	Activation functions	Classroom Teaching PPT	1,2,3	
8	3-8-22	5-8-22	Loss Functions	Classroom Teaching PPT	1,2	
9	5-8-22	10-8-22	Learning with Backpropagation	Classroom Teaching PPT	1,2	
10	10-8-22	17-8-22	Learning parameters	Classroom Teaching PPT	1,2	
11	12-8-22	24-8-22	Overview of overfitting, types of biases, Bias – variance trade off	Classroom Teaching PPT	1,2,15	

12	17-8-22	24-8-22	Regularization: L1,L2, Parameter sharing, Drop out, weight decay	Classroom Teaching, PPT **[Youtube Video]**	1,2,5,15	
13	19-8-22	26-8-22	Batch Normalization, Data augmentation, early stopping, Adding noise to input and output	Classroom Teaching PPT	1,2,5,15	Quiz2, Ass2
Module 3: Convolutional Neural Networks						
14	23-8-22	30-8-22	Convolution Operation, Motivation,	Classroom Teaching PPT **[NPTEL Video, coursera video]**	1,2	
15	25-8-22	6-9-22	Basic structure of a convolutional neural network: Padding, strides	Classroom Teaching PPT **[NPTEL Video, coursera video]**	1,2	
16	26-8-22	7-9-22	pooling, fully connected layers, interleaving between	Classroom Teaching PPT	1,2	
17	13-08-22	13-9-22	Training a convolutional network: Backpropagation through convolution,	Classroom Teaching PPT	1,2	
18	13-08-22	13-9-22	Backpropagation as convolution with inverted filter, convolution/ backpropagation as matrix multiplication	Classroom Teaching PPT	1,2	
19	25-08-22	14-9-22	LeNet, AlexNet	Classroom Teaching PPT **[Technical paper]**	1,2	
20	26-08-22	20-9-22	ZF-Net, VGGNet,	Classroom Teaching PPT **[Technical paper]**	1,2	
21	30-8-22	20-9-22	GoogLeNet, ResNet	Classroom Teaching PPT	1,2	Quiz3
Module 4: Recurrent Neural Networks (RNN)						
22	27-08-22	21-09-22	Sequence Learning Problem, Unfolding Computational graphs	Classroom Teaching PPT	1,2	31/8 - 4/9 Midterm break
23	9-9-22	21-09-22	Recurrent Neural Network	Classroom Teaching PPT	1,2	5,6,7 Sep UT1
24	13-9-22	23-9-22	Bidirectional RNN	Classroom Teaching PPT	1,2	
25	15-9-22	24-9-22	Back propagation Through Time (BTT), Vanishing and Exploding Gradients,, Truncated BTT	Classroom Teaching PPT	1,2	
26	16-9-22	27-9-22	Long Short Term Memory: Selective Read, Selective write, Selective Forget,	Classroom Teaching PPT	1,2	
27	20-9-22	28-9-22	Long Short Term Memory (continued)	Classroom Teaching PPT	1,2	Quiz, Ass3
Module 5: Encoders						
28	22-9-22	29-9-22	Introduction, linear encoder	Classroom Teaching PPT	1,2	
29	23-9-22	30-9-22	Undercomplete encoder	Classroom Teaching PPT	1,2	
30	27-9-22	30-9-22	Overcomplete encoder	Classroom Teaching PPT	1,2	
31	29-9-22	4-10-22	Regularization in encodr	Classroom Teaching PPT	1,2	
32	30-9-22	4-10-22	Denoising encoders	Classroom Teaching PPT	1,2	
33	4-10-22	7-10-22	Sparse encoders, Contractive encoders	Classroom Teaching PPT	1,2	Quiz4
Module 6: Recent Trends and Applications						
34	7-10-22	11-10-22	Generative Adversarial network:	Classroom Teaching PPT	1,2	
35	11-10-22	11-10-22	Applications: Image compression	Classroom Teaching PPT		

36	12-10-22	12-10-22	Brain tumor detection	Classroom Teaching PPT [Technical paper]		Flip classroom
37	14-10-22	14-10-22	Identification	Classroom Teaching PPT [Technical paper]		Quiz4, flip classroom

Text Books:

1. Ian Goodfellow and Yoshua Bengio and Aaron Courville. Deep Learning. An MIT Press book,2016.
2. Li Deng and Dong Yu, "Deep Learning Methods and Applications", now publishers Inc (30 June 2014),
3. Satish Kumar "Neural Networks A Classroom Approach" Tata McGraw-Hill.
4. J M Zurada "Introduction to Artificial Neural Systems", Jaico Publishing House
5. M. J. Kochenderfer, Tim A. Wheeler. "Algorithms for Optimization", MIt Press.

Reference Books:

6. Jon Krohn, Grant Beyleveld, Aglae Bassens, "Deep Learning Illustrated: A Visual, Interactive
7. Guide to Artificial Intelligence", Pearson Education.
8. Buduma, N. and Locascio, N., "Fundamentals of deep learning: Designing next-generation machine intelligence algorithms" 2017. O'Reilly Media, Inc.".
9. François Chollet, "Deep Learning with Python", Manning Publications, 2018.
10. Douwe Osinga. "Deep Learning Cookbook", O'REILLY, SPD Publishers, Delhi.
11. Simon Haykin, Neural Network- A Comprehensive Foundation- Prentice Hall International, Inc.

Online references:

12. https://nptel.ac. https://deeplearning.cs.cmu.edu/S21/index.html
13. http://www.cse.iitm.ac.in/~miteshk/CS6910.html
14. https://nptel.ac.in/courses/106/106/106106184/
15. https://www.deeplearningbook.org/
16. http://introtodeeplearning.com/
17. http://vlabs.iitb.ac.in/vlabs-dev/labs/machine_learning/labs/index.php

Videos:

Video 1: L2 Regularization: L1 and L2 Regularization Methods, Explained | Built In

Video 2: Convolution Operation: Deep Learning(CS7015): Lec 11.1 The convolution operation - YouTube

Video 3: CNN: Deep Learning(CS7015): Lec 11.3 Convolutional Neural Networks - YouTube

Video 4: CNN: One Layer of a Convolutional Network - Foundations of Convolutional Neural Networks | Coursera

Video 5: How to calculate Neural network Parameters: https://www.youtube.com/watch?v=bikmA-VmSbY

Technical papers:

[1] Alex Krichevsky et al. "ImageNet Classification with Deep Convolutional Neural Networks ", NIPS'12: Proceedings of the 25th International Conference on Neural Information Processing Systems - Volume 1 December 2012 .

[2] Karen Simonyan et al. "VERY DEEP CONVOLUTIONAL NETWORKS FOR LARGE-SCALE IMAGE RECOGNITION", ICLR 2015,

[3] Asifullah Khan et al. ," A Survey of the Recent Architectures of Deep Convolutional Neural Networks", In Artificial Intelligence Review, DOI: https://doi.org/10.1007/s10462-020-09825-6.

Examination Scheme

Module		Lecture Hours	Marks distribution in Test (For internal assessment/TW)		Approximate Marks distribution in Sem. End Examination
			Test 1	Test 2	
1	Introduction	05	06 (CO1)	--	
2	Optimization and regularization	08	08 (CO2)	--	
3	Convolution Neural networks	08	06 (CO3)	05(CO3)	
4	Recurrent Neural networks	06	--	08 (CO4)	
5	Encoders	06	--	03 (CO5)	
6	Recent trends and Application	06	--	04 (CO5)	

Submitted By	**Approved By**	
Prof. Dipali koshti	ii) Dr. D. V. Bhoir	Sign:
Sign: Dkoshti 5/8/22	ii) Prof. K. Narayanan	Sign:
	iii) Prof. Shilpa Patil	Sign: 5/8/22
Date of Submission: 5-8-2022	**Date of Approval:** 5/8/22	
Remarks by PAC (if any)		

PracticalPlan

B.E. (ECS) (Semester VII)

Subject: ***Deep Learning Lab (Practical)***

Teacher-in-charge: Prof. Dipali Koshti

Subject code: ECL 703

Academic Term: July – October 2022

Course Outcomes:

Upon successful completion of the laboratory students will be able to:

ECL703.1 Implement basic neural network models to learn logic functions.
ECL703.2 Design and train feedforward neural networks using various learning algorithms.
ECL703.3 Build and train suitable deep learning models such as CNN, RNN, Auto-encoders, and,LSTM to solve a real-world problem.
ECL703.4: Select and implement a suitable deep learning model to solve the real-world problem and evaluate the performance of the model with respect to the bias-variance trade-off, overfitting and underfitting, and estimation of test error.

Relationship of course outcomes with program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO 12	PSO1	PSO2
ECL703.1	3	2			1									
ECL703.2	3	2	2		1									
ECL703.3	3	3	3	2	3								3	3
ECL703.4	3	3	3	3	3				3	3		3	3	3

Provide justification of PO to CO mapping

CO	BL	C	PI	PO
ECL703.1: Implement basic neural network models to learn logic functions.	2	1.1 1.3 2.1 5.1	**1.1.1** **1.3.1**	PO1
			2.1.3 **2.1.4**	PO2
			5.1.1	PO5
ECL703.2 Design and train feedforward neural networks using various learning algorithms.	3	1.1 1.3 2.1 5.1	**1.1.1** **1.3.1**	PO1
			2.1.3 **2.1.4**	PO2
			3.2.1	PO3

			5.1.1	PO5
ECL703.3 Build and train suitable deep learning models such as CNN, RNN, Auto-encoders, and, LSTM to solve a real-world problem	3	1.1 1.4 2.1 2.2 2.3 4.1 4.3 5.1	**1.1.2** **1.4.1**	PO1
			2.1.2 **2.1.4** **2.2.4** **2.3.1**	PO2
			3.2.1	PO3
			4.1.2 **4.3.1**	PO4
			5.1.1	PO5
ECL703.4: Select and implement a suitable deep learning model to solve the real-world problem and evaluate the performance of the model with respect to the bias-variance trade-off, overfitting and underfitting, and estimation of test error.	5	1.1 1.4 2.1 2.2 3.1 3.2 3.4 4.3 5.1 9.1 9.2 9.3 10.1 10.3 12.3	**1.1.1** **1.4.1**	PO1
			2.1.1 **2.1.3** **2.2.2** **2.2.3** **2.2.4**	PO2
			3.1.3 **3.2.1** **3.4.1** **3.4.2**	PO3
			4.3.1 **4.3.2**	PO4
			5.1.1	PO5
			9.1.1 **9.3.1** **9.2.1**	PO9
			10.1.1 **10.3.1**	PO10
			12.3.1	PO12

CO Assessment Tools:

Course Outcomes	*Direct Methods(80%)*						*Indirect Method (20%)*
	Attendance	Viva-voce/Post lab questions/ Demonstration	Journal Assessment based on lab performance	Mini Project	Case study/ Technical paper presentation	End Sem Practical Exam	Lab exit survey
ECL703.1	10%	20%	20%	--	--	50%	100%
ECL703.2	10%	20%	20%	--	--	50%	100%
ECL703.3	10%	20%	20%	--	--	50%	100%
ECL 703.4	10%	20%	--	20%	10%	40%	100%

CO calculation= (0.8 *Direct method + 0.2*Indirect method)

Rubrics for assessing experiments:

Sr. No	Performance Indicator	Below average	Average	Good	Excellent
1	On time Submission (2)	Not submitted(0)	Submitted after deadline (1)	Early or on time submission(2)	---
2	Test cases and output (4)	Incorrect output (1)	The expected output is verified only a for few test cases (2)	The expected output is Verified for all test cases but is not presentable (3)	Expected output is obtained for all test cases. Presentable and easy to follow (4)
3	Coding efficiency (2)	The code is not structured at all(0)	The code is structured but not efficient (1)	The code is structured and efficient. (2)	-
4	Knowledge(2)	Basic concepts not clear (0)	Understood the basic concepts (1)	Could explain the concept with suitable example (1.5)	Could relate the theory with real world application(2)

Practical Session Plan

CLASS	**BE ECS, Semester VII**
Academic Term	**July – October 2022**
Subject	**Deep Learning Laboratory (ECL 703)**

Evaluation System		*Hours*	*Marks*
	Practical Examination	--	25
	Oral Examination	--	--
	Term work	--	25
	Total	--	50

Time Table	*Day*	*Batch*	*Time*
	Monday		
	Tuesday		
	Wednesday		
	Friday		

Title of Experiments

Sr.	*Title*	*Attained*	*Attained POs*
1	Implement perceptron algorithm and simulate any one logic gate.	ECL703.1	PO1, PO2,PO5
2	Implement MLP to simulate EX-OR gate	ECL703.1	PO1, PO2,PO5
3	Implement basic Gradient Descent Algorithm for 1D objective function	ECL703.2	PO1, PO2,PO3, PO5
4	Implement the Gradient Descent Optimization with Nesterov Momentum)	ECL703.2	PO1, PO2,PO3,PO5
5	Design and implement a fully connected deep neural network with at least 2 hidden layers for a classification application. Use appropriate Learning Algorithm, output function and loss function	ECL703.3	PO1,PO2,PO3,PO4,PO5 PSO1,PSO2
6	Design and implement a CNN model for image classification	ECL703.3	PO1,PO2,PO3,PO4,PO5 PSO1,PSO2
7	Design and implement anLSTM for predicting Time series data	ECL703.	PO1,PO2,PO3,PO4,PO5 PSO1,PSO2
8	Design the architecture and implement the auto-encoder model for Image denoising.	ECL703.3	PO1,PO2,PO3,PO4,PO5 PSO1,PSO2
9	Mini project base on real world problem	ECL 703.4	1,2,3,4,5,9,10,12 PSO1,PSO2

10.	Implement word predictor using transformer **(Content Beyond Syllabus)**	ECL 703.3	PO1,PO2,PO3,PO4,PO5 PSO1,PSO2
11	To select a real-word problem and study few recent technical papers related to the problem and summarize it.	ECL 703.4	1,2,3,4,5,9,10,12 PSO1,PSO2

Practical Session Plan

Batch	*Dates*		*Remarks*
	Planned	*Actual*	
Experiment No. 1			
D	4-8-2022	4-8-2022	
Experiment No. 2			
D	11-8-2022	11-8-202	
Experiment No. 3			
D	18-8-2022	18-8-2022	
Experiment No. 4			
D	25-8-2022	25-8-2022	
Experiment No.5			
D	01-9-2022	1-09-2022	
Experiment No. 6			
D	15-9-2022	22-09-2022	
Experiment No. 7			
D	22-09-2022	29-09-2022	
Experiment No. 8			
D	29-9-2022	6-10-2022	
Experiment No. 9			
D	6-10-2022	13-10-2022	
Experiment 10			
D	13-10-2022	20-10-2022	

Submitted By	**Approved By**	
Prof. Dipali Koshti	ii) Dr. D. V Bhoir	Sign:
Sign: dkoshti 5/8/22	ii) Prof. K. Narayanan	Sign:
	iii) Prof. Shilpa Patil	Sign: 5/8/22
Date of Submission: 5-8-2022	**Date of Approval:** 5-8-22	
Remarks by PAC (if any)		

FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRONICS AND COMPUTER SCIENCE

Branch/Semester: ECS/VII
Course: Deep Learning Lab (ECL703)

Academic Year: 2022-23

CO ATTAINMENT

CO No.	Course Outcome	Attainment
ECL703.1	Implement basic neural network models to learn logic functions	2.76
ECL703.2	Design and train feedforward neural networks using various learning algorithms	2.76
ECL703.3	Build and train suitable deep learning models such as CNN, RNN, Auto-encoders, and, LSTM to solve a real-world problem	2.6
ECL703.4	Select and implement a suitable deep learning model to solve the real-world problem and evaluate the performance of the model with respect to the bias-variance trade-off, overfitting and underfitting, and estimation of test error	2.92

S. J. Patil

Shilpa Patil

FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRONICS AND COMPUTER SCIENCE

Branch/Semester: ECS/VII
Course: Deep Learning Lab (ECL703)

Academic Year: 2022-23

PO ATTAINMENT

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	CO attainment
ECL703.1	3	2			1										**2.76**
ECL703.2	3	2	2		1										**2.76**
ECL703.3	3	3	3	2	3								3	3	**2.6**
ECL703.4	3	3	3	3	3				3	3		3	3	3	**2.92**
CO To PO	12	10	8	5	8				3	3		3	6	6	
CO-PO Matrix	3	2.5	2.66	2.5	2				3	3		3	3	3	
PO Attainment	**2.76**	**2.76**	**2.76**	**2.79**	**2.76**				**2.92**	**2.93**		**2.92**	**2.76**	**2.76**	

S. J. Patil

FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRONICS AND COMPUTER SCIENCE

Branch/Semester: ECS/VII
Course: Deep Learning (ECCDO701)

Academic Year: 2022-23

CO1 Attainment

ECCDO701.1:Explain the basic knowledge of Neural Networks

Direct Methods	Weightage	Successful students		Total No. Stud	Per(%)	Level	Attainment
Test	0.2	No. of students score >= 3.6/6 in Test1 =	17	17	100.00	3	0.6
60% of students will minimum score 60% marks							
Quiz	0.1	No. of students score >= 7/10 in Quiz1 =	15	17	88.24	3	0.3
60% of students will minimum score 70% marks							
Assignment	0.1	No. of students score >=7 /10 in Ass1 =	17	17	100.00	3	0.3
70% students will minimum score 70% marks							
End semester Examination(TH)	0.3	No. of students score >= 48/80	12	17	70.59	2	0.6
60% of Students with minimum score 60% marks							
End semester Examination(ORAL)	0.3	No. of students score >=17.5 /25 =	14	17	82.35	3	0.9
60% of Students with minimum score 70% marks							
Indirect Method						sum	2.7
Course Exit Survey	1	No. of students agree or strongly agree =	13	13	1.00	3	3
75% students strongly agree and agree		No.of Respondents = 13					

Co Attainment = 2.76

Levels	Test	Assignment	Quiz	End sem exam(TH)	End sem exam(PR)	Survey
1 (Low)	60-70	70-80	60-70	60-70	60-70	75-80
2 (Medium)	71-80	81-90	71-80	71-80	71-80	81-85
3 (High)	80 above	90 above	80 above	81 above	81 above	86 above

S.J Patil

FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRONICS AND COMPUTER SCIENCE

Branch/Semester: ECS/VII
Course: Deep Learning (ECCDO701)

Academic Year: 2022-23

CO2 Attainment

ECCDO701.2: ***explain the process of training, optimization and regularization of Deep neural networks***

Direct Methods	Weightage	Successful students		Total No. Stud	Per(%)	Level	Attainment
Test	0.2	No. of students score >= 4.8/8 in Test1 =	13	17	76.47	2	0.4
60% of students will minimum score 60% marks							
Quiz	0.1	No. of students score >= 10.5/15 in Quiz2 =	11	17	64.71	1	0.1
60% of students will minimum score 70% marks							
Assignment	0.1	No. of students score >=7 /10 in Assignment2 =	17	17	100.00	3	0.3
70% students will minimum score 70% marks							
End semester Examination(TH)	0.3	No. of students score >= 48/80	12	17	70.59	2	0.6
60% of Students with minimum score 60% marks							
End semester Examination(ORAL)	0.3	No. of students score >=17.5 /25 =	14	17	82.35	3	0.9
60% of Students with minimum score 70% marks							
Indirect Method						sum	2.3
Course Exit Survey	1	No. of students agree or strongly agree =	13	13	1.00	3	3
75% students strongly agree and agree		No.of Respondents = 13					

CO Attainment=2.44

Levels	Test	Assignment	Quiz	End sem exam(TH)	End sem exam(PR)	Survey
1 (Low)	60-70	70-80	60-70	60-70	60-70	75-80
2 (Medium)	71-80	81-90	71-80	71-80	71-80	81-85
3 (High)	80 above	90 above	80 above	81 above	81 above	86 above

S. J. Patil

FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRONICS AND COMPUTER SCIENCE

Branch/Semester: ECS/VII
Course: Deep Learning (ECCDO701) **Academic Year: 2022-23**

CO3 Attainment

ECCDO701.3: ***Design supervised models for DNN***

Direct Methods	Weightage	Successful students		Total No. Stud	Per(%)	Level	Attain
Test	0.2	No. of students score >= 6/10 in Test1 (Q3) and test2 (Q1)=	12	17	70.59	2	0.4
60% of students will minimum score 60% marks							
Quiz	0.1	No. of students score >= 7/10 in Quiz3 (Section 1)=	14	17	82.35	3	0.3
60% of students will minimum score 70% marks							
Assignment	0.1	No. of students score >=7 /10 in Assignment3 (Part 1) =	17	17	100.00	3	0.3
70% students will minimum score 70% marks							
End semester Examination(TH)	0.3	No. of students score >= 48/80	12	17	70.59	2	0.6
60% of Students with minimum score 60% marks							
End semester Examination(ORAL)	0.3	No. of students score >=17.5 /25 =	14	17	82.35	3	0.9
60% of Students with minimum score 70% marks							
Indirect Method						sum	2.5
Course Exit Survey	1	No. of students agree or strongly agree =	13	13	1.00	3	3
75% students strongly agree and agree		No.of Respondents = 13					

CO Attainment = 2.6

Levels	Test	Assignment	Quiz	End sem exam(TH)	End sem exam(PR)	Survey
1 (Low)	60-70	70-80	60-70	60-70	60-70	75-80
2 (Medium)	71-80	81-90	71-80	71-80	71-80	81-85
3 (High)	80 above	90 above	80 above	81 above	81 above	86 above

S J. Patil

FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRONICS AND COMPUTER SCIENCE

Branch/Semester: ECS/VII
Course: Deep Learning (ECCDO701) **CO4 Attainment** **Academic Year: 2022-23**

ECCDO701.4: ***Design unsupervised models for DNN***

Direct Methods	Weightage	Successful students		Total No. Stud	Per(%)	Level	Attain
Test	0.2	No. of students score >= 4.8/8 in Test2 (Q2) and test2 (Q1)=	12	17	70.59	2	0.4
60% of students will minimum score 60% marks							
Quiz	0.1	No. of students score >= 7/10 in Quiz3 (Section - 2)=	14	17	82.35	3	0.3
60% of students will minimum score 70% marks							
Assignment	0.1	No. of students score >=7 /10 in Assignment3 (part-2)	17	17	100.00	3	0.3
70% students will minimum score 70% marks							
End semester Examination(TH)	0.3	No. of students score >= 48/80	12	17	70.59	2	0.6
60% of Students with minimum score 60% marks							
End semester Examination(ORAL)	0.3	No. of students score >=17.5 /25 =	14	17	82.35	3	0.9
60% of Students with minimum score 70% marks							
Indirect Method						sum	2.5
Course Exit Survey	1	No. of students agree or strongly agree =	13	13	1.00	3	3
75% students strongly agree and agree		No.of Respondents = 13					

CO Attainment = 2.6

Levels	Test	Assignment	Quiz	End sem exam(TH)	End sem exam(PR)	Survey
1 (Low)	60-70	70-80	60-70	60-70	60-70	75-80
2 (Medium)	71-80	81-90	71-80	71-80	71-80	81-85
3 (High)	80 above	90 above	80 above	81 above	81 above	86 above

S. J. Patil

FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRONICS AND COMPUTER SCIENCE

Branch/Semester: ECS/VII
Course: Deep Learning (ECCDO701)

CO5 Attainment

Academic Year: 2022-23

ECCDO701.4: Select and apply a suitable DNN model for a given application

Direct Methods	Weightage	Successful students		Total No. Stud	Per(%)	Level	Attain
Test	0.2	No. of students score >= 4.8/8 in Test2 (Q2) and test2 (Q1)=	11	17	64.71	1	0.2
60% of students will minimum score 60% marks							
Quiz	0.1	No. of students score >= 7/10 in Quiz 4 =	15	17	88.24	3	0.3
60% of students will minimum score 70% marks							
Technical paper presenatation	0.1	No. of students score >=7 /10 in Assignment3 (part-2)	16	17	94.12	3	0.3
70% students will minimum score 70% marks							
End semester Examination(TH)	0.3	No. of students score >= 48/80	12	17	70.59	2	0.6
60% of Students with minimum score 60% marks							
End semester Examination(ORAL)	0.3	No. of students score >=17.5 /25 =	14	17	82.35	3	0.9
60% of Students with minimum score 70% marks							
Indirect Method						sum	2.3
Course Exit Survey	1	No. of students agree or strongly agree =	13	13	1.00	3	3
75% students strongly agree and agree		No.of Respondents = 13					

CO Attainment= 2.44

Levels	Test	Assignment	Quiz	End sem exam(TH)	End sem exam(PR)	Survey
1 (Low)	60-70	70-80	60-70	60-70	60-70	75-80
2 (Medium)	71-80	81-90	71-80	71-80	71-80	81-85
3 (High)	80 above	90 above	80 above	81 above	81 above	86 above

S-J Patil

FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRONICS AND COMPUTER SCIENCE

Branch/Semester: ECS/VII
Course: Deep Learning (ECCDO701)

Academic Year: 2022-23

CO ATTAINMENT

CO No.	Course Outcome	Attainment
ECCDO701.1	Explain the basic knowledge of Neural Networks	2.76
ECCDO701.2	Explain the process of training, optimization, and Regularization of Deep Neural Networks	2.44
ECCDO701.3	Design supervised models for DNN	2.6
ECCDO701.4	Design unsupervised model for DNN	2.6
ECCDO701.5	Select and apply a suitable DNN model for a given application	2.44

S. J. Patil

FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRONICS AND COMPUTER SCIENCE

Branch/Semester: ECS/VII
Course: Deep Learning (ECCDO701)

Academic Year: 2022-23

PO ATTAINMENT

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	CO attainment
ECCDO701.1	3														2.76
ECCDO701.2	3														2.44
ECCDO701.3	3	3	3	1	2								3	3	2.6
ECCDO701.4	3	3	3	1	2								3	3	2.6
ECCDO701.5	3	3	3	3	3				3	3		2	3	3	2.44
CO To PO	12	9	9	5	7				3	3		2	9	9	
CO-PO Matrix	2.4	3	3	1.7	2.3				3	3		2	3	3	
PO Attainment	**2.57**	**2.55**	**2.55**	**2.48**	**2.50**				**2.44**	**2.44**		**2.44**	**2.55**	**2.55**	

S. J. Patil

FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRONICS AND COMPUTER SCIENCE

Branch/Semester: ECS/VII
Course: Deep Learning Lab (ECL703)

Academic Year: 2022-23

Lab outcome1 Attainment

ECL703.1: Implement basic neural network models to learn logic functions

Direct Methods	Weightage	Successful students		Total No. Stud	Per(%)	Level	Attainment
Attendance	0.1	Attendance >=7/10	17	14	0.82	2	0.2
70% of students will minimum score 70% marks							
Viva Voce/Post Lab questions	0.2	No. of students score >= 6/10	15	13	0.87	3	0.6
60% of students will minimum score 60% marks							
Lab Performance	0.2	No. of students score >= 14/20 in exp 1,2	17	15	0.88	2	0.4
70% students will minimum score 70% marks							
End semester PR Examination	0.5	No. of students score >=17.5 /25 =	14	17	82.35	3	1.5
60% of Students with minimum score 60% marks							
Indirect Method						sum	2.7
LAB Exit Survey	1	No. of students agree or strongly agree =	13	13	1.00	3	3
75% students strongly agree and agree		No.of Respondents = 13					

CO Attainment = 2.76

Levels	Attendance	Lab Performance	Viva voce	End sem exam(TH)	Survey
1 (Low)	70-80	70-80	60-70	60-70	75-80
2 (Medium)	81-90	81-90	71-80	71-80	81-85
3 (High)	90 above	90 above	80 above	81 above	86 above

FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRONICS AND COMPUTER SCIENCE

S. H. Patil

Branch/Semester: ECS/VII
Course: Deep Learning Lab (ECL703)

Academic Year: 2022-23

Lab outcome2 Attainment

ECL703.2 :Design and train feedforward neural networks using various learning algorithms

Direct Methods	Weightage	Successful students		Total No. Stud	Per(%)	Level	Attainment
Attendance	0.1	Attendance >=7/10	17	14	0.82	2	0.2
70% of students will minimum score 70% marks							
Viva Voce/Post Lab questions	0.2	No. of students score >= 6/10	15	11	0.73	2	0.4
60% of students will minimum score 60% marks							
Lab Performance	0.2	No. of students score >= 14/20 in exp 3,4	17	16	0.94	3	0.6
70% students will minimum score 70% marks							
End semester PR Examination	0.5	No. of students score >=17.5 /25 =	14	17	82.35	3	1.5
60% of Students with minimum score 60% marks							
Indirect Method							
LAB Exit Survey	1	No. of students agree or strongly agree =	13	13	1.00	sum	2.7
75% students strongly agree and agree		No.of Respondents = 13				3	3

CO Attainment = 2.76

Levels	Attendance	Lab Performance	Viva voce	End sem exam(TH)	Survey
1 (Low)	70-80	70-80	60-70	60-70	75-80
2 (Medium)	81-90	81-90	71-80	71-80	81-85
3 (High)	90 above	90 above	80 above	81 above	86 above

FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRONICS AND COMPUTER SCIENCE

S. J. Patil

Branch/Semester: ECS/VII
Course: Deep Learning Lab (ECL703)

Academic Year: 2022-23

Lab outcome3 Attainment

ECL703.3 Build and train suitable deep learning models such as CNN, RNN, Auto-encoders, and, LSTM to solve a real-world problem

Direct Methods	Weightage	Successful students		Total No. Stud	Per(%)	Level	Attainment
Attendance	0.1	Attendance >=7/10	17	14	0.82	2	0.2
70% of students will minimum score 70% marks							
Viva Voce/Post Lab questions	0.2	No. of students score >= 6/10	15	12	0.80	3	0.6
60% of students will minimum score 60% marks							
Lab Performance	0.2	No. of students score >= 35/50 in exp 5,6,7,8,10	17	11	0.65	1	0.2
70% students will minimum score 70% marks							
End semester PR Examination	0.5	No. of students score >=17.5 /25 =	14	17	82.35	3	1.5
60% of Students with minimum score 60% marks							
Indirect Method						sum	2.5
LAB Exit Survey	1	No. of students agree or strongly agree =	13	13	1.00	3	3
75% students strongly agree and agree		No.of Respondents = 13					

CO Attainment = 2.6

Levels	Attendance	Lab Performance	Viva voce	End sem exam(TH)	Survey
1 (Low)	70-80	70-80	60-70	60-70	75-80
2 (Medium)	81-90	81-90	71-80	71-80	81-85
3 (High)	90 above	90 above	80 above	81 above	86 above

FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRONICS AND COMPUTER SCIENCE

Branch/Semester: ECS/VII

S. J. Patil

Course: **Deep Learning (ECCDO701)**

Academic Year: 2022-23

Lab outcome4 Attainment

ECL703.4: Select and implement a suitable deep learning model to solve the real-world problem

Direct Methods	Weightage	Successful students		Total No. Stud	Per(%)	Level	Attainment
Attendance	0.1	Attendance >=7/10	17	14	0.82	2	0.2
70% of students will minimum score 70% marks							
Viva Voce/Post Lab questions	0.2	No. of students score >= 6/10	15	13	0.87	3	0.6
60% of students will minimum score 60% marks							
Mini Project	0.1	No. of students score >=7 /10 in Ass1 =	17	16	0.94	3	0.3
70% students will minimum score 70% marks							
Case Study	0.1		17	16	0.94	3	0.3
70% students will minimum score 70% marks							
End semester PR Examination	0.5	No. of students score >=17.5 /25 =	14	17	82.35	3	1.5
60% of Students with minimum score 60% marks							
Indirect Method						sum	2.9
LAB Exit Survey	1	No. of students agree or strongly agree =	13	13	1.00	3	3
75% students strongly agree and agree		No.of Respondents = 13					

CO Attainment = 2.6

Levels	Attendance	Lab Performance	Viva voce	End sem exam(TH)	Survey
1 (Low)	70-80	70-80	60-70	60-70	75-80
2 (Medium)	81-90	81-90	71-80	71-80	81-85
3 (High)	90 above	90 above	80 above	81 above	86 above

S. J. Patil

					ECS BatchWISE Attainment 2022-23 BATCH											
	COURSE ID	Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	Applied Mathematics-I	FEC101	2.744													
	Applied Physics-I	FEC102	2.893													
	Applied Chemistry-I	FEC103	2.444													
2019-20	Engineeering Mechanics	FEC104	2.6793	2.67	2.721333333											
	Basic Electrical Engineering	FEC105	2.58	2.52												
	Basic Workshop practices I	FEL105	2.9		2.9		2.9	2.9			2.9					
	Applied Mathematics-II	FEC201	2.624													
	Applied Physics-II	FEC202	3													
	Applied Chemistry-II	FEC203	2.258666667													
	Engineering Graphics	FEC204	2.41													
	C programming	FEC205	2.436	2.44	2.44											
	Professional Communication	FEC206	2.42	2.3		2.4						3				
	Basic Workshop practices II	FEL206	2.9		2.9		2.9	2.9			2.9					
	Applied Mathematics-III	ECC301	2.5													
	Electronic Devices	ECC302	3	2.66	2	3	2									
	Digital Electronics	ECC303	2.76	2.66	2	3	3								2	2
	Data Structures and Algorithms	ECC304	3	2.66	3	3	2									
	Database Management Systems	ECC 305	2		3	3	3		2		3				3	
2020-21	Object Orineted Programming with C++ and Java	ECL305	2	2	3		3				2	2	3		1.6	2.4
	Database Management Systems	ECL306	2.46	1.6	2.55		2.56				1.6	1.6	2.4			
	MINI PROJECT 1A	ECM301	3	3	2	-	2	3	3	2	3	3	2	3	2.56	2.8
	AM-IV	ECC401	2.17													
	Electronic Circuits,	ECC402														
	Controls and Instrumentation	ECC403	3	3	-	0	0	0	0	0	0	0	0	0	-	-
	Microprocessors and Microcontrollers	ECC404	3		2		2									
	Discrete structures and Automata Theory	ECC405	2.46	1.6	2.55		2.56									
	Skill-based Lab Course: Python programming	ECL405														
	Mini-project -1 B	ECM401	3	3	2	2	2	3	3	2	3	3	2	3		
	Communication Engineering	ECC501	2.6	2.6		2.6										
	Computer Organization and Architecture	ECC502	2.5	2.5	2.5	2.5								1.98		
	Software Engineering	ECC503	2.5	1.98	2.6				2.6				2.6	2.6		

	Web Technologies	**ECC504**	2.96		3		2.92				2.97				3	
	ECC DO501	**Software Testing and**	2.84	2.94	3		3						3			2.96
2021-22	**ECC DO 504**	**Sensors and Application**	2.9	3		3	2.76								3	2.76
	ECL504	**Professional**										3				
	ECM501	**Mini project**	2.85	2.75	2.7		2.75	2.8	2.75	2.7	2.8	2.8	0	2.8	2.85	2.73
	ECC 601	**Embedded**		2.46	2.48	2.6	2.5	2.4	2.5	2.5					2.53	2.6
	ECC 602	**Artificial**	2.58	2.58	2.49	2.54		2.6								2.58
	ECC 603	**Computer**	2.7	2.84	2.84										2.84	
	ECC 604	**Data**	2.7	2.84	2.84		2.54				3	3	3	3	2.84	2.54
	ECC DO601	**. Machine**	2.44	2.52	2.18		2.48								1.3	
	ECL 604	**Skill-based**	3	3		2.98	2.98				3				2.92	
	ECM601	**Mini Project**	2.9	2.75	2.8		2.75	2.8	2.75	2.8	2.78	2.8		2.75	2.9	2.78
	VLSI Design	**ECC701**	2.8	2.8	1.8		1.8								0.8	1.8
	Internet of Things	**ECC702**	2.79	2.54	2.57		2.56	2.6	2.6	2.6			2.6		2.6	2.6
	Deep Learning	**ECCDO701**	2.57	2.55	2.55	2.48	2.5				2.44	2.44		2.44	2.55	2.55
	Big data Analytics	**ECC DO701(3)**	2.229333333	2.210666667		2.32	2.04									
	Blockchain technology	**ECCDO702(4)**	2.24	2.28			2.36				2.28				2.333333333	
	Cloud Computing	**ECCDO702**	3	3	3	3	3	3	3					3		
2022-23	**Management Information System**	**ECCIO701**			3			3	3	3	3	3	3	3		
	VLSI Design Lab	**ECL701**	2.8	2.8	2.8	2.8									2.8	2.8
	Internet of Things Lab	**ECL702**			2.7		2.7								2.8	2.7
	Deep Learning Lab	**ECL703**	2.76	2.76	2.76	2.79	2.76				2.92	2.93		2.92	2.76	2.76
	BIG Data Analytics Lab	**ECL703(3)**	2.16	2.146666667		2.12	2.16								2.2	
	Major Project - I	**ECP701**	3	2.856	2.76	2.84	2.84	3	2.84	3	2.92	2.904	2.84	2.68	2.84	2.88
	Robotics	**ECC801**	2.925	2.8375	2.9025	2.833										
	Natural Language Processing	**ECCDO801**	2.872	2.808	2.68	2.60533										
	System Security	**ECCDO802**	2.28	2.36	2.4					2.32						2.28
	Project Management	**ECCIO801**		3	3	3		3					3	3		
	Robotics Laboratory	**ECL801**	3	3	3	3	3									
	Natural Language Processing lab	**ECL802**	2.95	2.94	2.92	5.84	2.93				2.92	2.92		2.92	2.92	2.92
	Major Project - II	**ECP801**	3	3	3	3	2.2	2.36	2.36	3	3	3	3	2.52	2.744	2.65
DIRECT ATTAINMENT	**SUM of Direct PO and PSO attainment**		147.4853	112.7588333	108.3338333	71.2483	87.45	39.36	32.4	25.92	52.43	41.394	32.44	41.61	60.68733333	52.09
	Count N (Subjects Mapped to each PO)		55	43	42	27	35	15	13	11	20	16	14	16	25	21
	Average of direct PO and PSO attainmnet		**2.681550909**	**2.62229845**	**2.579376984**	**2.63883**	**2.49857**	**2.624**	**2.49231**	**2.35636**	**2.6215**	**2.58713**	**2.31714**	**2.60063**	**2.427493333**	**2.48048**
INDIRECT ATTAINMENT	**Indirect PO Attainment (graduate Exit Survey)**		3	3	2	2	3	3	3	3	2	3	3	3		
	Alumni Exit survey															
	Indirect PO attainmnet (Events)		2.523809524	2.557692308	2.55	2.375	2.2	2.18182	2.33333	2.24242	2.30902	2.12069	2.2069	2.24444	2.16	2.07143

	Average Indirect PO & PSO attainment (Graduate Exit Survey & Alumni Exit Survey & Events)		2.761904762	2.778846154	2.275	2.1875	2.6	2.59091	2.66667	2.62121	2.15451	2.56034	2.60345	2.62222	2.16	2.07143
	Average PO Attainment (0.8*Direct+0.2*Indirect)		**2.69762168**	**2.65360799**	**2.518501587**	**2.54856**	**2.51886**	**2.61738**	**2.52718**	**2.40933**	**2.5281**	**2.58177**	**2.3744**	**2.60494**	**2.373994667**	**2.39867**
	Total Subjects : 82															

FR. Conceicao Rodrigues College Of Engineering

Father Agnel Ashram, Bandstand, Bandra-west,
Mumbai-50

Department of Production Engineering

B.E. (Production) (semester VII) (2022-2023)

Lecture Plan

Subject: Product Design and Industrial Marketing (PEDLO8011)

Credits -03

1. Syllabus.

Module	Contents	Hrs.
01	1.1. **Introduction:** Definition of product design, Classification of products, Design by evolution, Design by innovation, Product Mix, Various phases in product development and Design, Morphology of Design, Considerations in product design, Product specifications. 1.2. **Conceptual Design**: Market research, Generation , Selection and Embodiment of concept, Product Architecture, Customer centric product designing 1.3. **Creativity:** Role of creativity in problem solving, Vertical and lateral thinking, Brain storming, Synectics, Group working dynamics, Adaptation to changing scenarios in economics, social, cultural and technological fronts, Anticipation of new needs and aspirations. 1.4. **Materials:** Overview of materials including new generation materials, Tailor made material concepts, Material selection process.	06
02	2.1. **Design for manufacturing (DFM):** Guidelines and Methodology, Producibility requirements, Accuracy and Precision requirements, Strength considerations in Design: Criteria and objectives, Designing for uniform strength, Designing for stiffness and rigidity, Practical ideas for material saving in design - ribs, corrugations, rim shapes, bosses, laminates, etc. 2.2. **Design for forged and Cast components**, Design for Sheet Metal processed components, powder metallurgical components, Expanded metals and wire forms	12

	2.3. **Designing with plastics:** Mechanical behavior, special characteristics and considerations, Design concepts for product features to be manufactured by various production process technologies, Special considerations for designing of components for load bearing applications, 2.4. **Other DFX Principles** : Designs for Maintainability, Safety, Reliability, Sustainable Design 2.5. **Design for Assembly (DFA):** DFA Index, Analysis of assembly requirements, Standardization, Ease of Assembly and disassembly, Design for bolted, welded and riveted components, Design for hinge and snap fit assemblies, maintenance, consideration of handling and safety, Modular concepts.	
03	3.1. **Product Ergonomics:** Anthropometry, Environmental conditions, thermal, noise, vibration, displays, illusions, Psycho and psychological aspects in design, Man-machine information exchange. 3.2. **Product Aesthetics**: Visual awareness, Form elements in context of product design, Concepts of size, shape and texture, Introduction to colour and colour as an element in design, Colour classifications and dimensions of colour, Colour combinations and colour dynamics, Interaction / communication of colours, Psychological aspects of colours, generation of products forms with analogies from nature. 3.3. **Product Graphics**: Graphics composition and layout, Use of grids in graphics composition, Study of product graphics and textures.	**06**
04	4.1. **Value Engineering:** Product value and its importance, Value analysis job plan, Steps to problem solving and value analysis, Value analysis tests, Value Engineering idea generation check list, Material and process selection in value engineering, Cost reduction, case studies and exercises. 4.2. **Software solutions**: Software for drafting, modeling, assembly, detailing, CAM interfacing, Rapid tooling/rapid prototyping, etc. 4.3. **Modern Applications**: Concurrent Engineering, Robust Design, Additive Manufacturing/Rapid Prototyping, Product Life Cycle Management techniques and application areas.	**08**
05	Introduction to Industrial Marketing, Understanding Industrial Markets, Nature of Industrial Buying, Industrial Market Segmentation, New Products and Established product strategies, Resource based and Value based strategy, Industrial Pricing: Price Determinants, Pricing Policies, Pricing Decisions, Pricing - Value based and Competition based.	**08**
06	6.1. **Industrial Marketing Channels**: Channel participants, Channel effectiveness, Marketing logistics, Physical Distribution and Marketing Strategy, Value added market channels 6.2. Industrial Marketing Communication, Advertising, Sales promotion, Publicity Media Plan, Integrated Promotion Plan, Industrial Sales force Management, Technical Support for Marketing – customer technical services and feedback.	**08**

2. CO Statements.

Learner will be able to

PEDLO8011.1. Design and develop products right from the conceptual level.

PEDLO8011.2. Demonstrate concept of computer aided product design approach.

PEDLO8011.3. Illustrate various modern approaches like concurrent engineering, product life cycle management, robust design, rapid prototyping / rapid tooling.

PEDLO8011.4. Analyze products based on ergonomics and aesthetic aspects.

PEDLO8011.5. Apply appropriate strategies in industrial marketing.

PEDLO8011.6. Demonstrate various aspects related to Industrial Marketing Communication, Advertising, Sales promotion, Publicity Media Plan.

3. CO-PO-PSO Mapping.

CO# / PO#	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
PEDLO8011.1	3	3	3	-	-	-	-	-	-	-	-	-
PEDLO8011.2	3	3	3	-	-	-	-	-	-	-	-	-
PEDLO8011.3	3	3	3	-	2	-	-	-	-	-	-	-
PEDLO8011.4	3	3	3	-	-	-	-	-	-	-	-	-
PEDLO8011.5	3	3	3	-	-	-	-	-	-	-	-	-
PEDLO8011.6	3	3	3	-	-	-	-	-	-	-	-	-

CO# / PSO#	PSO1	PSO2
PEDLO8011.1	3	-
PEDLO8011.2	3	-
PEDLO8011.3	3	2
PEDLO8011.4	3	-
PEDLO8011.5	3	-
PEDLO8011.6	3	-

4. CO Assessment tools with target.

	Target for Assessment Tools		
	Unit Test	**End Semester Exam**	**Course Exit Survey**
PEDLO8011.1	60%	60%	70%
PEDLO8011.2	-	60%	70%
PEDLO8011.3	60%	60%	70%
PEDLO8011.4	-	60%	70%
PEDLO8011.5	60%	60%	70%
PEDLO8011.6	60%	60%	70%

5. Curriculum Gap/Content beyond syllabus (if any).

DOE and ANOVA, RSM, Industry 4.0

6. Lecture/Lab/Mini Project/Assignment Plan.

Week	**Duration (Hrs.)**	**Topic**	**Module**
1 (18.07.22 - 24.07.22)	3	**Introduction:** Definition of product design, Classification of products, Design by evolution, Design by innovation, Product Mix, Various phases in product development and Design, Morphology of Design, Considerations in product design, Product specifications.	
2 (25.07.22 - 31.07.22)	3	1.2. **Conceptual Design**: Market research, Generation , Selection and Embodiment of concept,	1
3 (1.08.22 - 7.08.22)	3	Product Architecture, Customer centric product designing **Materials:** Overview of materials including new generation materials, Tailor made material concepts, Material selection process	1

4 (8.08.22 - 14.08.22)	3	**Design for manufacturing (DFM):** Guidelines and Methodology, Producibility requirements, Accuracy and Precision requirements, Strength considerations in Design: Criteria and objectives, Designing for uniform strength, Designing for stiffness and rigidity, Practical ideas for material saving in design - ribs, corrugations, rim shapes, bosses, laminates, etc. 2.5. **Design for Assembly (DFA):** DFA Index, Analysis of assembly requirements, Standardization, Ease of Assembly and disassembly	1
5 (15.08.22 - 21.08.22)	3	Design for bolted, welded and riveted components, Design for hinge and snap fit assemblies, maintenance, consideration of handling and safety, Modular concepts. 2.2. **Design for forged and Cast components**, Design for Sheet Metal processed components, powder metallurgical components, Expanded metals and wire forms **2.4 Other DFX Principles** : Designs for Maintainability, Safety, Reliability, Sustainable Design **2.3 Designing with plastics:** Mechanical behavior, special characteristics and considerations, Design concepts for product features to be manufactured by various production process technologies, Special considerations for designing of components for load bearing applications	2
6 (22.08.22 - 28.08.22)	3	**Product Ergonomics:** Anthropometry, Environmental conditions, thermal, noise, vibration, displays, illusions, Psycho and psychological aspects in design, Man-machine information exchange. 3.2. **Product Aesthetics**: Visual awareness, Form elements in context of product design, Concepts of size, shape and texture, Introduction to colour and colour as an element in design, Colour classifications and dimensions of colour, Colour combinations and colour dynamics, Interaction / communication of colours, Psychological aspects of colours, generation of products forms with analogies from nature. **3.3 Product Graphics**: Graphics composition and layout, Use of grids in graphics composition, Study of product graphics and textures.	2
7 (29.08.22 - 4.09.22)	3	**Value Engineering:** Product value and its importance, Value analysis job plan, Steps to problem solving and value analysis, Value analysis tests, Value Engineering idea generation check list, Material and process selection in value engineering, Cost reduction, case studies and exercises.	3

8 (5.09.22 - 11.09.22)		Unit Test – 1	
9 (12.09.22 - 18.09.22)	3	**Modern Applications**: Concurrent Engineering, Robust Design, Additive Manufacturing/Rapid Prototyping, Product Life Cycle Management techniques and application areas	4
10 (19.09.22 – 25.09.22)	3	Content Beyond Syllabus: DOE and ANOVA, RSM, industry 4.0 **Software solutions**: Software for drafting, modeling, assembly, detailing, CAM interfacing, Rapid tooling/rapid prototyping, etc.	4
11 (13.09.21 - 19.09.21)		Introduction to Industrial Marketing, Understanding Industrial Markets, Nature of Industrial Buying, Industrial Market Segmentation, New Products and Established product strategies,	5
12 (26.09.22 – 2.10.22)	3	Resource based and Value based strategy, Industrial Pricing: Price Determinants, Pricing Policies, Pricing Decisions, Pricing - Value based and Competition based	5
13 (3.10.22 - 9.10.22)	3	6.1. **Industrial Marketing Channels**: Channel participants, Channel effectiveness, Marketing logistics, Physical Distribution and Marketing Strategy, Value added market channels	6
14 (10.10.22 - 16.10.22)	3	6.2. Industrial Marketing Communication, Advertising, Sales promotion, Publicity Media Plan, Integrated Promotion Plan, Industrial Sales force Management, Technical Support for Marketing – customer technical services and feedback.	6
15 (17.10.22 - 23.10.22)	Unit Test - II		

Dr. Ketaki Joshi
Subject teacher.

Dr. Vasim Shaikh
Program Coordinator (Mech)
& DQAC member

PEDLO8011 Product Design and Industrial Marketing															
		CO-PO/PSO Mapping													
CO Statement	**CO Attainment**	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO1**	**PSO2**
PEDLO8011.1. Design and develop products right from the conceptual level.	2.04	3	3	3	-	-	-	-	-	-	-	-	-	3	-
PEDLO8011.2. Demonstrate concept of computer aided product design approach.	1.4	3	3	3	-	-	-	-	-	-	-	-	-	3	-
PEDLO8011.3. Illustrate various modern approaches like concurrent engineering, product life cycle management, robust design, rapid prototyping / rapid tooling.	1.08	3	3	3	-	2	-	-	-	-	-	-	-	3	2
PEDLO8011.4. Analyze products based on ergonomics and aesthetic aspects.	1.4	3	3	3	-	-	-	-	-	-	-	-	-	3	-
PEDLO8011.5. Apply appropriate strategies in industrial marketing.	1.4	3	3	3	-	-	-	-	-	-	-	-	-	3	-
PEDLO8011.6. Demonstrate various aspects related to Industrial Marketing Communication, Advertising, Sales promotion, Publicity Media Plan.	1.4	3	3	3	-	-	-	-	-	-	-	-	-	3	-
Course Attainment		1.45	1.45	1.45	-	1.08	-	-	-	-	-	-	-	1.45	1.08

CO1	UT	Univ TH
weightage	40%	60%
attainment	3	1
Direct Attainment	1.8	
CES Attainment	3	
Weightage	Direct	CES
	80%	20%
Final Attainment	2.04	

CO2		Univ TH
weightage		100%
attainment		1
Direct Attainment	1	
CES Attainment	3	
Weightage	Direct	CES
	80%	20%
Final Attainment	1.4	

CO3	UT	Univ TH
weightage	40%	60%
attainment	0	1
Direct Attainment	0.6	
CES Attainment	3	
Weightage	Direct	CES
	80%	20%
Final Attainment	1.08	

CO4		Univ TH
weightage		60%
attainment		1
Direct Attainment	1	
CES Attainment	3	
Weightage	Direct	CES
	80%	20%
Final Attainment	1.4	

CO5	UT	Univ TH
weightage	40%	60%
attainment	1	1
Direct Attainment	1	
CES Attainment	3	
Weightage	Direct	CES
	80%	20%
Final Attainment	1.4	

CO6	UT	Univ TH
weightage	40%	60%
attainment	1	1
Direct Attainment	1	
CES Attainment	3	
Weightage	Direct	CES
	80%	20%
Final Attainment	1.4	

Sl.No	Roll No	Name	UT1Q1	UT1Q2	UT2Q1	UT2Q2	UNIV TH	CES					
		Co Mapping	CO1	CO3	CO1	CO5,6	ALL	CO1	CO2	CO3	CO4	CO5	CO6
1	8494	BOBDESAMYAKSHASHANK	7	6	8	5	21	4	4	4	4	4	4
2	8519	PASSANHAOLAFLOUISOWEN	10	6	9	5	36	4	5	4	4	4	4
3	8525	RAYTEANIKETSANDIP	7	7	9	10	59	4	4	4	3	3	3
4	8775	BANDYASHVIJAY	5	6	6	7	14	4	4	4	4	4	4
5	8777	FERNANDESRANEN	10	9	9	10	58	4	5	5	5	4	4
6	8778	JADHAVSHUBHAMSAMBHAJI	10	5	8	5	62	5	5	5	5	5	5
7	8779	JATALESIDDHANTVITTHAL	10	8	8	10	67	4	5	4	5	5	5
8	8780	KHANHASNAINISMAIL	10	7	8	8	56	4	3	3	4	3	3
9	8781	/LOUISVAILANKAFLEUR	10	9	9	8	65	4	4	4	5	4	4
10	8782	/MAHADIKRHUTIKAMANOHAR	10	5	9	6	65	3	4	3	2	3	3
11	8783	MANIKOTHAMOGHVINODAN	5	5	8	10	49	4	5	5	5	4	4
12	8784	MARDEADVAITBHUSHAN	10	8	9	5	61	5	5	5	5	5	5
13	8785	NADARUPKAR	9	10	8	10	65	4	4	5	4	3	3
14	8786	NIKALJESAHILSIDDHARTH	9	8	8	10	63	4	4	4	4	4	4
15	8787	PAGARVISHALSANJAY	8	4	8	7	61	4	4	4	4	4	4
16	8788	PARABOMKARARUN	10	3	9	10	49	5	5	5	5	5	5
17	8789	PATTANIHARSHDILIP	3	5	9	5	43	4	5	4	3	3	3
18	8790	/SABBANSANSKRITISACHIN	10	10	10	7	63	4	4	5	5	5	5
19	8791	SHARMAANMOLASHOKKUMAR	9	0	6	5	48	4	4	4	4	4	4
20	8792	SHEWALEDHIRAJPRALHAD	10	10	6	5	50	5	5	5	5	5	5
21	8793	SINGHMADHVENDRAAMIT	10	9	8	10	68	4	3	4	4	4	4
22	8794	/SOLANKIDIMPLEKUNWARMADANSINGH	10	10	9	10	61	5	5	5	5	5	5
23	8795	TANDALEPRANAVSACHIN	9	7	8	10	55	5	5	5	5	5	5
24	9035	AHIRWARSHANIKUMARBHIMRAJ	5	8	9	8	47	4	4	4	4	4	4
25	9036	ALIAADILAKBAR	10	3	8	7	48	4	4	4	5	5	5
26	9037	DURGAWALEPRASHILMUKUND	6	8	4	5	50	4	4	4	4	4	4
27	9038	GANDHIUMANGSUHAS	9	8	9	8	67	4	5	4	5	5	5
28	9039	INDULKARVIVEKSANJAY	0	8	9	5	38	4	4	4	4	5	5
29	9040	ISAMEHRISHIKESHSANJAY	9	10	8	5	54	5	4	4	4	5	5
30	9041	KHANAHSAANAYUB	5	3	8	10	41	5	5	5	5	5	5
31	9042	KHANSALMANFIROZ	10	5	8	5	40	3	4	3	4	4	4
32	9043	KHEDEKARPRATHMESHPRADIP	5	9	8	7	56	4	4	4	4	4	4
33	9044	KONARARUMUGAMSUDALAIMANI	10	8	8	10	38	5	5	5	3	3	3
34	9045	LOBOJOELJOACHIM	9	1	7	10	52	4	4	4	4	4	4
35	9046	MACHADOSAMSONJOACHIM	10	5	8	5	53	5	4	3	3	4	4
36	9047	MACHADOSHELDONSIMON	10	10	8	10	59	3	4	4	5	4	4
37	9048	MANJALKARVISHALMANOHAR	10	8	8	5	38	4	3	4	4	3	3
38	9049	MISTRYABHISHEKJAYWANT	10	2	8	10	32	5	5	5	5	5	5
39	9050	MUKRIYAHYANISAR	10	4	9	10	54	4	3	3	4	3	3
40	9051	NAIKRUSHIKESHSHAILESH	5	4	8	10	48	3	4	3	4	3	3
41	9052	PANCHALASHISHVINODKUMAR	10	5	8	10	66	1	1	2	2	2	2
42	9053	PANCHALNIRAVDINESH	10	4	8	9	32	4	4	5	4	5	5
43	9054	PARADKARRUGVEDSURENDRA	10	8	9	5	54	5	5	4	4	4	4
44	9055	PARMARDHRUVMANISH	10	9	8	10	41	4	4	4	4	4	4
45	9056	PATELWASIMUDDINNEEJAMUDDIN	5	0	8	5	41	4	4	4	4	4	4
46	9057	PAWAROMKARSANJAY	4	1	8	10	43	5	5	5	5	5	5
47	9058	/POLSONIAMAHENDRA	10	5	10	10	41	5	5	5	5	5	5
48	9059	RANEHEMANSHUASHOK	5	4	9	10	19	4	4	4	4	4	4
49	9060	SHAIKHAADILZIAULHAQ	8	7	9	5	42	4	3	4	4	3	3
50	9061	SHETKARDEEPENVILAS	7	7	9	5	51	5	4	4	4	2	2
51	9062	SHETTYAAKASHAVINASH	10	3	8	5	50	4	4	4	3	3	3
52	9063	TALGAONKARSHIVAMSANDEEP	10	8	9	10	57	4	4	4	3	3	3
53	9064	TEMBULKARDHRUVSALIL	7	9	8	8	60	4	4	4	4	4	4
54	9065	UKEMANTHANRATNAKAR	8	9	8	10	42	5	4	5	5	5	5
55	9066	VANISSUMEDHPRAFULL	7	5	8	8	37	5	5	5	5	5	5
Number of Students			55										
Target			6	6	6	6	48	3	3	3	3	3	3
Number of Students above target			44	32	54	37	35	54	54	54	53	53	53
% of students above target			80	58.18	98.18	67.27	63.64	98.18	98.18	98.18	96.36	96.36	96.36
attainment			3	0	3	1	1	3	3	3	3	3	3

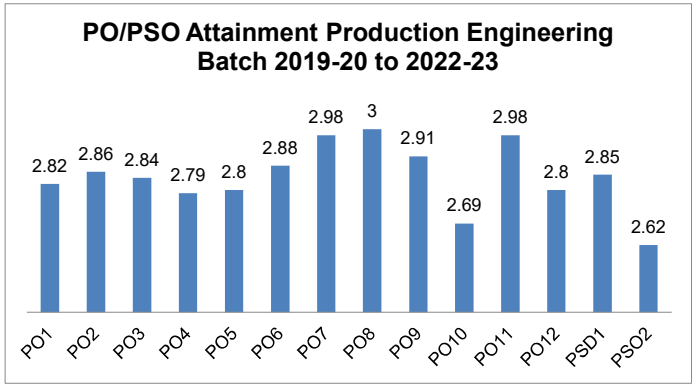
PO_Attainment_Production Engineering

COURSE	Course code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSD1	PSO2
Engineering Mathematics - I	FEC101	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0
Engineering Physics - I	FEC102	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0
Engineering Chemistry - I	FEC103	2.29	0	0	0	0	0	0	0	0	0	0	0	0	0
Engineering Mechanics	FEC104	2.48	2.49	2.47	0	0	0	0	0	0	0	0	0	0	0
Basic Electrical & Electronics Engineering	FEC105	2.6	2.54	0	0	0	0	0	0	0	0	0	0	0	0
Engineering Mathematics-II	FEC201	2.04	0	0	0	0	0	0	0	0	0	0	0	0	0
Engineering Physics-II	FEC202	2.88	0	0	0	0	0	0	0	0	0	0	0	0	0
Engineering Chemistry -II	FEC203	2.28	0	0	0	0	0	0	0	0	0	0	0	0	0
Engineering Graphics	FEC204	2.4	2.4	2.4	0	0	0	0	0	0	2.4	0	0	0	0
C-Programming	FEC205	2.2	2.25	2.25	0	0	0	0	0	0	0	0	2.2	0	0
Professional Communication and Ethics 1	FEC206	0	0	0	0	0	0	0	0	0	3	0	0	0	0
Basic Workshop Practice 1 & 2	FEL105/	2.9	0	2.9	0	2.9	2.9	0	0	2.9	0	0	0	0	0
Engineering Mechanics Lab	FEL103	2.9	2.9	2.88	0	0	0	0	0	0	0	0	0	0	0
Engineering Mathematics III	PEC301	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Applied Thermodynamics	PEC302	3	3	0	0	0	0	0	0	0	0	0	0	0	0
mechanics of materials	PEC303	3	3	3	0	0	0	0	0	0	0	0	0	0	0
manufacturing process	PEC304	3	3	3	0	0	0	0	0	0	0	0	3	3	0
Engineering Materials and	PEC305	3	3	3	0	3	0	0	0	0	0	0	3	3	0
Computer Aided Machine	PEL301	3	3	3	0	0	0	0	0	0	0	0	3	3	0
Python Lab	PEL302	2.48	2.45	2.3	2.29	0	0	0	0	0	0	0	0	2.48	0
Material testing lab	PEL303	3	3	3	3	3	0	0	0	0	0	0	0	0	0
Skill based lab 1/2	PEL304	3	3	0	0	0	0	0	0	0	0	0	0	3	0
Engineering mathematics -IV	PEC401	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Mould and Metal Forming	PEC402	3	3	3	0	0	0	0	0	0	0	0	0	0	0
Theory of Machines	PEC403	3	3	0	0	0	0	0	0	0	0	0	0	0	0
Theory of Machines lab	PEL402	3	3	3	0	0	0	0	0	0	0	0	0	0	0
Applied Electrical and	PEL403	3	3	3	0	0	0	0	0	0	0	0	0	0	0
Advanced Manufacturing	PEC405	3	3	0	3	0	0	0	0	0	0	0	0	0	0
Mould and Metal Forming	PEL401	3	3	3	0	0	0	0	0	0	0	0	0	0	0
Applied Electrical and	PEC404	3	3	3	0	0	0	0	0	0	0	0	0	0	0
Production Tooling	PEC501	3	3	3	3	3	3	3	0	0	0	0	3	3	0
Production Tooling lab	PEL501	3	3	3	3	3	3	3	0	0	0	0	3	3	0
Machine Design - I	PEC502	3	3	3	0	0	0	0	0	0	0	0	0	3	0
Machine Design - I lab	PEL502	3	3	3	0	0	0	0	0	0	0	0	0	3	0
Metrology & Quality	PEC504	2.4	2.4	2.4	2.4	2.4	2.4	0	0	2.4	2.4	0	2.4	2.4	0
Metrology & Quality	PEL504	3	3	0	0	0	0	0	0	0	0	0	0	3	0
Machining Science and	PEC503	3	3	3	0	0	0	0	0	0	0	0	3	3	0
Machining Science and	PEL503	3	3	3	0	0	0	0	0	0	0	0	3	3	0
DLOC - Sustainable Manufacturing	PEDO5012	0	0	3	0	0	3	3	3	3	3	3	3	3	3
Professional Communication and Ethics-II	PEC602	2.67	2.67	2.67	0	0	0	0	3	3	3	0	2.67	2.67	0
process Engineering	PEC601	3	3	3	0	0	0	0	0	0	0	0	3	3	0
process Engineering Lab	PEL601	3	3	3	0	0	0	0	0	0	0	0	3	3	0
Operations research	PEC604	2.8	2.8	2.8	2.8	2.8	2.8	2.8	0	2.8	0	2.8	2.8	2.8	0
Industrial Engineering	PEC603	0	0	0	0	0	0	3	0	3	0	3	0	0	0
DLOC - Logistics and Supply Chain Management	PEDO6014	0	0	0	0	0	0	3	0	3	0	3	0	0	0
DLOC- Rapid prototyping	PEDO6013	3	3	3	0	0	0	0	0	0	0	0	0	0	0
Additive mfg lab	PEL603	3	3	3	0	0	0	0	0	0	0	0	0	0	0
Data Analytics lab	PEL604	3	3	3	0	3	0	0	0	0	0	0	0	0	0
Machine Design - II	PEC602	2.67	2.67	2.67	0	0	0	0	3	3	3	0	2.67	2.67	0
Machine Design - II lab	PEL602	2.67	2.64	2.67	0	0	0	0	0	0	0	0	2.67	2.67	0
product design and industrial marketing	PEDO8012	1.45	1.45	1.45	0	0	0	0	0	0	1.48	0	1.48	1.45	0
Automation & Control	PEC801	2.25	2.25	2.25	2.58	2	0	0	0	0	0	0	2.23	2.26	2
Automation & Control	PEL801	2.67	2.67	2.67	2.6	2.4	0	0	0	0	0	0	2.67	2.67	2.6
Computer Aided Engineering	PEC802	3	3	0	0	0	0	0	0	0	0	0	3	3	0
Computer Aided Engineering Lab	PEL802	3	3	0	0	0	0	0	0	0	0	0	3	3	0
Engg Economics, Finance, Costing Accounting	PEC803	0	0	0	0	0	0	0	0	0	0	3	0	0	0
ILOC - Finance Management	ILO8022	0	0	0	0	0	0	0	0	0	0	3	0	3	0

Industrial Training and B.E. Project	PEC701	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Direct Attainment	2.78	2.82	2.8	2.74	2.75	2.85	2.97	3	2.89	2.61	2.97	2.75	2.81	2.53
Indirect Attainment	3	3	3	3	3	3	3	3	3	3	3	3	3	3

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSD1	PSO2
Final Attainment	2.82	2.86	2.84	2.79	2.8	2.88	2.98	3	2.91	2.69	2.98	2.8	2.85	2.62



Society of St. Francis Xavier, Pilar's
Fr. Conceicao Rodrigues College of Engineering
Fr. Agnel Technical Education Complex Bandstand,
Bandra Mumbai -400 050

Lesson Plan

Branch: Mechanical Engineering
Semester VII

Year: 2022-23

Course Title:	Design of Mechanical Systems 4 Hours – Theory & Oral/Practical Examination
Total Contact Hours: 48 Hours	Duration of ESE: 3 Hrs
ESE Marks: 80 (Theory) + 20 (IA)	
Lesson Plan Author: Dr. Ketaki Joshi	Date:
Checked By: Dr. Vasim Shaikh	Date: 25/07/2023

Prerequisites: Machine Design. Material Science

Syllabus:

Module	Contents	Hours
1.	Methodology & Morphology of design, Optimum design, system concepts in design.	03
2.	**Design of Transmission Gear Box:** Single stage andTwo stage Gear box with fixed ratio consisting of Design of spur, helical, bevel and worm and wormwheel gear pairs, Gear box housing layout and housing design.	08
3.	**Design of Hoisting Mechanism:** Design of Snatch Block Assembly including Rope Selection, Sheave, Hook, Bearing for hook, cross piece, Axle for sheave and shackle plate, Design of rope drum, selection motor with transmission system.	08
4.	**Design of Belt Conveyors :** Power requirement, selection of belt, design of tension take up unit, idler pulley	04
5.	**Engine Design (Petrol and Diesel):** Design of cylinder, Piston with pin and rings, connecting rod & crank shaft with bearings	08
6.	**Design of Pump:** **5.1 Design of main components of gear pump.** 1 Motor selection 2 Gear design 3 Shaft design and bearing selection 4 Casing and bolt design 5 Sizing of design of suction and delivery pipe **5.2 Design of main components of Centrifugal Pump:** 1 Motor selection 2 Suction and Delivery pipe 3 Design of Impeller, Impeller shaft 4 Design of Volute Casing	08

Course Outcomes (CO):

On successful completion of course learner will be able to:

MEC701.1. Apply the concept of system design.
MEC701.2. Select appropriate gears for power transmission on the basis of given load and speed
MEC701.3. Design material handling systems such as hoisting mechanism of EOT crane,
MEC701.4. Design belt conveyor systems
MEC701.5. Design engine components such as cylinder, piston, connecting rod and crankshaft
MEC701.6. Design pumps for the given applications

CO-PO Mapping: (BL – Blooms Taxonomy, C – Competency, PI – Performance Indicator)

CO	BL	C	PI	PO	Mapping
MEC701.1	3	1.3 1.4	1.3.1 1.4.1	PO1	3
		2.1 2.2 2.41	2.1.2 2.1.3 2.2.1 2.4.1	PO2	3
		3.2 3.3 3.4	3.2.3 3.3.2 3.4.1	PO3	3
MEC701.2	3	1.3 1.4	1.3.1 1.4.1	PO1	3
		2.1 2.2 2.41	2.1.2 2.1.3 2.2.1 2.4.1	PO2	3
		3.2 3.3 3.4	3.2.3 3.3.2 3.4.1	PO3	3
		6.2	6.2.1	PO6	2
		8.2	8.2.2	PO8	2
MEC701.3	3	1.3 1.4	1.3.1 1.4.1	PO1	3
		2.1 2.2 2.41	2.1.2 2.1.3 2.2.1 2.4.1	PO2	3
		3.2 3.3 3.4	3.2.3 3.3.2 3.4.1	PO3	3
		6.2	6.2.1	PO6	2
		8.2	8.2.2	PO8	2
MEC701.4	3	1.3 1.4	1.3.1 1.4.1	PO1	3
		2.1 2.2	2.1.2 2.1.3 2.2.1	PO2	3

		2.41	2.4.1		
		3.2 3.3 3.4	3.2.3 3.3.2 3.4.1	PO3	3
		6.2	6.2.1	PO6	2
		8.2	8.2.2	PO8	2
MEC701.5	3	1.3 1.4	1.3.1 1.4.1	PO1	3
		2.1 2.2 2.41	2.1.2 2.1.3 2.2.1 2.4.1	PO2	3
		3.2 3.3 3.4	3.2.3 3.3.2 3.4.1	PO3	3
		6.2	6.2.1	PO6	2
		8.2	8.2.2	PO8	2
MEC701.6	3	1.3 1.4	1.3.1 1.4.1	PO1	3
		2.1 2.2 2.41	2.1.2 2.1.3 2.2.1 2.4.1	PO2	3
		3.2 3.3 3.4	3.2.3 3.3.2 3.4.1	PO3	3
		6.2	6.2.1	PO6	2
		8.2	8.2.2	PO8	2

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
MEC701.1	3	3	3									
MEC701.2	3	3	3			2		2				
MEC701.3	3	3	3			2		2				
MEC701.4	3	3	3			2		2				
MEC701.5	3	3	3			2		2				
MEC701.6	3	3	3			2		2				

CO-PSO Mapping:

-

	PSO1	PSO2
MEC701.1		
MEC701.2		

MEC701.3		
MEC701.4		
MEC701.5		
MEC701.6		

CO attainment value for students above targets values:

CO	Tool	Target Value %		Attainment
		Marks	Students	
MEC701.1 MEC701.2 MEC701.3 MEC701.4	Test	50%	60 70 80	1 2 3
	ESE	40%	60 70 80	1 2 3
	CES	60%	60 70 80	1 2 3
MEC701.5 MEC701.6	ESE	40%	60 70 80	1 2 3
	CES	60%	60 70 80	1 2 3

	Direct Method					Indirect Method
	Test	Lab	Assignment	ESE (O)	ESE (T)	
MEC701.1	60%				40%	
MEC701.2	60%				40%	
MEC701.3	60%				40%	
MEC701.4	60%				40%	
MEC701.5	-				100%	
MEC701.6	-				100%	

CO Measurement Weightages for Tools:

	Direct Method					Indirect Method
	80%					Course Exit Survey 20%
	Test	Lab	Assignment	ESE (O)	ESE (T)	
MEC701.1	40%				60%	
MEC701.2	40%				60%	
MEC701.3	40%				60%	
MEC701.4	40%				60%	
MEC701.5	-				100%	
MEC701.6	-				100%	

Attainment:

CO MEC701.1:

Direct Method

$CO_{MEC701.1DM}$ = 0.4 * Test + 0.6* ESE(T)

Indirect Method

$CO_{MEC701.1IM}$ = CES

Final CO $CO_{MEC701.1}$ = 0.8 * $CO_{MEC701.1DM}$ + 0.2* $CO_{MEC701.1IM}$

CO MEC701.2:

Direct Method

$CO_{MEC701.2DM}$ = 0.4 * Test + 0.6* ESE(T)

Indirect Method

$CO_{MEC701.2IM}$ = CES

Final CO $CO_{MEC701.2}$ = 0.8 * $CO_{MEC701.2DM}$ + 0.2* $CO_{MEC701.2IM}$

Direct Method

$CO_{MEC701.3DM}$ = 0.4 * Test + 0.6* ESE(T)

Indirect Method

$CO_{MEC701.3IM}$ = CES

Final CO $CO_{MEC701.3}$ = 0.8 * $CO_{MEC701.3DM}$ + 0.2* $CO_{MEC701.3IM}$

Direct Method

$CO_{MEC701.4DM}$ = 0.4 * Test + 0.6* ESE(T)

Indirect Method

$CO_{MEC701.4IM}$ = CES

Final CO $CO_{MEC701.4}$ = 0.8 * $CO_{MEC701.4DM}$ + 0.2* $CO_{MEC701.4IM}$

Direct Method

$CO_{MEC701.5DM}$ = ESE(T)

Indirect Method

$CO_{MEC701.5IM}$ = CES

Final CO $CO_{MEC701.5}$ = 0.8 * $CO_{MEC701.5DM}$ + 0.2* $CO_{MEC701.5IM}$

Direct Method

$CO_{MEC701.6DM}$ = ESE(T)

Indirect Method

$CO_{MEC701.6IM}$ = CES

Final CO $CO_{MEC701.6}$ = 0.8 * $CO_{MEC701.6DM}$ + 0.2* $CO_{MEC701.6IM}$

Course Level Gap (if any):

-

Content beyond Syllabus:

-

Society of St. Francis Xavier, Pilar's
Fr. Conceicao Rodrigues College of Engineering
Fr. Agnel Technical Education Complex Bandstand,
Bandra Mumbai -400 050

Lecture Plan:

Week	Durati on (Hrs.)	Topic	Modul e
1 (18.07.22 - 24.07.22)	4	Module 1 Methodology & Morphology of design, Optimum design, system concepts in design. Module 2 Design of Transmission Gear Box: Introduction	1 and 2
2 (25.07.22 - 31.07.22)	4	Module 2 Single stage and Two stage Gear box with fixed ratio consisting of Design of spur Gear box	2
3 (1.08.22 - 7.08.22)	4	housing layout and housing design	2
4 (8.08.22 - 14.08.22)	3	helical, bevel and worm and worm wheel gear pairs Design of Hoisting Mechanism: Design of Snatch Block Assembly including Rope Selection	2 and 3
5 (15.08.22 - 21.08.22)	3	Sheave, Hook, Bearing for hook, cross piece, Axle for sheave and shackle plate,	3
6 (22.08.22 - 28.08.22)	4	Design of rope drum, selection motor with transmission system. revision	3
7 (29.08.22 - 4.09.22)		Mid Term Break	
8 (5.09.22 - 11.09.22)		Unit Test – 1	
9 (12.09.22 - 18.09.22)	4	Design of Belt Conveyors : Power requirement, selection of belt, design of tension take up unit, idler pulley	4
10 (19.09.22 – 25.09.22)	4	Engine Design (Petrol and Diesel): Design of cylinder, Piston with pin and rings	5
11 (26.09.22 – 2.10.22)	4	connecting rod & crank shaft with bearings Design of Pump: 5.1 Design of main components of gear pump. 1 Motor selection 2 Gear design 3 Shaft design and bearing selection	6

12 (3.10.22 - 9.10.22)	3	4 Casing and bolt design 5 Sizing of design of suction and delivery pipe 5.2 Design of main components of Centrifugal Pump: 1 Motor selection 2 Suction and Delivery pipe	6
13 (10.10.22 - 16.10.22)	4	3 Design of Impeller, Impeller shaft 4 Design of Volute Casing Revision	6
14 (17.10.22 - 23.10.22)	**Unit Test - II**		

Text Books:

1 "Machine Design Exercises", S.N.Trikha - New Delhi Khanna Publisher 1978.
2 "Mechanical Engineering Design", Shigley J E and Mischke C R,11th Edition 2019, McGraw Hill, ISBN: 9788184956207.
3 "Design of Machine Elements", Bhandari VB,5th Edition 2020, TMH,ISBN: 9789390177479
4 "Design Data", P.S.G. College of Technology, Coimbatore. ISBN: 978-8192735504
5 "Engineering Design", Dieter G E, McGraw Hill Inc, ISBN: 9781260113297
6 "Mechanical System Design", SP Patil, 2nd Edition., JAICO Publishing House ISBN: 978-8179923153
7 "Material Handling Equipment", Rudenko,2nd Edition, M.I.R. publishers, Moscow
8 "Material Handling Equipments", N. Rudenko, Peace Publication
9 "Machine Design", R.C.Patel, Pandya, Sikh, Vol -I & II,12th Edition, C. Jamnadas& Co.
10 "Pumps: Theory, Design and Applications", G K Sahu, New Age International 2000 ISBN: 9788122412246 University of Mumbai B. E. (Mechanical Engineering), Rev 2019
11 "Gear Design Handbook", GitinMaitra, 2nd Edition, ISBN: 978-0074602379
12 "Design Data Book- Design of engine parts",Khandare S.S & Kale A.V, 2nd Edition, ISBN: 978-9352654260

Reference Books:

1 "Mechanical design analysis", MF Spotts, 3rd Edition, Prentice Hall Inc.
2 "Machine Design", Black PH and O Eugene Adams, 3rd Edition, McGraw Hill ISBN 10: 0070055246
3 "Machine Design-An Integrated Approach", Robert L. Norton,6th Edition, Pearson Education, ISBN: 9780135184233
4 "Material Handling Equipments", Alexandrov,5th Edition, Mir Publication ISBN: 9780714717456
5 Machine Desgin", Reshetov, Mir Publication 1978.
6 "Design of Machine Elements", 4th Edition, V. M. Faires, ISBN: 978-0023359507

Web References:

1. https://onlinecourses.nptel.ac.in/noc22_me62 - Gear And Gear Unit Design: Theory and Practice, IIT Kharagpur
2. https://nptel.ac.in/courses/112/106/112106137/ - Machine Design-II, IIT Madras

Evaluation Scheme

CIE Scheme

Internal Assessment: 20 (Average of two tests)

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Fr. Agnel Technical Education Complex Bandstand,
Bandra Mumbai -400 050

Internal Assessment Scheme

Module		Lecture Hours	No. of questions in		
			Test 1	Test 2	Test 3*
1	Introduction to Design	3	01 (5 marks)	-	--
2	Gear Box	8	01 (15 Marks)	-	--
3	Hoisting Mechanism	8	-	01 (10 marks)	--
4	Belt Conveyor	4	-	01 (10 Marks)	--
5	Engine Design	8	-	-	--
6	Pumps	8	-	-	--

Note: Four to six questions will be set in the Test paper

Verified by:

Programme Coordinator

Subject Expert

DMES CO - attainment

CO Attainment: Design of Mechanical Systems (Theory and Lab)	
MEC701.1. Apply the concept of system design.	3
MEC701.2. Select appropriate gears for power transmission on the basis of given load and speed	2.68
MEC701.3. Design material handling systems such as hoisting mechanism of EOT crane,	2.04
MEC701.4. Design belt conveyor systems	2.68
MEC701.5. Design engine components such as cylinder, piston, connecting rod and crankshaft	3
MEC701.6. Design pumps for the given applications	3
MEL701.1. Apply the concept of system design.	3
MEL701.2. Design of hoisting mechanism of EOT crane	3
MEL701.3. Design belt conveyor systems	3
MEL701.4. Design pumps for the given applications	3
MEL701.5. Design engine components such as cylinder, piston, connecting rod and crankshaft	3

CO Attainment

Design of Mechanical Systems (Theory)

CO#	UT	Univ TH	CES	Attainment
CO1	3	3	3	3
CO2	2	3	3	2.68
CO3	0	3	3	2.04
CO4	2	3	3	2.68
CO5	-	3	3	3
CO6	-	3	3	3

Design of Mechanical Systems (Lab)

CO#	Assignment	Drawing Sheet	Course Project	Practical	CES	Attainment
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	-	3	3	3	3
CO4	3	-	3	3	3	3
CO5	3	-	3	3	3	3

Course Attainment: Design of Mechanical Systems (Theory)

CO# / PO#	CO Attainment	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2
MEC701.1	3	3	3	3	-	-	-	-	0	-	-	-	-	-	-
MEC701.2	2.68	3	3	3	-	-	-	-	2	-	-	-	-	-	-
MEC701.3	2.04	3	3	3	-	-	-	-	2	-	-	-	-	-	-
MEC701.4	2.68	3	3	3	-	-	-	-	2	-	-	-	-	-	-
MEC701.5	3	3	3	3	-	-	-	-	2	-	-	-	-	-	-
MEC701.6	3	3	3	3	-	-	-	-	2	-	-	-	-	-	-
Course-PO Mapping		3	3	3	-	-	-	-	2	-	-	-	-	-	-
Course Attainment		2.73	2.73	2.73	-	-	-	-	2.68	-	-	-	-	-	-

Course Attainment: Design of Mechanical Systems (Lab)

CO# / PO#	CO Attainment	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
MEL701.1	3	3	3	3	-	0	-	-	-	2	-	-	-	-	-
MEL701.2	3	3	3	3	-	3	-	-	-	2	-	-	-	-	-
MEL701.3	3	3	3	3	-	0	-	-	-	2	-	-	-	-	-
MEL701.4	3	3	3	3	-	0	-	-	-	2	-	-	-	-	-
MEL701.5	3	3	3	3	-	0	-	-	-	2	-	-	-	-	-
Course-PO Mapping		3	3	3	-	1	-	-	-	2	-	-	-	-	-
Course Attainment		3.00	3.00	3.00	-	3.00	-	-	-	3.00	-	-	-	-	-

Course Attainment

Course Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
FEC101	2.71	0	0	0	0	0	0	0	0	0	0	0	0	0
FEC102	2.81	0	0	0	0	0	0	0	0	0	0	0	0	0
FEC103	2.38	0	0	0	0	0	0	0	0	0	0	0	0	0
FEC104	2.48	2.49	2.47	0	0	0	0	0	0	0	0	0	0	0
FEC105	2.55	2.49	0	0	0	0	0	0	0	0	0	0	0	0
FEC201	2.61	0	0	0	0	0	0	0	0	0	0	0	0	0
FEC202	2.94	0	0	0	0	0	0	0	0	0	0	0	0	0
FEC203	2.28	0	0	0	0	0	0	0	0	0	0	0	0	0
FEC204	2.48	2.48	2.48	0	0	0	0	0	0	2.48	0	0	0	0
FEC205	2.2	2.25	2.25	0	0	0	0	0	0	0	0	2.2	0	0
FEC206	0	0	0	0	0	0	0	0	0	3	0	0	0	0
FEL105/ FEL206	2.9	0	2.9	0	2.9	2.9	0	0	2.9	0	0	0	0	0
FEL103	2.94	2.93	2.93	0	0	0	0	0	0	0	0	0	0	0
MEC301	3	0	0	0	0	0	0	0	0	0	0	0	0	0
MEC302	3	3	3	0	0	0	0	0	0	0	0	0	3	0
MEC303	3	3	0	0	3	0	3	0	0	0	0	3	3	0
MEC304	3	3	3	3	0	0	0	0	0	0	0	0	3	0
MEC305	3	3	3	0	0	0	0	0	0	0	0	0	0	0
MEL301	3	3	3	3	3	0	0	0	0	0	0	0	3	0
MEL302	3	0	3	0	3	0	0	0	3	0	0	0	0	0
MESBL301	3	3	3	3	0	0	0	0	0	3	3	0	0	0
MEPBL301	3	3	3	0	0	3	0	0	3	3	0	0	3	3
MEC401	3	0	0	0	0	0	0	0	0	0	0	0	0	0
MEC402	3	3	3	0	0	0	0	0	0	0	0	0	3	0
MEC403	3	3	0	0	0	0	0	0	0	0	0	0	3	0
MEC404	3	3	3	3	3	3	3	3	3	3	3	3	3	0
MEC405	2.43	0	0	0	0	0	0	0	0	0	0	0	2.43	0
MEL402	3	3	3	0	0	0	0	0	0	0	0	0	3	0
MEL403	1.32	1.32	0	0	1.32	0	0	0	0	0	0	0	0	0
MESBL401	3	3	3	0	0	0	0	0	0	0	0	3	3	0
MEPBL401	3	3	3	0	0	3	0	0	3	3	0	0	3	3
MEC501	2.87	2.85	2.92	2.93	3	0	0	0	0	0	0	2.87	2.87	3
MEC502	0	0	2.8	0	2.8	2.8	2.8	0	2.8	2.8	2.8	2.8	0	0
MEC503	0.96	1.14	0	0	0	0	0	0	0	0	0	0	0	0
MEC504	3	3	3	0	3	0	0	0	0	0	0	0	3	0
MEDLO5011	3	2.34	0	2.42	0	0	0	0	3	0	0	0	2.56	2.31
MEDLO5012	2.09	2.09	2.09	0	2.09	0	0	0	0	0	0	0	2.09	0
MEL501	0	0	2.8	0	2.8	2.8	2.8	0	2.8	2.8	2.8	2.8	0	0
MEL502	2.47	2.22	0	0	0	0	0	0	0	0	0	0	0	0
MEL503	3	3	3	0	3	0	0	0	0	0	0	3	3	0
MESBL501	0	0	0	0	0	0	0	3	3	3	0	0	0	0

MEC601	2.92	2.92	2.92	0	0	0	0	0	0	0	0	0	0	0
MEC602	2.76	2.77	2.93	0	0	0	0	0	0	0	0	0	0	0
MEC603	1.97	1.88	1.88	0	1.92	1.93	1.9	0	1.92	1.9	1.9	1.9	0	0
MEC604	2	1.78	1.76	0	1.7	0	1.85	0	1.7	1.7	1.85	1.8	0	0
MEDLO6022	2.45	2.78	0	2.49	0	0	0	0	0	0	0	0	2.58	2.37
MEDLO6023	3	3	3	0	0	0	0	0	0	0	0	0	3	0
MEL601	3	3	3	0	0	0	0	0	0	0	0	0	0	0
MEL602	3	3	0	0	0	0	0	0	0	0	0	0	0	0
MEL603	2.1	2.1	2.1	0	2.1	2.1	2.1	0	2.1	2.1	2.1	2.1	2.1	2.1
MESBL601	3	3	3	3	3	0	0	0	0	0	0	3	0	0
MEC701	2.79	2.79	2.79	0	0	0	0	2.74	0	0	0	0	0	0
MEL701	3	3	3	0	3	0	0	0	3	0	0	0	0	0
MEDLO7032	2.52	2.52	2.52	0	0	0	2.52	0	0	0	0	0	0	0
MEDLO7041	2.84	2.84	0	0	0	0	0	0	0	0	0	2.84	2.84	0
ILO7013	0	0	3	0	0	3	3	3	3	3	0	0	0	0
MEDLO8012	2.36	2.36	2.36	0	2.33	2.33	2.33	2.33	0	2.2	0	2.36	0	2.36
MEL801	3	3	3	0	3	3	3	3	3	3	0	3	0	3
ILO8021	0	0	3	3	0	0	0	0	0	0	3	3	0	0
ILO7015	2	2	0	2	0	0	0	0	0	0	0	0	2	2
MEDLO8052	2.52	2.52	0	0	0	0	0	0	0	0	0	0	2.52	2.52
MEL702	3	3	3	0	3	0	0	0	0	0	0	0	3	0
MEP701	3	3	3	3	3	3	3	3	3	3	3	3	3	3
MEC702	0	2	0	2.4	0	2.33	2.2	0	0	2.2	0	0	0	0
MEL703	0	0	0	0	3	0	0	0	3	3	3	3	0	3
MEC801	0	2.93	0	3	0	2.84	3	0	0	2.88	0	0	0	0
MEP801	3	3	3	3	3	3	3	3	3	3	0	3	3	3
ILO8022	0	0	0	0	0	0	0	0	0	0	3	0	3	0
MEL802	2.53	0	0	0	2.53	2.5	2.5	0	0	0	0	2.53	0	0
MEDLO7031	0	2.35	2.33	0	2.34	2.35	2.3	0	2.29	2.34	2.34	2.32	2.33	2.28
ILO7017	2.2	2.2	0	0	0	0	2.2	0	0	0	0	0	0	0

PO/PSO Attainment

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Direct Attainment	2.69	2.65	2.79	2.8	2.67	2.7	2.58	2.88	2.76	2.69	2.65	2.69	2.8	2.64
Indirect Attainment	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Final Attainment	2.75	2.72	2.83	2.84	2.74	2.76	2.66	2.9	2.81	2.75	2.72	2.75	2.84	2.71

Lesson Plan

Branch: AI & DS
Semester: V

Year: 2022-2023

Course Title: Web Computing	SEE: 3 Hours – Theory & Oral Examination
Total Contact Hours: 36 Hours	Duration of SEE: 3 Hrs
SEE Marks: 80 (Theory) + 20 (IA)	
Lesson Plan Author: Swati Ringe	Date: 3-02-2023
Checked By:	Date:

Syllabus: **Prerequisite**: HTML Basics

1. **Web Programming Fundamentals (08)**
   1.1. Working of web browser, HTTP protocol, HTTPS, DNS, TLS, XML introduction, Json introduction, DOM, URL, URI, REST API .

2. **JavaScript (08)**
   Introduction to JavaScript: JavaScript language constructs, Objects in JavaScript- Built in, Browser objects and DOM objects, event handling, form validation and cookies.
   Introduction to ES5,ES6, Difference between ES5 and ES6. Variables, Condition, Loops, Functions, Events, Arrow functions, Setting CSS Styles using JavaScript, DOM manipulation, Classes and Inheritance. Iterators and Generators, Promise, Client-server communication, Fetch

3. **React Fundamentals (10)**
   Installation, Installing libraries, Folder and file structure, Components, Component lifecycle, State and Props, React Router and Single page applications, UI design, Forms, Events, Animations, Best practices

4. **Node.js (04)**
   Environment setup, First app, Asynchronous programming, Callback concept, Event loops, REPL, Event emitter, Networking module, Buffers, Streams, File system, Web module.

5. **Express models (04)**
   Introduction, Express router, REST API, Generator, Authentication, sessions, Integrating with React

6. **Advance React (04)**
   Functional components- Refs, Use effects, Hooks, Flow architecture, Model-ViewController framework, Flux, Bundling the application. Web pack.

Internal Assessment:
Assessment consists of two class tests of 20 marks each. The first-class test is to be conducted when approx. 40% syllabus is completed and second class test when additional40% syllabus is completed. Duration of each test shall be one hour.

End Semester Theory Examination:
1. Question paper will consist of 6 questions, each carrying 20 marks.
2. The students need to solve a total of 4 questions.
3. Question No.1 will be compulsory and based on the entire syllabus.
4. Remaining question (Q.2 to Q.6) will be selected from all the modules.

Course Outcomes: [Target 2.5]

After successful completion of the course students will be able to:

CSC502.1 : Select protocols or technologies required for various web applications
CSC502.2: Apply JavaScript to add functionality to web pages. .
CSC502.3: Design front end application using basic React. .
CSC502.4: Construct web based Node.js applications using Express
CSC502.5: Design front end applications using functional components of React.
CSC502.6: Design back-end applications using Node.js.

CO-PO Mapping: (BL – Blooms Taxonomy, C – Competency, PI – Performance Indicator)

Course Outcome	BL	C	PI	PO	Mapping
CSC502.1 : Select protocols or technologies required for various web applications	2	1.7	1.7.1	PO1	3
		2.6	2.6.2	PO2	2
CSC502.2: Apply JavaScript to add functionality to web pages.	3	1.7	1.7.1	PO1	3
		2.7	2.7.1	PO2	3
		3.8	3.8.3	PO3	2
CSC502.3: Design front end application using basic React.	3	1.7	1.7.1	PO1	3
		2.7	2.7.1	PO2	3
		3.8	3.8.3	PO3	2
		5.5	5.5.2	PO5	1
CSC502.4: Construct web based Node.js applications using Express.	3	1.7	1.7.1	PO1	3
		2.7	2.7.1	PO2	3
		3.8	3.8.2 3.8.3	PO3	2
		5.5	5.5.2	PO5	1
		9.6	9.6.1	PO9	1
		10.4	10.4.2	PO10	1
		11.6	11.6.1	PO11	1
CSC502.5: Design front end applications using functional components of React.	3	1.7	1.7.1	PO1	3
		2.7	2.7.1	PO2	3
		3.8	3.8.2 3.8.3	PO3	2
		9.6	9.6.1	PO9	1
		10.4	10.4.2	PO10	1
		11.6	11.6.1	PO11	1
CSC502.6: Design back-end applications using Node.js.	3	1.7	1.7.1	PO1	3
		2.7	2.7.1	PO2	3
		3.8	3.8.2 3.8.3	PO3	2
		9.6	9.6.1	PO9	1
		10.4	10.4.2	PO10	1
		11.6	11.6.1	PO11	1

CO-PSO Mapping: (BL – Blooms Taxonomy, C – Competency, PI – Performance Indicator)

Course Outcome	BL	C	PI	PSO	Mapping
CSC502.1 : Select protocols or technologies required for various web applications	2	1.6 1.7	1.5.1 1.7.1	PSO1	2
CSC502.2: Apply JavaScript to add functionality to web pages.	3	1.7	1.7.1	PSO1	2
		2.7	2.7.1		
		3.8	3.8.3		
CSC502.3: Design front end application using basic React.	3	1.7	1.7.1	PSO1	2
		2.7	2.7.1		
		3.8	3.8.3		
		5.5	5.5.2		
CSC502.4: Construct web based Node.js applications using Express	3	1.7	1.7.1	PSO1	2
		2.7	2.7.1		
		3.8	3.8.2 3.8.3		
		5.5	5.5.2		
		9.6	9.6.1		
		10.4	10.4.2		
		11.6	11.6.1		
CSC502.5: Design front end applications using functional components of React.	3	1.7	1.7.1	PSO1	2
		2.7	2.7.1		
		3.8	3.8.2 3.8.3		
		9.6	9.6.1		
		10.4	10.4.2		
CSC502.6: Design back-end applications using Node.js.	3	1.7	1.7.1	PSO1	2
		2.7	2.7.1		
		3.8	3.8.2 3.8.3		
		9.6	9.6.1		
		10.4	10.4.2		
		11.6	11.6.1		

CO -PO PSO Mapping

Relationship of course outcomes with program outcomes: Indicate 1 (low importance), 2 (Moderate Importance) or 3 (High Importance) in respective mapping cell.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1
CSC502.1	3	2												2
CSC502.2	3	3	2											2
CSC502.3	3	3	2		1									2
CSC502.4	3	3	2		1				1	1	1			2
CSC502.5	3	3	2		1				1	1	1			2
CSC502.6	3	3	2		1				1	1	1			2
TOTAL	18	17	10		4				3	3	3			12
CO-PO MATRIX	3	2.83	2		1				1	1	1			2

CO Measurement Weightages for Tools:

	Direct Methods (80%)				Indirect Methods (20%)
	Test	Lab	Assignment	SEE (T)	Course Exit Survey
CSC502.1	Test1 (20%)	Lab 7 (20%)	-	60%	(100%)
CSC502.2	Test1 (20%)	-	Assign 1(20%)	60%	(100%)
CSC502.3	Test2 (20%)	Lab 5 (20%)	-	60%	(100%)
CSC502.4	Test2 (20%)	Lab 6 (20%)		60%	(100%)
CSC502.5	Test2 (20%)	-	Assign 3(20%)	60%	(100%)
CSC502.6	Test2 (20%)	MP (20%)	-	60%	(100%)

Attainment:

CO CSC502.1:

Direct Method

$A_{CSC502.1D} = 0.2*Test1+0.2*Lab7 + 0.6 * SEE\_Theory$

Final Attainment:

$A_{CSC502.1} = 0.8 * A_{CSC502.1D} + 0.2 * A_{CSC502.1I}$

CO CSC502.2:

Direct Method

$A_{CSC502.2D} = 0.2*Test1+0.2*Assignment1 + 0.6 * SEE\_Theory$

Final Attainment:

$A_{CSC502.2} = 0.8 * A_{CSC502.2D} + 0.2 * A_{CSC502.2I}$

CO CSC502.3:

Direct Method

$A_{CSC502.3D} = 0.2*Test2+0.2*Lab5 + 0.6 * SEE\_Theory$

Final Attainment:

$A_{CSC502.3} = 0.8 * A_{CSC502.3D} + 0.2 * A_{CSC502.3I}$

CO CSC502.4:

Direct Method

$A_{CSC502.4D} = 0.2*Test2+0.2*Lab6 + 0.6 * SEE\_Theory$

Final Attainment:

$A_{CSC502.4} = 0.8 * A_{CSC502.4D} + 0.2 * A_{CSC502.4I}$

CO CSC502.5:

Direct Method

$A_{CSC502.5D} = 0.2*Test2+0.2*Assignment3 + 0.6 * SEE\_Theory$

Final Attainment:

$A_{CSC502.5} = 0.8 * A_{CSC502.5D} + 0.2 * A_{CSC502.5I}$

CO CSC502.6:

Direct Method

$A_{CSC502.6D} = 0.2*Test2+ 0.2*MP+ 0.6 * SEE\_Theory$

Final Attainment:

$A_{CSC502.1} = 0.8 * A_{CSC502.1D} + 0.2 * A_{CSC502.1I}$

Gurriculum Gap/Content Beyond Syllabus:

Sr.No	Gap/Content Beyond Syllabus	Activity	Topic
1	HTML	Extra Lecture	HTML and HTML5.0
2	Sample Demo Practical Implementation	Hands-on	MEAN Stack with MongoDB connectivity
3	Security in Web Technology, Search Engine Optimization, Web based repository hosting, Project Management tools **(EXPERT LECTURE)**	Seminar	Seminar on Web based repository hosting -GIT , GitHub and Project Management tool - Jira
4	Django, Backend Node and Express connectivity with MongoDB **(WORKSHOP)**	Workshop	Portfolio and API development (Backend with node-express-MongoDb and Django)

Lecture Plan : SEM VII-ML-CSC604

Modes of Content Delivery:

i	Class Room Teaching	v	Self-Learning Online Resources	ix	Industry Visit
ii	Tutorial	vi	Slides	x	Group Discussion
iii	Remedial Coaching	vii	Simulations/Demonstrations	xi	Seminar
iv	Lab Experiment	viii	Expert Lecture	xii	Case Study

Term : 18th July – 30 Oct 2022 (UT1 : 05 Sept - 07 Sept) (UT2 : 17Oct -19 Oct)

No.	Portion to be covered	Planned date	Actual date	Content Delivery - Reference /Assessment Method
1	Web programming Fundamentals: Introduction Terms- Client-Server, Web Page, URL, URI, WWW, Internet, Browser, Server, Protocols. DNS, TLS Syllabus and CO-PO discussion. Mini Project topics	20/07/2022	20/07/2022	PPT/BlackBoard
2	Web Application Architecture & technologies	22/07/2022	22/07/2022	PPT
3	HTTP-HTTPS Protocol, DNS, TLS, URL, URI	25/07/2022	25/07/2022	PPT/BlackBoard
4	JSON-XML introduction, REST API	27/07/2022	27/07/2022	PPT/BlackBoard
5	HTML5 – Elements, Attributes, Head, Body, Hyperlink, Formatting, Images, Lists, Multimedia	29/07/2022	29/07/2022	PPT/Lab Demo
6	Tables, Frames, Forms	1/8/2022	3/8/2022	PPT/Lab Demo
7	CSS3 - Syntax, Inclusion, Color, Background, Fonts, Tables, Lists	3/8/2022	5/8/2022	Lab Demo
8	CSS3 Selectors, Pseudo Classes, Pseudo Elements	5/8/2022	8/8/2022	Lab Demo
9	Bootstrap: BootstrapGrid System, Forms, Button	8/8/2022	9/8/2022	Lab Demo
10	Navbar, Breadcrumb, Jumbotron	10/8/2022	9/8/2022	Lab Demo
11	JavaScript: Introduction, variables, operators, Conditions, loops, Functions	12/8/2022	10/8/2022	PPT
12	Events, Classes and Objects in JavaScript, Built-in, Browser objects and DOM objects	17/08/2022	12/8/22	PPT
13	Event handling, form validation and cookies.	17/08/2022	12/8/22	PPT/Demo
14	Introduction to ES5,ES6, Difference between ES5 and ES6, Var, Conditions, Loops, Functions, Events, Arrow Functions.	22/08/2022	17/08/2022	PPT
15	Setting CSS styles for using Javascript, DOM Manipulations	24/08/2022	22/08/2022	PPT/Blackboard
16	Classes and Inheritance, Iterators and Generators, Promise	26/08/2022	24/08/2022 29/08/2022	PPT
17	Client-server communication, Fetch	29/08/2022	29/08/2022 09/09/2022	PPT

No.	Portion to be covered	Planned date	Actual date	Content Delivery - Reference /Assessment Method
18	React Fundamentals: Installation, Installing Libraries, Folder and File structure	09/09/2022	12/09/2022 13/09/2022	PPT Demo
19	Components, Component lifecycle	12/09/2022	14/09/2022	PPT /Demo
20	State and Props	14/09/2022	16/09/2022	PPT /Demo
21	React Router and Single page applications	16/09/2022	19/09/2022	PPT /Demo
22	UI design	19/09/2022	19/09/2022	PPT/Blackboard
23	Forms, Events	21/09/2022	21/09/2022	PPT /Demo
24	Animations, Best Practices	21/09/2022	21/09/2022	PPT
25	Node.js: Environment setup, First app,	23/09/2022	23/09/2022	PPT /Demo
26	Asynchronous programming, Callback concept, Loops	26/09/2022	23/09/2022	PPT /Demo
27	REPL, Event emitter	28/09/2022	26/09/2022	
28	Networking Module, Web Module	30/09/2022	28/09/2022	
29	Buffers, Streams, File system	03/10/2022	28/09/2022	
30	Express : Introduction, Express Router	07/10/2022	30/09/2022	
31	REST API, Generator	08/10/2022	3/10/2022	
32	Authentication, Session	10/10/2022	07/10/2022	
33	Integrating with React	12/10/2022	10/10/2022	
34	Case Study	14/10/2022	12/10/2022	
35	Advanced React: Functional Components-Refs,	20/10/2022	14/10/2022	PPT/blackboard
36	Use Effects, Hooks	21/10/2022	21/10/2022	
37	Flow Architectures	27/10/2022	27/10/2022	
38	Model-View Controller Framework	28/10/2022	28/10/2022	
39	FLUX	26/08/2022	26/08/2022	
40	Bundling the application. Web Pack.	28/10/2022	27/10/2022	PPT/Demo

Total Lectures : 40

Text Books:

1. Rediscovering JavaScript, Master ES6, ES7, and ES8, By Venkat Subramaniam · 2018
2. Learning React Functional Web Development with React and Redux, Alex Banks and Eve Porcello, O'Reilly
3. Learning Redux, Daniel Bugl, Packt Publication
4. Learning Node.js Development, Andrew Mead, Packt Publishing
5. RESTful Web API Design with Node.js 10, Valentin Bojinov, Packt Publication

References books:

1. Web Development with Node and Express, Ethan Brown, O'Reilly
2. HTML5 Cookbook, By Christopher Schmitt, Kyle Simpson, O'Reilly Media
3. Core Python Applications Programming by Wesley J Chun Third edition Pearson Publication

Reference Web Resources:

1. https://www.coursera.org/learn/html-css-javascript-for-web-developers?action=enroll
2. https://onlinecourses.swayam2.ac.in/ugc19_lb05/preview
3. https://reactjs.org/tutorial/tutorial.html
4. https://react-redux.js.org/introduction/quick-start 4. https://webpack.js.org/

List of Experiments/Mini Project Plan

Expt No.	Date (week)	CO Map	Title/aim
01	27 July	LCO1	Develop web page using HTML5 tags. (USE- IMAGE, LINKS, TABLE, FORM, LIST, SEMANTIC ELEMENTS, HTML5 FEATURES- audio, video, drag-drop, geolocation, canvas)
02	2 Aug	LCO2	Apply the styles (CSS3- inline, internal and external) to web page (APPLY COLOR, BACKGROUND-COLOUR/IMAGE, FONT STYLES, TABLE STYLES, LIST STYLES)
03	9 Aug	LCO3	Use Bootstrap to make the webpage dynamic (BootstrapGrid system, Forms, Button, Navbar, Breadcrumb, Jumbotron)
04	23 Aug	LCO4	Use JavaScript to make the webpage interactive (Loops, Functions, Events, Classes and Objects, Error handling, Form Validation, Arrays, String, Date, Map, Set)
05	30 Aug	CO3	Design a web page REACT JS (JSX, Components, Props, State, Forms, Events, Router) – **Mini Project**
06	06 Sept	CO4	Server side Programming with NODE JS (Callbacks, Event loops, Creating express app) - **Mini Project**
07	13 Sept	CO1	Dynamic routing using Cisco packet TRACER/GNS3
08	20 Sept	LCO6	Design and Simulate VLANs on the switch/router using Cisco packet tracer/ GNS3
09	27 Sept	LCO6	Design and Simulate NAT on the router using Cisco packet tracer/ GNS3
10	04 Oct	-	Simulation of Software Defined Network using Mininet

Assignments Plan

01	20 Sept 2022	CO2	Prepare a diagrammatic view of listing of all in-built and DOM objects of JavaScript. Highlight/Mention few Important functions that are frequently used. Explain with real world example how to Create user defined Object using JavaScript?
02	5 Oct	To do CO4&6	How does Node.js Works? What are the advantages and limitations of using Express with Node.js
03	15 Sept onwards	All	Topic of Study

Mini Project Plan

11	2 Aug	LCO2 LCO3 LCO4 LCO5 CO5 CO6	**Mini Project:** One real life Web Application using (ReactJs/NodeJs/Express/Flux) (Group of 1/2/3/4).
	13 Aug		**Topic Submission**
	15 Sept		**Progress review**
	3 Oct		**Presentation and Demo**
	10 Oct		**Mini Project Report submission**

Evaluation Scheme

CIE Scheme

Teaching Scheme

Course Code	Course Name	Teaching Scheme			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Practical/Oral	Tut	Credits
CSC502	Web Computing	03	--	--	03	--	---	03
CSL502	Web Computing and Networking Lab	--	02	--	--	1	--	01

Examination Scheme

Course Code	Course Name	Theory Marks				Term Work	Practical & Oral	Total
		Internal Assessment			End Sem Exam			
		Test1	Test2	Avg				
CSC502	Web Computing	20	20	20	80 (3hr)	--	---	100
CSL502	Web Computing and Networking Lab					25	25	50

Internal Assessment: 20 (Average of two tests)

Internal Assessment Scheme

	Module	Lecture Hours	No. of questions in			No. of questions in SEE
			Test 1	Test 2	Test 3*	
1	Web Programming Fundamentals	8	02 (10 marks)	-	--	02 (10 Marks)
2	JavaScript	8	02 (10 Marks)	-	--	04 (30 Marks)
3	React Fundamentals	10	-	01 (05 Marks)	--	03 (20 Marks)
4	Node.js	4	-	01 (05 Marks)	--	02 (20 Marks)
5	Express models	4	-	01 (05 Marks)	--	03 (25 Marks)
6	Advanced React	4	-	01 (05 Marks)	--	02 (15 Marks)

Note: Four to six questions will be set in the Test paper

Verified by:

Programme Coordinator

Subject Expert

Subject: Web Computing (CSC502) **Credits-3**

CO Statements

After successful completion of the course students will be able to:

CSC502.1 : Select protocols or technologies required for various web applications
CSC502.2: Apply JavaScript to add functionality to web pages. .
CSC502.3: Design front end application using basic React.
CSC502.4: Construct web based Node.js applications using Express
CSC502.5: Design front end applications using functional components of React.
CSC502.6: Design back-end applications using Node.js

Mapping of CO and PO/PSO

Relationship of course outcomes with program outcomes:
Indicate 1 (low importance), 2 (Moderate Importance) or 3 (High Importance) in respective mapping cell.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	CO Attainment YEAR 22-23
CSC502.1	3	2												2	2.32
CSC502.2	3	3	2											2	2.04
CSC502.3	3	3	2		1									2	2.16
CSC502.4	3	3	2		1				1	1	1			2	2.32
CSC502.5	3	3	2		1				1	1	1			2	1.68
CSC502.6	3	3	2		1				1	1	1			2	2.16
TOTAL	18	17	10		4				3	3	3			12	
CO-PO MATRIX	3	2.83	2		1				1	1	1			2	
PO Attainment	2.1	1.342	2.07		2.08				2.05	2.053	2.053			2.113	

TE COMPUTER (SEM-V) 2022-2023

SUBJECT : Web Computing (CSC502) CREDITS :3

Upon completion of this course students will be able to:

CSC502.1 : Select protocols or technologies required for various web applications

Target Level - CO1	Weightage	No. Of students Scoring Minimum	Successful Students %	Attainment (in %)	Attainment Level	
Direct Method						
Test1						
60% of students will score minimum 60% marks	0.2	6 marks(out of 10)	59	86.7647059	3	
Lab 7						
80% of students will minimum score 70% marks	0.2	7 marks (out of 10)	68	100	3	
End Semester Examination(Theory)						
60% of students will minimum score 55% marks	0.6	44 marks(out of 80)	48	70.5882353	2	
		Total Students	68			
Indirect Method						
Course Exit Survey		agree + Strongly agree	36	72	2	
60% students will strongly agree and agree			50			
Attainment - Direct Method	2.4					
Overall Attainment	2.32	Overall Attainment=(0.8*Direct Method Attainment +0.2*Indirect Method Attainment)				

TARGET LEVEL PERCENTAGE			
	LOW(1)	*MODERATE(2)*	*SUBSTANTIAL(3)*
Test 1 and Test 2	*60 TO 70*	*71-85*	*>85*
ASSIGN2	*70-80*	*81-85*	*>85*
Quiz1	*70-80*	*81-85*	*>85*
End Sem Exam % Practical-Oral	*>70 TO < 75*	*76-80*	*>80*
End Sem Exam % Theory	*>55 TO < 65*	*66-76*	*>76*
CES	*60-70*	*70-80*	*>80%*

TE COMPUTER (SEM-V) 2022-2023

SUBJECT : Web Computing (CSC502) **CREDITS :3**

CSC502.2: Apply JavaScript to add functionality to web pages. .

Target Level - CO2	Weightage	No. Of students Scoring Minimum	Successful Students %	Attainment (in %)	Attainment Level	
Direct Method						
Test1						
60% of students will score minimum 60% marks	0.2	6 marks(out of 10)	38	55.8823529	0	
Assignment1						
80% of students will minimum score 70% marks	0.2	7 marks (out of 10)	60	88.2352941	3	
End Semester Examination(Theory)						
60% of students will minimum score 55% marks	0.6	44 marks(out of 80)	48	70.5882353	2	
		Total Students	68			
Indirect Method						
Course Exit Survey		agree + Strongly agree	44	88	3	
60% students will strongly agree and agree			50			
Attainment - Direct Method	1.8					
Overall Attainment	2.04	Overall Attainment=(0.8*Direct Attainment +0.2*Indirect Attainment)				

TARGET LEVEL PERCENTAGE			
	LOW(1)	*MODERATE(2)*	*SUBSTANTIAL(3)*
Test 1 and Test 2	*60 TO 70*	*71-85*	*>85*
ASSIGN	*70-80*	*81-85*	*>85*
Quiz1	*70-80*	*81-85*	*>85*
End Sem Exam % Practical-Oral	*70 TO < 7*	*76-80*	*>80*
End Sem Exam % Theory	*55 TO < 6*	*66-76*	*>76*
CES	*60-70*	*70-80*	*>80%*

TE COMPUTER (SEM-V) 2022-2023						
SUBJECT : Web Computing (CSC502)			CREDITS :3			
CSC502.3: Design front end application using basic React.						
Target Level - CO3	Weightage	No. Of students Scoring Minimum	Successful Students %	Attainment (in %)	Attainment Level	
Direct Method						
Test2						
Target: 60% of students will score minimum 60% marks	0.2	3 marks(out of 05)	57	83.8235294	2	
Lab Assignment 5						
80% of students will minimum score 70% marks	0.2	7 marks (out of 10)	65	95.5882353	3	
End Semester Examination(Theory)						
60% of students will minimum score 55% marks	0.6	44 marks(out of 80)	48	70.5882353	2	
		Total Students	68			
Indirect Method						
Course Exit Survey		agree + Strongly agree	38	76	2	
60% students will strongly agree and agree			50			
Attainment - Direct Method	2.2					
Overall Attainment	2.16	Overall Attainment=(0.8*Direct Attainment +0.2*Indirect Attainment)				

TARGET LEVEL PERCENTAGE			
	LOW(1)	*MODERATE(2)*	*SUBSTANTIAL(3)*
Test 1 and Test 2	*60 TO 70*	*71-85*	*>85*
ASSIGN2	*70-80*	*81-85*	*>85*
Quiz1	*70-80*	*81-85*	*>85*
End Sem Exam % Practical-Oral	*70 TO < 7*	*76-80*	*>80*
End Sem Exam % Theory	*55 TO < 6*	*66-76*	*>76*
CES	*60-70*	*70-80*	*>80%*

TE COMPUTER (SEM-V) 2022-2023					
SUBJECT : Web Computing (CSC502)		CREDITS :3			
CSC502.4: Construct web based Node.js applications using Express					
Target Level - CO4	Weightage	No. Of students Scoring Minimum	Successful Students %	Attainment (in %)	Attainment Level
Direct Method					
Test2					
Target: 60% of students will score minimum 60% marks	0.2	6 marks(out of 10)	59	86.7647059	3
Lab Assignment 6					
80% of students will minimum score 70% marks	0.2	7 marks (out of 10)	67	98.5294118	3
End Semester Examination(Theory)					
60% of students will minimum score 55% marks	0.6	44 marks(out of 80)	48	70.5882353	2
		Total Students	68		
Indirect Method					
Course Exit Survey		agree + Strongly agree	37	74	2
60% students will strongly agree and agree			50		
Attainment - Direct Method	2.4				
Overall Attainment	2.32	Overall Attainment=(0.8*Direct Attainment +0.2*Indirect Attai			

TARGET LEVEL PERCENTAGE			
	LOW(1)	MODERATE(2)	SUBSTANTIAL(3)
Test 1 and Test 2	60 TO 70	71-85	>85
ASSIGN2	70-80	81-85	>85
Quiz1	70-80	81-85	>85
End Sem Exam % Practical-Oral	>70 TO < 75	76-80	>80
End Sem Exam % Theory	>55 TO < 65	66-76	>76
CES	60-70	70-80	>80%

TE COMPUTER (SEM-V) 2022-2023

SUBJECT : Web Computing (CSC502) **CREDITS :3**

Upon completion of this course students will be able to:

CSC502.5: Design front end applications using functional components of React.

Target Level - CO5	Weightage	No. Of students Scoring Minimum	Successful Students %	Attainment (in %)	Attainment Level	
Direct Method						
Test2						
Target: 60% of students will score minimum 60% marks	0.2	6 marks(out of 10)	48	70.5882353	1	
Assignment 3						
80% of students will minimum score 70% marks	0.2	7 marks (out of 10)	48	70.5882353	1	
End Semester Examination(Theory)						
60% of students will minimum score 55% marks	0.6	44 marks(out of 80)	48	70.5882353	2	
		Total Students	68			
Indirect Method						
Course Exit Survey		agree + Strongly agree	38	76	2	
60% students will strongly agree and agree			50			
Attainment - Direct Method	1.6					
Overall Attainment	1.68	Overall Attainment=(0.8*Direct Method Attainment +0.2*Indirect Method A				

TARGET LEVEL PERCENTAGE			
	LOW(1)	*MODERATE(2)*	*SUBSTANTIAL(3)*
Test 1 and Test 2	*60 TO 70*	*71-85*	*>85*
ASSIGN2	*70-80*	*81-85*	*>85*
Quiz1	*70-80*	*81-85*	*>85*
End Sem Exam % Practical-Oral	*70 TO < 7*	*76-80*	*>80*
End Sem Exam % Theory	*55 TO < 6*	*66-76*	*>76*
CES	*60-70*	*70-80*	*>80%*

TE COMPUTER (SEM-V) 2022-2023

SUBJECT : Web Computing (CSC502) **CREDITS :3**

Upon completion of this course students will be able to:

CSC502.6: Design back-end applications using Node.js.

Target Level - CO6	Weightage	No. Of students Scoring Minimum	Successful Students %	Attainment (in %)	Attainment Level	
Direct Method						
Test2						
Target: 60% of students will score minimum 60% marks	0.2	6 marks(out of 10)	52	76.4705882	2	
MP						
80% of students will minimum score 70% marks	0.2	7 marks (out of 10)	66	97.0588235	3	
End Semester Examination(Theory)						
60% of students will minimum score 55% marks	0.6	44 marks(out of 80)	48	70.5882353	2	
		Total Students	68			
Indirect Method						
Course Exit Survey		agree + Strongly agree	38	76	2	
60% students will strongly agree and agree			50			
Attainment - Direct Method	2.2					
Overall Attainment	2.16	Overall Attainment=(0.8*Direct Method Attainment +0.2*Indirect Method A				

TARGET LEVEL PERCENTAGE			
	LOW(1)	*MODERATE(2)*	*SUBSTANTIAL(3)*
Test 1 and Test 2	*60 TO 70*	*71-85*	*>85*
ASSIGN2	*70-80*	*81-85*	*>85*
Quiz1	*70-80*	*81-85*	*>85*
End Sem Exam % Practical-Oral	*70 TO < 7*	*76-80*	*>80*
End Sem Exam % Theory	*55 TO < 6*	*66-76*	*>76*
CES	*60-70*	*70-80*	*>80%*

Subject: Web Computing (CSC502) **Credits-3**

CO Statements

After successful completion of the course students will be able to:

CSL502.1: Identify and apply the appropriate HTML tags to develop a webpage
CSL502.2: Identify and apply the appropriate CSS tags to format data on webpage
CSL502.3: Construct responsive websites using Bootstrap
CSL502.4: Use JavaScript to develop interactive web pages.
CSL502.5: Construct front end applications using React and back end using Node.js/express
CSL502.6: Use simulator for CISCO Packet Tracer/GNS3.

Mapping of CO and PO/PSO

Relationship of course outcomes with program outcomes: Indicate 1 (low importance), 2 (Moderate Importance) or 3 (High Importance) in r

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	CO Attainment YEAR 22-23
CSL502.1	3				3									3	3
CSL502.2	3	3	3	2	3				2	2	2	2		3	3
CSL502.3	3	3	3	2	3				2	2	2	2		3	2.8
CSL502.4	3	3	3	2	3				2					3	3
CSL502.5	3	3	3												2.8
CSL502.6	3	3	3												2.6
TOTAL	18	15	15	6	12	0	0	0	6	4	4	4	0	12	
CO-PO MATRIX	3	3	3	2	3				2	2	2	2		3	
PO Attainment	2.9	0.57	2.84		2.8				2.8	2.8	2.8			2.867	

TE COMPUTER (SEM-V) 2022-2023

SUBJECT : Web Computing Lab (CSL502) **CREDITS :1**

Upon completion of this course students will be able to:

CSL502.1: Identify and apply the appropriate HTML tags to develop a webpage

Target Level - CO1	Weightage	No. Of students Scoring Minimum	Successful Students %	Attainment (in %)	Attainment Level	
Direct Method						
Lab1						
80% of students will minimum score 70% marks	0.3	7 marks(out of 10)	68	100	3	
Assign Activity1						
80% of students will minimum score 70% marks	0.2	7 marks (out of 10)	66	97.0588235	3	
End Semester Examination(Practical/Oral)						
80% of students will minimum score 70% marks	0.5	17.5 marks(out of 25)	63	92.6470588	3	
		Total Students	68			
Indirect Method						
Course Exit Survey		agree + Strongly agree	42	84	3	
60% students will strongly agree and agree			50			
Attainment - Direct Method	3					
Overall Attainment	3	Overall Attainment=(0.8*Direct Method Attainment +0.2*Indirect Method A				

TARGET LEVEL PERCENTAGE			
	LOW(1)	*MODERATE(2)*	*SUBSTANTIAL(3)*
Test 1 and Test 2	*60 TO 70*	*71-85*	*>85*
ASSIGN2	*70-80*	*81-85*	*>85*
Quiz1	*70-80*	*81-85*	*>85*
End Sem Exam % Practical-Oral	*>70 TO < 75*	*76-80*	*>80*
End Sem Exam % Theory	*>55 TO < 65*	*66-76*	*>76*
CES	*60-70*	*70-80*	*>80%*

TE COMPUTER (SEM-V) 2022-2023

SUBJECT : Web Computing Lab (CSL502) **CREDITS :1**

CSL502.2: Identify and apply the appropriate CSS tags to format data on webpage

Target Level - CO2	Weightage	No. Of students Scoring Minimum	Successful Students %	Attainment (in %)	Attainment Level	
Direct Method						
Lab2						
80% of students will minimum score 70% marks	0.3	7 marks(out of 10)	68	100	3	
Mini Project						
80% of students will minimum score 70% marks	0.2	7 marks (out of 10)	60	88.2352941	3	
End Semester Examination(Practical/Oral)						
80% of students will minimum score 70% marks	0.5	17.5 marks(out of 25)	63	92.6470588	3	
		Total Students	**68**			
Indirect Method						
Course Exit Survey		agree + Strongly agree	42	84	3	
60% students will strongly agree and agree			50			
Attainment - Direct Method	3					
Overall Attainment	3	Overall Attainment=(0.8*Direct Attainment +0.2*Indirect Attainment)				

TARGET LEVEL PERCENTAGE			
	LOW(1)	*MODERATE(2)*	*SUBSTANTIAL(3)*
Test 1 and Test 2	*60 TO 70*	*71-85*	*>85*
ASSIGN	*70-80*	*81-85*	*>85*
Quiz1	*70-80*	*81-85*	*>85*
End Sem Exam % Practical-Oral	*70 TO < 7*	*76-80*	*>80*
End Sem Exam % Theory	*55 TO < 6*	*66-76*	*>76*
CES	*60-70*	*70-80*	*>80%*

TE COMPUTER (SEM-V) 2022-2023

SUBJECT : Web Computing Lab (CSL502) **CREDITS :1**

CSL502.3: Construct responsive websites using Bootstrap

Target Level - CO3	Weightage	No. Of students Scoring Minimum	Successful Students %	Attainment (in %)	Attainment Level	
Direct Method						
Lab 3						
80% of students will minimum score 70% marks	0.3	7 marks(out of 10)	68	100	3	
Mini Project						
80% of students will minimum score 70% marks	0.2	7 marks (out of 10)	66	97.0588235	3	
End Semester Examination(Practical/Oral)						
80% of students will minimum score 70% marks	0.5	17.5 marks(out of 25)	63	92.6470588	3	
		Total Students	68			
Indirect Method						
Course Exit Survey		agree + Strongly agree	37	74	2	
60% students will strongly agree and agree			50			
Attainment - Direct Method	3					
Overall Attainment	2.8	Overall Attainment=(0.8*Direct Attainment +0.2*Indirect Attainment)				

TARGET LEVEL PERCENTAGE			
	LOW(1)	*MODERATE(2)*	*SUBSTANTIAL(3)*
Test 1 and Test 2	*60 TO 70*	*71-85*	*>85*
ASSIGN2	*70-80*	*81-85*	*>85*
Quiz1	*70-80*	*81-85*	*>85*
End Sem Exam % Practical-Oral	*70 TO < 7*	*76-80*	*>80*
End Sem Exam % Theory	*55 TO < 6*	*66-76*	*>76*
CES	*60-70*	*70-80*	*>80%*

TE COMPUTER (SEM-V) 2022-2023

SUBJECT : Web Computing Lab (CSL502) **CREDITS :1**

CSL502.4: Use JavaScript to develop interactive web pages.

Target Level - CO4	Weightage	No. Of students Scoring Minimum	Successful Students %	Attainment (in %)	Attainment Level
Direct Method					
Lab 4					
80% of students will minimum score 70% marks	0.3	7 marks(out of 10)	68	100	3
Mini Project					
80% of students will minimum score 70% marks	0.2	7 marks (out of 10)	66	97.0588235	3
End Semester Examination(Practical/Oral)					
80% of students will minimum score 70% marks	0.5	17.5 marks(out of 25)	63	92.6470588	3
		Total Students	68		
Indirect Method					
Course Exit Survey		agree + Strongly agree	44	88	3
60% students will strongly agree and agree			50		
Attainment - Direct Method	3				
Overall Attainment	3	Overall Attainment=(0.8*Direct Attainment +0.2*Indirect Attai			

TARGET LEVEL PERCENTAGE			
	LOW(1)	*MODERATE(2)*	*SUBSTANTIAL(3)*
Test 1 and Test 2	*60 TO 70*	*71-85*	*>85*
ASSIGN2	*70-80*	*81-85*	*>85*
Quiz1	*70-80*	*81-85*	*>85*
End Sem Exam % Practical-Oral	*>70 TO < 75*	*76-80*	*>80*
End Sem Exam % Theory	*>55 TO < 65*	*66-76*	*>76*
CES	*60-70*	*70-80*	*>80%*

Upon completion of this course students will be able to:

CSL502.5: Construct front end applications using React and back end using Node.js/express

Target Level - CO5	Weightage	No. Of students Scoring Minimum	Successful Students %	Attainment (in %)	Attainment Level	
Direct Method						
Mini Project						
80% of students will minimum score 70% marks	0.4	7 marks(out of 10)	66	97.0588235	3	
Lab 5-6						
80% of students will minimum score 70% marks	0.1	7 marks (out of 10)	66	97.0588235	3	
End Semester Examination(Practical/Oral)						
80% of students will minimum score 70% marks	0.5	17.5 marks(out of 25)	63	92.6470588	3	
		Total Students	68			
Indirect Method						
Course Exit Survey		agree + Strongly agree	38	76	2	
60% students will strongly agree and agree			50			
Attainment - Direct Method	3					
Overall Attainment	2.8	Overall Attainment=(0.8*Direct Method Attainment +0.2*Indirect Method A				

TARGET LEVEL PERCENTAGE			
	LOW(1)	*MODERATE(2)*	*SUBSTANTIAL(3)*
Test 1 and Test 2	*60 TO 70*	*71-85*	*>85*
ASSIGN2	*70-80*	*81-85*	*>85*
Quiz1	*70-80*	*81-85*	*>85*
End Sem Exam % Practical-Oral	*70 TO < 7*	*76-80*	*>80*
End Sem Exam % Theory	*55 TO < 6*	*66-76*	*>76*
CES	*60-70*	*70-80*	*>80%*

SUBJECT : Web Computing Lab(CSL502) **CREDITS :1**

Upon completion of this course students will be able to:

CSL502.6: Use simulator for CISCO Packet Tracer/GNS3.

Target Level - CO6	Weightage	No. Of students Scoring Minimum	Successful Students %	Attainment (in %)	Attainment Level	
Direct Method						
Lab 8						
80% of students will minimum score 70% marks	0.2	7 marks(out of 10)	68	100	3	
Lab 9-10						
80% of students will minimum score 70% marks	0.3	7 marks (out of 10)	68	100	3	
End Semester Examination(Practical/Oral)						
80% of students will minimum score 70% marks	0.5	17.5 marks(out of 25)	63	92.6470588	3	
		Total Students	68			
Indirect Method						
Course Exit Survey		agree + Strongly agree	33	66	1	
60% students will strongly agree and agree			50			
Attainment - Direct Method	3					
Overall Attainment	2.6	Overall Attainment=(0.8*Direct Method Attainment +0.2*Indirect Method A				

TARGET LEVEL PERCENTAGE			
	LOW(1)	*MODERATE(2)*	*SUBSTANTIAL(3)*
Test 1 and Test 2	*60 TO 70*	*71-85*	*>85*
ASSIGN2	*70-80*	*81-85*	*>85*
Quiz1	*70-80*	*81-85*	*>85*
End Sem Exam % Practical-Oral	*>70 TO < 75*	*76-80*	*>80*
End Sem Exam % Theory	*>55 TO < 65*	*66-76*	*>76*
CES	*60-70*	*70-80*	*>80%*