BASAVESHWAR ENGINEERING COLLEGE (AUTONOMOUS), BAGALKOT

COURSE PLAN

Title of Course	:	Analysis and Design of Algorithms	Course Code	:	UCS551C
Credits	:	4	Contact Hours/ Week	:	3Hrs/Week
Total Hours	:	05	Tutorial Hours	:	2Hrs/Week
CIE Marks	:	50	SEE Marks	:	50
Semester	:	V	Year	:	2022-23

Prerequisites: Data Structures

Course Objectives:

	The Course objectives are:
1	Have insight into the basics of various algorithmic design techniques.
2	To develop proficiency in algorithmic approaches of Brute Force, Divide and Conquer, Decrease and conquer, Greedy and Dynamic programming.

Course Outcomes:

	At the end of the course the student should be able to:
1	Analyze the asymptotic performance of algorithms.
2	Demonstrate a familiarity with major algorithms and data structures.
3	Implement the algorithms to ascertain their working.
4	Apply important algorithmic design paradigms and methods of analysis.
5	Synthesize efficient algorithms in common engineering design situations.

Course Articulation Matrix: Mapping of Course Outcomes (CO) with Programme Outcomes (PO) and Programme Specific Outcomes (PSO)

No	Programme Outcomes / Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
The students will be able to:																
1	Analyze the asymptotic performance of algorithms	2	3	3		1							2		3	3
2	Demonstrate a familiarity with major algorithms and data structures.	2	3	3	2	3									2	
3	Implement the algorithms to ascertain their working.	2	2	3	2	3							3		3	2
4	Apply important algorithmic design paradigms and methods of analysis	2	2	3	3	2									2	

5	Synthesize efficient algorithms in common engineering design situations.	2	2	3	2									3	1	2

Competencies Addressed in the course and Corresponding Performance Indicators

Programme Outcome: Any of 1 to 12 PO's:

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

Competency	Indicators
2.1 Demonstrate an ability to identify and formulate complex engineering problem	2.5.1 Evaluate problem statements and identifies objectives 2.5.2 Identify modules/algorithms of a computer based system and parameters to solve a problem 2.5.3 Identify algorithmic knowledge that applies to a given problem
2.6 Demonstrate an ability to formulate a solution plan and methodology for an engineering problem	2.6.1 Reframe the computer-based system into interconnected subsystems 2.6.2 Identify functionalities and computing resources. 2.6.3 Identify existing solution/methods to solve the problem, including forming justified approximations and assumptions 2.6.4 Compare and contrast alternative solution/methods to select the best methods 2.6.5 Compare and contrast alternative solution processes to select the best process.
2.7 Demonstrate an ability to formulate and interpret a model	2.7.1 Able to apply computer engineering principles to formulate modules of a system with required applicability and performance. 2.7.2 Identify design constraints for required performance criteria.
2.8 Demonstrate an ability to execute a solution process and analyze results	2.8.1 Applies coding technique to implement the solution. 2.8.2 Analyze and interpret the results using tools. 2.8.3 Identify the limitations of the solution and sources/causes. 2.8.4 Arrive at conclusions with respect to the objectives

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

Competency	Indicators
3.5 Demonstrate an ability to define a complex problem in engineering terms.	3.5.1 Able to define a precise problem statement with objectives and scope. 3.5.2 Able to identify and document system requirements where the algorithmic approaches are used.
3.6 Demonstrate an ability to generate a diverse set of alternative design solutions	3.6.1 Able to explore and design alternative algorithms to generate solutions for problems. 3.6.2 Able to produce a variety of potential design solutions suited to meet the problem statement. 3.6.3 Identify suitable test cases for evaluation of alternate design solutions.
3.7 Demonstrate an ability to select optimal design scheme for further development	3.7.1 Able to perform systematic evaluation of the degree to which several design concepts meet the criteria. 3.7.2 Consult with domain experts and stakeholders to select candidate engineering design solution for

	further development
	3.7.3 Designing systems for healthcare, cyber security and safety
	3.7.4 Employ knowledge representation, search, inference, and reasoning abilities
3.8 Demonstrate an ability to advance an engineering design to defined end state	3.8.1 Able to refine an algorithm design into a detailed design within the existing constraints
	3.8.2 Able to implement and integrate the modules.
	3.8.3 Able to verify the functionalities and validate the design by applying on real time applications.

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

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

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

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

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

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

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

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

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

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

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

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

Unit Learning Outcomes (ULO):

Unit Learning Outcome (ULO)	CO	BLL	PI addressed
Analyze the asymptotic performance of algorithms and be familiar with basics of algorithms and data structures	1 & 2	2.4	2.5.2 2.6.3
Demonstrate and compare efficiencies of different algorithmic strategies.	1 & 2	3,5	2.6.4
Design different algorithms for finding the solutions to some complex problems.	3	5	2.8.3

		4	3	3.6.2
Apply important algorithmic design paradigms and methods of analysis		4	3	3.6.2
Synthesize efficient algorithms in common engineering design situations.		5	5	3.5.5

Course Content:

Hours Required	Topic to be covered	Mode of Delivery
01	**Introduction:** Notion of Algorithm	
01	Fundamentals of Algorithmic Problem Solving	
01	Important Problem Types, Fundamental Data Structures.	i. Chalk and talk in classroom
01	**Fundamentals of the Analysis of Algorithm Efficiency:** Analysis Framework, Asymptotic Notations	ii. Presentation iii. Lecture combined with discussions
01	Basic Efficiency Classes,	iv. Tutorial and Assignments
01	Mathematical Analysis of Non-recursive. Example	v. Demonstration vi. Group Assignment
01	Recursive Algorithms, Examples, Fibonacci Numbers.	
01	**Brute Force:** Selection Sort and Bubble Sort,	
01	Sequential Search and Brute-Force String Matching,	
01	Exhaustive Search, Examples.	
01	Implementation of Algorithms	
01	Implementation of Algorithms	
01	Divide and Conquer: Strategy, Example	i. Chalk and talk in classroom
01	Mergesort: Algorithm, Example, Analysis	ii. Presentation
01	Quicksort: Algorithm, Example, Analysis	iii. Lecture combined with discussions
01	Binary Search, Binary tree traversals and related properties,	iv. Tutorial and Assignments
01	Multiplication of large integers and Stressen's Matrix Multiplication.	v. Demonstration vi. Group Assignment
01	Decrease and Conquer: Insertion Sort,	
01	Depth First Search,	
01	Breadth First Search,	
01	Topological Sorting,	
01	Algorithms for Generating Combinatorial Objects.	
01	Implementation of Algorithms	
01	**Transform and Conquer:** Presorting	
01	Balanced Search Trees	
01	Heaps and Heapsort,	i. Chalk and talk in classroom
01	Problem Reduction, **Space and Time Tradeoffs:** Sorting by Counting	ii. Presentation iii. Lecture combined with discussions
01	Input Enhancement in String Matching,	iv. Tutorial and Assignments
01	String Matching Algorithms: Horspool String Matching	v. Demonstration vi. Group Assignment
01	Boyre Moor String Matching Algorithms	
01	Hashing, B-Trees	
01	**Dynamic Programming:** Computing a Binomial Coefficient,	
01	Warshall's and Floyd's Algorithms,	
01	Optimal Binary Search Trees.	
01	The Knapsack Problem and Memory Functions.	
01	**Greedy Technique:** Prim's Algorithm	i. Chalk and talk in classroom
01	Kruskal's Algorithm,	ii. Presentation
01	Dijkstra's Algorithm,	iii. Lecture combined with discussions
01	Huffman Trees.	iv. Tutorial and Assignments
01	Implementation of Algorithms	v. Demonstration
01	**Limitations of Algorithm Power:** Lower-Bound Arguments,	vi. Group Assignment
01	Decision Trees, Problems	
01	Coping with the Limitations of Algorithm Power:	

01	Backtracking: n-Queens Problem,	
01	Knapsack Problem, Sum of Subsets	
01	Branch-and-Bound: n-Queens Problem,	
01	Travelling Salesman Problem, Knapsack Problem	

Review Questions:

Review Questions	ULO	BLL	PI addressed
Explain the concept of algorithms. Illustrate with examples how same problem can be solved using different algorithms and same algorithms can be represented in several different ways.	1	2,3	1.7.1
Explain Knapsack problem with all conditions and Apply dynamic programming strategy to find solution for knapsack problem for the following instance. 	Item	Weight	Profit
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1	7	42
2	3	12
3	4	40
4	5	25 | Maximum capacity of knapsack = 10	04	5	2.8.2
Write an algorithm for depth first search traversal and also illustrate the same by taking an example to construct DFS tree showing its back edges and tree edges. Analyze its efficiency.	1,3,4	3,4	2.7.1

Evaluation Scheme:

Assessment	Marks	Weightage
CIE-I	20	20
CIE-II	20	20
Assignments/ Quizzes/ Case Study/ Course Project/ Term Paper/Field Work	10	10
SEE	100	50
Total	150	100

Details of Assignment:

Assignment	Marks (10)	CO	PI	CA	PO
Assignment 1	Marks- 5	1,2			2
Assignment 2	Marks - 5	3,4,5			3

MODEL COURSEPLAN

Title of Course	:	Artificial Intelligence and Robotics		Course Code	:	UCS531N/UCS632N
Credits	:	3		Contact Hours/ Week	:	3
Total Hours	:	40		Tutorial Hours	:	0
CIE Marks	:	50		SEE Marks	:	100
Semester	:	5th or 6th		Year	:	2023-24

Prerequisites:

Basic knowledge of Algorithms and Data Structures

Course Objectives:

	The Course objectives are:
1	To present the basic principles of AI toward problem solving, knowledge representation and robotics.
2	Investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
3	Explore the current scope, potential, limitations, and implications of intelligent systems.
4	Develop abilities to apply, build and modify decision models to solve real problems
5	Design and program small expert systems and robotic applications.

Course Outcomes:

	At the end of the course the student should be able to:
1	Identify problems that are amenable to solution by AI methods and identify appropriate methods to solve a given problem.
2	Illustrate the representation of knowledge and inference using logic.
3	Analyze various control strategies and solve problems using search techniques
4	Apply the learnt concepts to solve simple problems of AI and robotics.
5	Demonstrate the knowledge of expert systems and robotic programming.

ARTIFICIALINTELLIGENCEANDROBOTICS			
Course Code	UCS632N	CIEMarks	50
TeachingHours /Week(L:T:P)	(3:0:0)	SEEMarks	50
Credits	03	Hours	40

Courseobjectives:

- To have insight into the fundamentals of Artificial Intelligence (AI) and Robotics that includes the variouspeculiarsearchstrategiesforAI,ProgrammingtheRobotsandControllingAutonomousRobotsetc.

- To have proficiency in developing the techniques to solve real world problems unconventionally withoptimality.

UNIT- I   (10 hours)

1. Introduction   to AI: TheAIProblems,Underlyingassumptions,AItechnique,Levelofthemodel,Criteriaforsuccess   (1.1to 1.5fromRich andKnight)

2. Problems:ProblemspacesandsearchProblemasastatespacesearch,Productionsystems,Problemcharacteristics,Productionsystemcharacteristics,Issuesinthedesignofsearchproblems,additionalproblems(2.1   to 2.6fromRich andKnight)

Revised Bloom'sTaxonomyLevel	$L_1-Remembering, L_2-Understanding$

UNIT-II(10hours)

3. Search and control Strategies: Introduction, Generate and Test, Hill Climbing, Simulated annealing(3.1, 3.2fromRich andKnight)

4. Expert systems Architectures: Introduction, Rule-Based System Architectures, Nonproduction System Architectures, Dealing with Uncertainty, Knowledge Acquisition and Validation (15.1 to 15.6from Dan W. Patterson)

Revised Bloom'sTaxonomyLevel	$L_1-Remembering, L_2-Understanding, L_3-Applying, L_4-Analysing$

UNIT-III(10hours)

5. Introduction to Robotics: TheSevenCriteriaofDefiningaRobot,RobotCategories,Sensors,Actuators, EndEffectors, Controllers,Scenario, Givingthe robotinstructions. (Chapter 1fromCameron Hughes)

6. RobotVocabulariesandRSVP: AdditionalEffort,Actions,TheAutonomousRobot'sROLLModel,RSVP (Robot ScenarioVisual Planning):MappingtheScenario, PseudocodeandFlowchartingRSVP. (Chapter 2 and 3fromCameron Hughes)

Revised Bloom'sTaxonomyLevel	$L_1-Remembering, L_2-Understanding, L_3-Applying$

UNIT-IV(10 hours)

7. ActualCapabilitiesofRobot: TheRealityCheckfortheMicrocontroller,SensorRealityCheck,Determine YourRobot'sSensor,Limitations,ActuatorsEnd-EffectorsRealityCheck. (Chapter 4fromCameron Hughes)

8. Sensors: TypesofSensors,SensorInterfacingwithMicrocontrollers,AttributesofSensors,Sensor Calibration. (Chapter 5fromCameron Hughes)

Revised Bloom'sTaxonomyLevel	$L_1-Remembering, L_2-Understanding, L_3-Applying, L_4-Analysing, L_5-Evaluating,$

Course Articulation Matrix: Mapping of Course Outcomes (CO) with Programme Outcomes (PO) and Programme Specific Outcomes (PSO)

No	Programme Outcomes / Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
The students will be able to:																
1	Identify problems that are amenable to solution by AI methods and identify appropriate methods to solve a given problem.	2	2	3	2									3	1	2
2	Illustrate the representation of knowledge and inference using logic.	3	2		3										2	
3	Analyze various control strategies and solve problems using search techniques		3	3	3		2							3		3
4	Apply the learnt concepts to solve simple problems of AI and robotics.		2	1	3	3									2	
5	Demonstrate the knowledge of expert systems and Robotics.				3								3		3	2

Competencies Addressed in the course and Corresponding Performance Indicators

Programme Outcome:Any of 1 to 12 PO's:

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

Competency	Indicators
1. Identify complex engineering problem	i. Students should be able to identify problemsthat require AI solutions ii. Identify the domains where Expert Systems may be developed
2. Design a system and identify system requirements	iii. Analysis of the problem, represent the knowledge iv. Encode the knowledge v. Augment the knowledge vi. Analyze the complexity of the solution
3. Consideration for public health, safety	vii. Designing systems for healthcare, cybersecurity and safety viii. Employ knowledge representation, search, inference, and reasoning abilities
4. Cultural, societal and environmental considerations	ix. Applying the AI for societal needs and environmental protection, especially the problems like conservation of water, conservation of forest, healthcare, telemonitoring, ensuring social and ethical responsibilities, like proctored conduction of examinations

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

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

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

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

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

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

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

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

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

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

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

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

Unit Learning Outcomes (ULO):

Unit Learning Outcome (ULO)	CO	BLL	PI addressed
Identify problems that are amenable to solution by AI methods and identify appropriate methods to solve a given problem.Illustrate the representation of knowledge and inference using logic.	1,2	1,2,4	i, ii, iii, iv, v, and vi
Analyze various control strategies and solve problems using search techniques	3	3,5	vii
Apply the learnt concepts to solve simple problems of AI and robotics.	4	3,4	viii
Demonstrate the knowledge of expert systems and robotics.	5	2, 6	ix

Course Content:

Hours Required	Topic to be covered	Mode of Delivery
01	**What is AI?** AI technique, Criteria for success	i. Chalk and talk in classroom
01	The AI Problems	
01	Underlying assumptions	ii. Lecture combined with discussions
01	Level of the model	
01	**Problems, problem spaces and search** Problem as a state space search	iii. Assignments
01	Production systems,	iv. Group Assignment
01	Problem characteristics,	
01	Production system characteristics,	
01	Issues in the design of search problems,	
01	Additional problems	
01	**Search and control strategies** Introduction	i. Lecture combined with discussions
01	preliminary concepts,	
01	examples of search problems, uniformed or blind search,	ii. Tutorial iii. Assignments

01	Informed search, Searching And-Or graphs	iv.	Group Assignment
01	**Expert system architectures** Introduction,	v.	Seminars, Presentations
01	Rule-based system architectures, Non-production system architectures		
01	Dealing with uncertainty, Knowledge acquisition and validation		
01	Knowledge system building tools		
01	**Introduction to Robotics**		
01	TheSevenCriteriaofDefiningaRobot,		
01	Robot	i.	Lecture combined with discussions
01	Sensors,Actuators,	ii.	Tutorial
01	Categories,EndEffectors, Controllers,Scenario,	iii.	Demonstration
01	Givingthe robotinstructions.	iv.	Group Assignment
01	**RobotVocabulariesandRSVP**	v.	Seminars, Presentations
01	AdditionalEffort,	vi.	Group Discussion
01	Actions,TheAutonomousRobot'sROLLModel		
01	RSVP (Robot ScenarioVisual Planning)		
01	MappingtheScenario		
01	PseudocodeandFlowchartingRSVP.		
01	**ActualCapabilitiesofRobotSensors**		
01	TheRealityCheckfortheMicrocontroller,		
01	SensorRealityCheck	i.	Lecture combined with discussions
01	DetermineYourRobot'sSensor,	ii.	Assignments
01	Limitations,	iii.	Demonstration
01	ActuatorsEnd-EffectorsRealityCheck.	iv.	Group Assignment
01	TypesofSensors,	v.	Seminars, Presentations
01	SensorInterfacingwithMicrocontrollers,		
01	AttributesofSensors,		
01	Sensor Calibration		
01	Revision		
01	Presentations		

Review Questions:

Students should be able to identify problems that require AI solutions			
i. Identify the domains where Expert Systems may be developed			
ii. Analysis of the problem, represent the knowledge			
iii. Encode the knowledge			
iv. Augment the knowledge			
v. Analyze the complexity of the solution			
vi. Designing systems for healthcare, security, and simple applications that require intelligence.			
vii. Employ knowledge representation, search, inference, and reasoning abilities			
viii. Applying the AI for societal needs and environmental protection, especially the problems like conservation of water, conservation of forest, healthcare, telemonitoring, ensuring social and ethical responsibilities, like proctored conduction of examinations			
Review Questions	**ULO**	**BLL**	**PI addressed**
Define Artificial Intelligence. List out the task domains of AI. What is the order of learning of these tasks?	1	1	**i**
Discuss the algorithm which defines the Tic-Tac-Toe game in nine turns. Also comment on the strategy.	1	2	**i**
Discuss the Turing Test as a criterion for success.	1	2	**ii**
State the Water Jug problem. Discuss the rules. Give a possible solution to the problem.	4	6	**vii**
Compare and contrast breadth-first, depth-first and heuristic search techniques.	1	3	**ii**
Explain various characteristics of problems with an example each.	1	2	**i**
Discuss representations and mappings of knowledge with a neat diagram.	1	2	iv
Discuss the types of knowledge representation, with an example each.	1	2	v
Write the algorithm for Simple Hill Climbing technique. Compare and Contrast Hill climbing techniques.	2	5	viii
Demonstrate the impact of heuristic function by taking the blocks-world problem.	2	3	iii
Discuss Simulating annealing with examples.	4	6	viii
With a neat block diagram explain the architecture of a rule-based Expert System.	1	4	iv

Compare the architecture of an expert system with human expert system.	2	4	iv
A robot can replace a human being. Justify.	2	2	x
Discuss the architecture of a simple robot.	3	5	vi
What are the seven criteria to define a robot.	3	2	x
What is the role of sensors in robots.	4	2	iii
Discuss the significance of the controller and end-effectors in a robot.	3	2	viii
In the birthday party, design RSVP for the robot.	4	4	vii
Discuss the calibration of sensors used in robots.	3	5	x

Evaluation Scheme:

Assessment	Marks	Weightage
CIE-I	20	20
CIE-II	20	20
Assignments/ Quizzes/Case Study/ Course Project/Term Paper/Field Work	10	10
SEE	50	50
Total	100	100

Details of Assignment:

Assignment	Marks (10)	CO	PI	CA	PO
Assignment 1: Solution to AI problem, For e.g., Water Jug problem, Cryptarithmeticproblem	2	1	i, ii	1	1,2
Assignment 2: Seminar on a given topicrelated to Unit II	2	2	Iii, iv	2	3,4
Assignment 3: Preparing a Poster of a given topic, related to Unit III	2	3	v, vi	2	5
Assignment 4:Visiting the Robotics lab of our college and prepare a report.	2	4	vii, viii	3	6
Assignment 5:Design a small robot for the purpose of cleaning the floor, pick and place, detection of obstacles.	2	5	ix	4	12

BASAVESHWAR ENGINEERING COLLEGE (AUTONOMOUS), BAGALKOT

MODEL COURSEPLAN

Title of Course	:	Computer Networks	Course Code	:	21UCS502C
Credits	:	4	Contact Hours/ Week	:	4
Total Hours	:	52	Tutorial Hours	:	0
CIE Marks	:	50	SEE Marks	:	100
Semester	:	5	Year	:	2023-24

Prerequisites:

Not Required

Course Objectives:

	The Course objectives are:
1	Have insight into the basic taxonomy and terminology of the computer networking area.
2	Develop proficiency in specific areas of networking such as the design and maintenance of individual networks.

Course Outcomes:

	At the end of the course the student should be able to:
1	Explain the fundamental concepts of Computer Networks.
2	Analyze different network protocols.
3	Apply techniques for efficient handling of Computer Networks.
4	Formulate Routing and Congestion Control Algorithms.
5	Implement Application Layer protocols.

Course Articulation Matrix: Mapping of Course Outcomes (CO) with Programme Outcomes (PO) and Programme Specific Outcomes (PSO)

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	1	3	1	2	1	-	-	-	-	-	-	-	3	-	-
CO3	2	2	3	1	-	-	1	2	-	-	-	-	1	2	3
CO4	1	3	1	3	1	-	-	-	-	-	-	-	3	-	-
CO5	1	2	3	2	-	3	1	1	-	-	-	-	1	2	2

Competencies Addressed in the course and Corresponding Performance Indicators

Programme Outcome: Any of 1 to 12 PO's:

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

Competency	Indicators
1. Demonstrate an ability to identify and formulate complex engineering problem.	i. Students should be able to identify problems that require networking solutions. ii. Identify networking concepts that applies to a given problem.
2. Demonstrate an ability to formulate a solution plan and methodology for an engineering problem	iii. Identify functions and features of layers of network models. iv. Compare and contrast alternative mechanisms to select the best method.
3. Demonstrate an ability to execute a solution process and analyze results	v. Able to apply computer networking principles to routing with required applicability and performance. vi. *Analyze* the features and operations of various protocols. vii. Identify the limitations of the various routing strategies.

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

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

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

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

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

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

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

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

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

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

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

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

Unit Learning Outcomes (ULO):

Unit Learning Outcome (ULO)	CO	BLL	PI addressed
Understand and ***Contrast*** the concept of Signals, OSI & TCP/IP reference models and ***discuss*** the functionalities of each layer in these models.	1,2	1,2	i, ii, iii
Discuss and **Analyse** various addressing schemes, flow control and error control mechanisms and apply them using standard data link layer protocols	1,2	4	iv, v
Apply various routing algorithms to find shortest paths for packet delivery.	4	3	v, vii
Analyze the features and operations of various transport and application layer protocols.	4,5	4	v, vi, vii

Course Content:

Hours Required	Topic to be covered	Mode of Delivery
01	**Introduction:** Data Communications: Components, Data representations, Data flow.	i. Chalk and talk in classroom ii. Lecture combined with discussions iii. Assignments iv. Group Assignment
01	**Networks:** Distributed Processing	
01	Network Criteria and Physical structures	
01	Categories of Networks [LAN, WAN, MAN]	
01	Protocols and Standards, Key elements.	
01	**Network Models:** The OSI Model: layered architecture	
01	Peer to peer processes, and encapsulation, Layers in the OSI Model : [Brief description of all seven layers]	
01	TCP / IP Protocol Suite	
01	**Addressing:** physical, logical and port addresses and specific address	
01	**Physical Layer:** Transmission Impairment, Transmission Modes.	
01	**Data Link Layer:** Introduction, Block Coding	i. Lecture combined with discussions ii. Tutorial iii. Assignments iv. Group Assignment v. Seminars, Presentations
02	Detection and Correction: Cyclic codes: Checksum.	
04	**Data link control:** Framing, Flow and Error control	
02	**Protocols:** Noiseless channels: Noisy channels.	
02	**Channelization:** FDMA, TDMA, CDMA	
02	**Connecting Devices:** Passive Hubs, Repeaters, Active Hubs, Bridges, Routers, Gateways. Virtual LANs**.**	
02	**Network Layer:** Logical Addressing: IPv4 Addresses: Address Space, Notation	i. Lecture combined with discussions ii. Tutorial iii. Demonstration iv. Group Assignment v. Seminars, Presentations vi. Group Discussion
01	Classful Addressing, Classless Addressing	
01	**IPv6 Addresses:** Structure	
01	**Network Layer :** Internet Protocol: IPv4 Datagram	
01	IPv6, Transition from IPv4 to IPv6	
01	**Network Layer:** Address Mapping	
01	**Network Layer:** Address Mapping	
01	**Network Layer:** Delivery, Forwarding & Routing: Delivery	
01	**Forwarding:** Routing Table	
03	**Unicast Routing Protocols:** Distance Vector Routing, Link State Routing, Path Vector Routing.	
01	**Transport Layer:** Process to Process Delivery	i. Lecture combined with discussions ii. Assignments iii. Demonstration
02	UDP: TCP: TCP services, TCP features, Segment	
02	**A TCP connection. SCTP:** SCTP services, SCTP features, Packet format, An SCTP association.	

01	Congestion Control and Quality of Service	iv.	Group Assignment
02	**Congestion control:** Open loop congestion control and closed loop congestion control. Quality of Service.	v.	Seminars, Presentations
02	**Application Layer:** Domain Name System, Name Space, Domain Name Space, DNS In The Internet, Resolution. Registrars		
01	Remote Logging, Electronic Mail and File Transfer: Remote logging: Telnet		
02	**Electronic mail:** Architecture, User Agent, MIME, SMTP POP and IMAP. **File Transfer:** FTP.		
01	**Transport Layer:** Process to Process Delivery		

Evaluation Scheme:

Assessment	Marks	Weightage
CIE-I	40	20
CIE-II	40	20
Assignments/ Quizzes/Case Study/ Course Project/Term Paper/Field Work	10	10
SEE	100	50
Total	190	100

Details of Assignment:

Assignment	Marks (10)	CO	PI	CA	PO
Assignment 1: Quizzes	5	1	i, ii	1	1,2
Assignment 2: Questions on a given topic.	5	1,2,3,4,5	Iii, iv	2	3,4

BASAVESHWAR ENGINEERING COLLEGE(AUTONOMOUS), BAGALKOT

COURSEPLAN

Title of Course	:	Python Application Programming	Course Code	:	UCS065E
Credits	:	03	Contact Hours/ Week	:	03
Total Hours	:	40	Tutorial Hours	:	-
CIE Marks	:	50	SEE Marks	:	100
Semester	:	v	Year	:	2023-2024

Prerequisites:

Programming language

Course Objectives:

	The Course objectives are:
1	Have insight into programming skills in python
2	Have proficiency in designing database applications and network programming

Course Outcomes:

	At the end of the course the student should be able to:
1	Explain syntax and semantics of Python programming structure
2	Demonstrate the use of strings, files, lists, dictionaries and tuples in simple applications
3	Write simple applications using regular expressions, multiple threads
4	Build database applications with GUI
5	Analyze the given problem and select appropriate data types and modules to develop the solution

Course Articulation Matrix: Mapping of Course Outcomes (CO) with Programme Outcomes (PO) and Programme Specific Outcomes (PSO)

No	Programme Outcomes / Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
The students will be able to:															
1	Explain syntax and semantics of Python programming structure	1	2	2		1								2		
2	Demonstrate the use of strings, files, lists, dictionaries and tuples in simple applications	2	3	3		1								3	1	1
3	Write simple applications using regular expressions, multiple threads	3	3	3		1								3	1	1
4	Build database applications with GUI	3	3	3		1								3	1	3
5	Analyze the given problem and select appropriate data types and modules to develop the solution.	2	3	1		1								3	1	1

Competencies Addressed in the course and Corresponding Performance Indicators

Programme Outcome:Any of 1 to 12 PO's:

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

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

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

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

Competency	Indicators
1.1 Demonstrate competence in engineeringfundamentals	i. Apply engineering fundamentals
1.2 Demonstrate competence in specialized engineering knowledgegetotheprogram	ii.Apply theory and principles of computer science and engineering to solve an engineering problem
2.1 Demonstrate an ability to identify and formulate complex engineering problem	iii. Evaluate problem statements and identifiesobjectives iv.Identify processes/modules/algorithms of a computer-based system and parameters to solve aproblem
2.2 Demonstrate an ability to formulate a solution plan and methodology for an engineering problem	v.Compareandcontrastalternativesolution/methodstoselectthebestmethods
2.3 Demonstrate an ability to execute a solution process and analyze results	vi.Appliesengineeringmathematicstoimplementthesolution.
3.1 Demonstrate an ability to define a complex/ open-ended problem in engineeringterms	vii.Abletodefineapreciseproblemstatementwithobjectivesandscope.
5.1Demonstrate an ability to identify/create modern engineering tools, techniques andresources	viii.Adapt tools and techniques to solve engineeringproblems

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

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

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

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

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

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

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

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

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

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

Unit Learning Outcomes (ULO):

Unit Learning Outcome (ULO)	CO	BLL	PI addressed
Demonstrate the basic constructs of python programming language	1,2,5	1,2,3,4	i,ii,iii,iv
Analyze the given problem and select appropriate data types and modules to develop the solution.	1,2,5	1,2,3,4,5	Iii,iv,v,vi,vii,viii
Write programs using regular expressions and network programming	1,3,5	1,2,3,4,5	Iii,iv,v,vi,vii,viii
Build applications using thread and database and GUI concepts	1,4,5	2,3,4,5,6	Iii,iv,v,vi,vii,viii

Course Content:

Hours Required	Topic to be covered	Mode of Delivery
01	**Datatypes in python:** comments in python, Docstrings, how python sees variables, Datatypes in python	**Chalk and talk in classroom/Lecture with a quiz/ Assignments/ Demonstration/Group Discussion**
01	Sequences in python, Literals in python, Determing the data type of a variable, Identifiers and reserved words, Naming conventions in python	
01	**Operators in Python:** Operator, operator precedence and associativity, Mathematical functions	
01	**Input and Output:** Output statements, Input statements, Command Line arguments	
01	**Control Statements**	
01	**Control Statements**	
01	**Control Statements**	
01	**Strings and Characters**	
01	**Strings and Characters**	
01	**Strings and Characters**	
01	**Functions:** Defining a function, calling a function, Returning Results from a function, Returning multiple values from a function	**Chalk and talk in classroom/Lecture with a quiz/ Assignments/ Demonstration/Group Discussion**
01	Formal and actual arguments, local and global variables, passing a group of elements to a function, recursive functions, the special variable __name__	
01	**Lists and tuples: lists**	
01	**Lists and tuples: lists**	
01	**tuple**	
01	**Dictionaries**	
01	**Dictionaries**	
01	**Exceptions:** exceptions, exception handling, types of exceptions, user defined exceptions	
01	**Files in python:** files, types of files in python, opening a file, closing a file	
01	working with text files containing strings, working with binary files, pickle in python	
01	**Regular Expressions in python**	**Chalk and talk in classroom/Lecture with a quiz/ Assignments/ Demonstration/Group Discussion**
01	**Regular Expressions in python**	
01	**Regular Expressions in python**	
01	**Object Oriented Programming:**Classes and Objects, Creating Classes in Python, Creating Objects in Python	

01	The Constructor Method, Classes with Multiple Objects	
01	Class Attributes versus Data Attributes	
01	Encapsulation, Inheritance, The Polymorphism	
01	**Networking in python**	
01	**Networking in python**	
01	**Networking in python**	
01	**Threads**	**Chalk and talk in classroom/Lecture with a quiz/ Assignments/ Demonstration/Group Discussion**
01	**Threads**	
01	**Threads**	
01	**Graphical user Interfaces**	
01	**Graphical user Interfaces**	
01	**Graphical user Interfaces**	
01	**Graphical user Interfaces**	
01	**How to work with Database**: How to use SQLite Manager to work with a database	
01	How to use python to work with database	
01	How to use python to work with database	

Review Questions:

Review Questions	ULO	BLL	PI addressed
Explain the following basic data types of python i) int ii) bool iii) complex	1	L2	i
Write the output of the following print statements, i. print(10//3) ii. print ('hello' and 'hi') iii. print (oct(12)) iv. print('hello woRLD'.title())	1	L3	ii
Write a syntax of the following if –elif-else ii) for with range function	1	L2	i
Write a python program to check whether given number is prime or not	1	L4	iii,iv,viii
Define tuple in python and state the difference between tuple and list	2	L1	v
Write a python program to convert a list of characters into a string object.	1	L4	iii,iv
Explain the use of following member functions of tuple class with example,	2	L2	iii

i)index ii) count			
Write a python program to create a dictionary that contains each vowel as keys and the number of occurrences of each vowels in a given string as values.	2	L6	Iii,iv,viii
Write syntax for defining user defined function in python	2	L2	iii
Write a python program to create user defined function FIND () which accepts the string as argument and returns the minimum and maximum letter in string and also length of the string. Find the length of string without using built in function. Print the returned values on console.	2	L3	iii,iv,viii
List and explain the different file opening modes.	2	L2	iii
Write a python program to count number of lines in a given file and also print each line stored in a file on console.	2	L4	iii,iv,viii
Define regular expression. Illustrate with example uses of the following characters in regular expression i) \d ii) * iii) {m} iv) \A v) [..]	3	L5	Iii,iv,vi
Write a python program to create a class Rectangle with instance variable width and height. Use constructor to initialize instance variables and define method area () to find area of rectangle	3	L3	iii,iv,viii
Develop a Python program to check the validity of a password given by the user. The Password should satisfy the following criteria: 1. Contain at least 1 letter between a and z 2. Contain at least 1 number between 0 and 9 3. Contain at least 1 letter between A and Z 4. Contain at least 1 character from $, #, @ 5. Minimum length of password: 6 6. Maximum length of password: 12	3	L6	Iii,iv,vi,viii
Define socket? Write a python program that makes a connection to a web server and follows the rules of HTTP protocol to request a plain test document and display what server sends back.	3	L3	Iii,iv,v,vi,viii
Write python programs to create two threads that perform withdraw and deposit operation on same account. In case a race condition occurs in above situation then modify a program to synchronize the threads.	4	L5	Iii,iv,v,vi,viii
Define cursor? Explain connect, execute and close command of databases with suitable example.	4	L3	Iii,iv

Write a python a code to establish a database connection to 'Empdb' and display the gross salary paid to the employees working in the 'Quality Control' department. Assume the employee table has already been created and exists in 'Empdb'. The fields of employee table are (EMPID,deptName,GrossSalary).	4	L4	Iii,iv,v,vi,vii,viii
Define TKinter and list the steps that are required to set GUI up and running	4	L1	iii
Design GUI to calculate a Age of a person. Input date of birth using Entry widget and use pushbutton to calculate age. Print the calculated age using label widget.	4	L6	Iii,iv,v,vi,vii,viii

Evaluation Scheme:

Assessment	Marks	Weightage
CIE-I	40	20
CIE-II	40	20
Assignments/ Quizzes/ Case Study/ Course Project/ Term Paper/Field Work	10	10
SEE	100	50
Total	190	100

Details of Assignment:

Assignment	Marks (10)	CO	PI	CA	PO
Development of web application for real time problem using GUI and SQLite in Team	05	4	iii,iv,v,vi,vii,viii		2,3

COURSE PLAN

22UCS503C		Credits: 03
L:T:P - 2 : 0: 2	**Web Technologies**	CIE Marks: 50
Total Hours/Week: 40		SEE Marks: 50

Prerequisites: Java, DBMS

Course Objectives:

SI No	The Course objectives are:
1	Have insight into World Wide, HTML/XHTML, Java Script, PHP.
2	Have proficiency in design of web applications which will work with database.

Course Outcomes:

SI No	At the end of the course the student should be able to:
1.	Explain the basics of World Wide Web.
2.	Implement web concepts using different tools like HTML/CSS/JavaScript PHP.
3.	Design dynamic web pages using JavaScript.
4.	Design server-side pages using PHP.
5.	Develop web application for real world problem.

Course Articulation Matrix: Mapping of Course Outcomes (CO) with Programme Outcomes (PO) and Programme Specific Outcomes (PSO)

No	Programme Outcomes / Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
The students will be able to:																
1.	Explain the basics of World Wide Web.	1														
2.	Implement web concepts using different tools like HTML/CSS/JavaScript PHP.		3	3		2								1		
3.	Design dynamic web pages using JavaScript.		3	3		2								1		
4.	Design server-side pages using PHP.		3	3		2								2		

5.	Develop web application for real world problem.		3	3		2								2	1	2

Competencies Addressed in the course and Corresponding Performance Indicators

Programme Outcome: Any of 1 to 12 PO's:

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

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

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

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

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

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

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

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

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

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

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

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

PO NO	Competency	Indicators
1	1.3 Demonstrate competence in engineering fundamentals.	1.6.1 Apply fundamental engineering concepts to solve engineering problems.
2	2.5 Demonstrate an ability to identify and formulate complex engineering problem	2.5.1 Evaluate problem statements and identifies objectives 2.5.2 Identify modules/algorithms of a computer based system and parameters to solve a problem
	2.7 Demonstrate an ability to formulate and interpret a model	2.7.1 Able to apply computer engineering principles to formulate modules of a system with required applicability and performance. 2.7.2 Identify design constraints for required performance criteria.
	2.8 Demonstrate an ability to execute a solution process and analyze results	2.8.3 Identify the limitations of the Solution and sources/causes.
3	3.5 Demonstrate an ability to define a complex/ open-ended problem in engineering terms	3.5.1 Able to define a precise problem statement with objectives and scope
	3.8 Demonstrate an ability to advance an engineering design to defined end state	3.8.3 Able to verify the functionalities and validate the design.

5	5.4 Demonstrate an ability to identify/create modern Engineering tools, techniques and resources.	5.4.1 Identify modern engineering tools, techniques and resources for engineering activities 5.4.2 Create/adapt/modify/extend tools and techniques to solve engineering problems
8	8.3 Demonstrate an ability to recognize ethical dilemmas.	8.3.1 Identify situations of unethical professional conduct and propose ethical Alternatives.
12	12.5 Demonstrate an ability to identify changing trends in engineering knowledge and Practice.	12.5.1. Identify historic points of technological advance in engineering that required practitioners to seek education in order to stay current

Unit Learning Outcomes (ULO):

Unit Learning Outcome (ULO)	CO	BLL	PI addressed
UNIT-I 1. Understand the basic concepts of web programming. 2. Create web pages using HTML tags 3. Write HTML code for given specification.	1 ,2,3	2,3	1.6.1 2.5.1 2.5.2 2.7.1 2.7.2 2.8.3
UNIT-II 1. Create web pages using CSS. 2. Understand the concepts of JavaScript. 3. Write simple Java Scripts for given problem.	1 & 2	2,3,4	1.6.1 2.5.1 2.5.2 2.8.3 3.5.1 3.8.3
UNIT-III . 1. Understand the concepts of dynamic documents with JavaScript. 2. Create web pages for given problem to validate the input using JavaScript 3. Create dynamic web pages using JavaScript.	1,3,4	2,3,5	1.6.1 2.5.1 2.5.2 2.8.3 3.5.1 3.8.3 5.4.1 5.4.2 8.3.1
UNIT-IV 1. Understand the concepts of PHP 2. Develop web applications using PHP and SQL	1,3,4	2,3,5	1.6.1 2.5.1 2.5.2 2.8.3 3.5.1 3.8.3 5.4.1 5.4.2 8.3.1

Course Content:

Hours Required	Topic to be covered	Mode of Delivery
01	**Fundamentals of Web** XHTML : Internet, WWW, Web Browsers, and Web Servers;	1. **Chalk and talk in classroom** 2. **Lecture combined with discussions of programs** 3. **Group Assignment**
01	URLs; MIME; HTTP;	
01	The Web Programmers Toolbox.	
01	**XHTML:** Origins and evolution of HTML and XHTML; Basic syntax; Standard XHTML document structure	
01	Basic text markup. XHTML : Images; Hypertext Links; Lists; Tables;	
01	Forms; Frames; Syntactic differences between HTML and XHTML.	
01	**CSS:** Introduction; Levels of style sheets; Style specification formats; Selector forms;	1. **Lecture combined with discussions** 2. **Programs** 3. **Demonstration** 4. **Group Assignment**
01	Property value forms; CSS: Font properties;	
01	List properties; Color; Alignment of text; The Box model; Background images; The <span> and <div> tags; Conflict resolution.	
01	**JAVASCRIPT:** Overview of Javascript; Object orientation and Javascript; General syntactic characteristics; Primitives, operations, and expressions;	
01	Screen output and keyboard input; Control statements; Object creation and modification; Arrays; Functions; Constructor;	
01	Pattern matching using regular expressions; Errors in scripts; Examples.	
01	**JAVASCRIPT AND HTML DOCUMENTS:** The Javascript execution environment; The Document Object Model; Element access in Javascript;	1. **Lecture combined with discussions** 2. **Programs** 3. **Demonstration** 4. **Group Assignment**
01	Events and event handling: Handling events from the Body elements,	
01	Button elements, Text box and Password elements;	
01	**DYNAMIC DOCUMENTS WITH JAVASCRIPT:** Introduction to dynamic documents; Positioning elements;	
01	Moving elements; Element visibility;	

01	Changing colors and fonts; Dynamic content; Stacking elements;	
01	**Introduction to PHP:**Origins and Uses of PHP, Overview of PHP, General Syntactic Characteristics, Primitives, Operations, and Expressions, Output,	1. **Lecture combined with discussions** 2. **Programs** 3. **Demonstration** 4. **Group Assignment**
01	Control Statements	
01	Arrays, Functions, Pattern Matching, Form Handling ,	
01	Cookies, Session Tracking.	
01	**Database Access through the Web:** Database Access with PHP	
01	**Database Access through the Web:** Database Access with PHP	

Review Questions:

Review Questions	ULO	BLL	PI addressed
Explian the following tags with example. i.<blockqoute> ii. <pre> iii. <select>	1	2	1.6.1
Create HTML document that describes nested ordered list of diseases. The outer list must have names of two disease.Inside each of disease there must be two symptoms of the disease. The outer list must use uppercase roman numeral and the inner list must use uppercase letters. All of the styles must be in an external stylesheet.	1	3	2.5.1 2.5.2
Explain how to access elements in JavaScript with an example.	2	2	1.6.1
Create HTML document which displays three radio buttons labeled as VISA, DISCOVER and CASH. The event handler for these radio buttons must produce message stating the chosen payment mode. Assign event handler to event property of radio button elements.	2	4	1.6.1 2.5.1 2.5.2 3.8.3
Explain the PHP.	3	2	1.6.1
Develop HTML form to collect EMPLOYEE details such as name, id, designation, gross salary from user to store details in database EMP_DETAILS using PHP and SQL.	3	4	2.8.3 3.8.3 5.4.1 5.4.2
Develop a cookies and session tracking applications.	4	4	2.7.1 2.7.2 2.8.3 3.8.3 5.4.1

		5.4.2 8.3.1

Evaluation Scheme:

Assessment	Marks	Weight age
CIE-I	40	20
CIE-II	40	20
Regular Lab and Lab CIE(Assignment)	10	10
SEE	100	50
Total	150	100

Details of Assignment:

Assignment	Marks (10)	CO	PI	CA	PO
Assignment 1: Miniproject real world application	5	1	1.6.1 2.5.1 2.5.2		1,2
Assignment 2: Regular Lab and Lab CIE	5	2,3, 4	2.7.1 2.7.2 2.8.3 3.8.3 5.4.1 5.4.2 8.3.1		2,3,5, 8

BASAVESHWAR ENGINEERING COLLEGE (AUTONOMOUS), BAGALKOT

COURSE PLAN

Title of Course	:	Web Programming	Course Code	:	21UCS004N
Credits	:	3	Contact Hours/ Week	:	3
Total Hours	:	40	Tutorial Hours	:	0
CIE Marks	:	50	SEE Marks	:	50
Semester	:	5	Year	:	2023-24

Prerequisites:

C programming,

Course Objectives:

	The Course objectives are:
1	Become familiar with basic principles of web programming toward problem solving, inference, perception, knowledge representation, and learning.
2	Investigate applications of web programming in business and enterprise solutions.
3	Explore the current scope, potential, limitations, and implications of web programming
5	Design and web program for small business systems.

Course Outcomes:

	The Course objectives are:
1	Implement web concepts using different tools like HTML/XHTML/CSS/JavaScript /XML/XSLT/jQuery/AngularJS.
2	Design web applications using client-side Java Scripts.
3	Implement web applications using server –side PHP.
4	Develop web application for real world problem.
5	Apply the web design principles for web sites.

Course Articulation Matrix: Mapping of Course Outcomes (CO) with Programme Outcomes (PO) and Programme Specific Outcomes (PSO)

No	Programme Outcomes / Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
The students will be able to:																
1	Implement web concepts using different tools like HTML/XHTML/CSS/JavaScript/XML/XSLT/jQuery/AngularJS.	2	2	3	2									3	1	2
2	Design web applications using client-side Java Scripts.	3	2		3										2	
3	Implement web applications using server –side PHP.		3	3	3		2							3		3
4	Develop web application for real world problem.		2	1	3	3									2	
5	Apply the web design principles for hosting web sites.				3								3		3	2

Competencies Addressed in the course and Corresponding Performance Indicators

Programme Outcome: Any of 1 to 12 PO's:

Competency	Indicators
1. Identify complex engineering problem	i. Students should be able to identify problems that require web programming solutions ii. Identify the domains where web site may be developed
2. Design a system and identify system requirements	iii. Analysis of the problem, represent the solution using web applications iv. Analyze the complexity of the web programming solution
3. Consideration for public health, safety	v. Designing systems for healthcare, cybersecurity and safety vi. Employ dynamic web programming abilities
4. Cultural, societal and environmental considerations	vii. Applying the web solutions for societal needs and environmental protection, especially the problems

	like healthcare, telemonitoring, like proctored conduction of examinations

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

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

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

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

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

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

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

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

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

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

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

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

Unit Learning Outcomes (ULO):

Unit Learning Outcome (ULO)	CO	BLL	PI addressed
Identify problems that are amenable to solution by web programming methods. Illustrate the dynamic web application creation.	1,2	1,2,4	i, ii, iii, iv, v, and vi

Analyze various dynamic web programming methodologies	3	3,5	vii
Apply solution to real time problems using web solutions.	4	3,4	viii
Demonstrate the knowledge of intelligent system creation using web programming	5	2, 6	ix

Course Content:

Hours Required	Topic to be covered	Mode of Delivery
01	A Brief Introduction to the Internet	i. Chalk and talk in classroom ii. Lecture combined with discussions iii. Assignments iv. Group Assignment
01	The World Wide Web	
01	Web Browsers	
01	Web Servers	
01	Uniform Resource Locators	
01	Origins and Evolution of HTML	
01	Basic Syntax	
01	Standard HTML Document Structure, Basic Text Markup,	
01	Images, Hypertext Links, Lists;	i. Lecture combined with discussions ii. Tutorial iii. Assignments iv. Group Assignment v. Seminars, Presentations
01	Tables, Forms :The Audio Element,	
01	The Video Element, Organization Elements, The Time Element,	
01	Syntactic Differences between HTML and XHTML.	
01	**Cascading Style Sheets:** Introduction, Levels of Style Sheets,	
01	Style Specification Formats, Selector Forms, Property-Value Forms, Font Properties	
01	List Properties, Alignment of Text, Color: The Box Model,	
01	Background Images, The span and div Tags, Conflict Resolution.	
01	Overview of JavaScript, Object Orientation and JavaScript, General Syntactic Characteristics, Primitives, Operations, and Expressions,	
01	Screen Output and Keyboard Input, Control Statements, Object Creation and Modification	i. Lecture combined with discussions ii. Tutorial iii. Demonstration iv. Group Assignment v. Seminars, Presentations vi. Group Discussion
01	Arrays, Functions, And Example, Constructors, Pattern Matching Using Regular Expressions.	
01	**JavaScript and HTML Documents:** The JavaScript Execution Environment**,** The Document Object Model**,**	
01	Element Access in JavaScript**,** Events and Event Handling.	

01	Handling Events from Body Elements,
01	Handling Events from Button Elements
01	Handling Events from Textbox and Password,
01	Introduction, Positioning Elements,
01	: Moving Elements,
01	Element Visibility,
01	Changing Colors and Fonts,
01	Dynamic Content, Stacking Elements
01	, Locating the Mouse Cursor, Reacting to a Mouse Click,
01	Slow Movement of Elements,
01	Dragging and Dropping Elements.
01	Origins and Uses of PHP, Overview of PHP,
01	General Syntactic Characteristics,
01	Primitives, Operations, and Expressions
01	Output, Control Statements,
01	Arrays, Functions, Pattern Matching,
01	Form Handling ,Cookies, Session Tracking.
01	Database Access with PHP and MySQL.

Method column (spanning rows):
i. Lecture combined with discussions
ii. Assignments
iii. Demonstration
iv. Group Assignment
v. Seminars, Presentations

Review Questions:

i.	ii. Students should be able to identify problems that require web programming solutions
	iii. Identify the domains where web application may be developed
iv.	Design html page using style sheets
v.	vi. Designing systems for healthcare, cybersecurity and safety
	vii. Employ dynamic web programming technique
viii.	ix. Design web application for business applications

Review Questions	ULO		BLL	PI addressed
What are the Basic text markup tags illustrated with example.	7	1	1	1.1.1
Create XHTML document to describe an unordered list of at least four countries. Each element of the list must have a nested list of at least three states in the country.	8	4	2	2.1.1
How table created in HTML and explain the Basic table tags with an example.	7	2	1	1.1.2
Create XHTML document that has a form with following controls i) Text box to collect user name. ii) Four check boxes for weight	8	4	4	1.1.2

representation(40kg,50kg,60kg,70kg) iii) Three radio button for representation of bank card(Visa, Master, Discover)				
Describe the methods in Math, Number, string and Date object with examples.	7	2	2	2.1.2
Write java script to compute the real roots of a given quadratic equation. Get the coefficient of the equation from the user.	8	3	2	4.4.1
Explain Document object model in Java script. How element access is done in Java Script? Give Example.	7	1	3	1.2.1
Write HTML document and Java script to Illustrate the form element validation to HTML document that displays the text boxes for a customer name and phone number.	8	3	4	1.4.1
Describe the positioning elements using Java script for three different types positioning.	7	2	3	2.1.2
Write HTML document with Java script that must contain for short paragraph of text stacked on top of each other with only enough of each.	8	4	2	3.1.2
How elements and attributes declared in HTML document? Give example.	7	2	1	2.3.1
Write the DTD for describing planes(Year, make, color, price, seller, location(city, state)). Represent the XML document that is valid for the planes DTD.	8	4	4	2.1.2
Explain the two different types of JSP page architecture. Write the functions of components of this model with block diagram.	7	2	2	2.1.1
List the JSP elements. Explain Directive and scripting elements of JSP page with example.	8	2	3	2.1.3
Identify the actions elements in JSP. Illustrate implementation of these using program examples.	8	4	1	4.3.1
Explain the EJB architecture in detail by exploring the functions of EJB server, EJB Container.	7	2	3	1.4.1
Identify the classification of EJBs. Explain lifecycle of a stateless session Bean with block diagram.	8	4	4	2.4.2
Explain the EJB architecture in detail by exploring the functions of EJB server, EJB Container.	7	2	3	1.4.1

Evaluation Scheme:

Assessment	Marks	Weightage
CIE-I	20	20
CIE-II	20	20
Assignments/ Quizzes/ Case Study/ Course Project/ Term Paper/Field Work	10	10
SEE	50	50
Total	100	100

Details of Assignment:

Assignment	Marks (10)	CO	PI	CA	PO
Assignment 1: Design and develop static web page using HTML to demonstrate tables, different forms of hypertext links and frames.	2	1	i, ii	1	1,2
Assignment 2: Design and develop web page to demonstrate CSS (Use different font styles, set background image for both the page and single elements on page, Control the repetition of image with background-repeat property, define style for links as a:link, a:active, a:hover,a:visited)	2	2	Iii, iv	2	3,4
Assignment 3: Develop dynamic web page to demonstrate Positioning Elements, Moving Elements, Implement web page to demonstrate Element Visibility, Changing Colors and Fonts,	2	3	v, vi	2	5
Assignment 4 Develop dynamic web page to demonstrate Dynamic Content, Develop dynamic web page to demonstrate Stacking Elements, Locating the Mouse Cursor, reacting to a Mouse Click	2	4	vii, viii	3	6
Assignment 5: PHP program to demonstrate Cookie creation, display and deletion.	2	5	ix	4	12