

Advances in Computer Networks			
Course Code	22VSC13	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	03:0:02	SEE Marks	50
Total Hours of Pedagogy	50	Total Marks	100
Credits	04	Exam Hours	03
<b>Course Learning objectives:</b> <ul style="list-style-type: none"><li>• Classify the various Advanced internetworking Techniques.</li><li>• Survey various wired and wireless networking technologies</li><li>• Discover the different Congestion Control methods, quality of service.</li></ul>			
<b>Module-1</b>			
<b>Module 1:</b> Internetworking: Switching and Bridging, Basic Internetworking, Routing, Software Defined Networks ,Broader Perspective			
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation		
<b>Module-2</b>			
<b>Module 2:</b> Advanced Internetworking, Global Internet, Multicast, Multiprotocol Label Switching, Routing Among Mobile Devices, Broader Perspectiv			
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation		
<b>Module-3</b>			
<b>Module 3:</b> End-to-End Protocols, Simple De multiplexor (UDP), Reliable Byte Stream (TCP), Remote Procedure Call, Transport for Real-Time (RTP), Broader Perspective			
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation		
<b>Module-4</b>			
<b>Module 4:</b> Congestion Control, Issues in Resource Allocation, Queuing Disciplines, TCP Congestion Control, Advanced Congestion Control, Quality of Service, Broader Perspective			
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation		
<b>Module-5</b>			
<b>Module 5:</b> End-to-End Data & Network Security, Presentation Formatting, Multimedia Data, Broader Perspective, Trust and Threats, Cryptographic Building Blocks, Key Pre distribution, Authentication Protocols, Example Systems, Broader Perspective			
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation		

### **Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### **Continuous Internal Evaluation:**

1. Three Unit Tests each of **20 Marks**
2. Two assignments each of **20 Marks** or **one Skill Development Activity of 40 marks** to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

**CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

#### **Semester End Examination:**

1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
2. The question paper will have ten full questions carrying equal marks.
3. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
4. Each full question will have a sub-question covering all the topics under a module.
5. The students will have to answer five full questions, selecting one full question from each module

#### **Suggested Learning Resources:**

##### **Text Books:**

1. Larry Peterson and Bruce Davie, Computer Networks - A Systems Approach, Morgan Kaufmann, 6th edition, 2022

##### **Reference books:**

1. James F. Kurose and Keith W. Ross, Computer Networking A Top-Down Approach, Pearson, 8th edition, 2022
2. William Stallings, Data and Computer Communications, Pearson, 5th edition, 2017

#### **Web links and Video Lectures (e-Resources):**

- <https://www.youtube.com/watch?v=DRhWaTE62oM>

#### **Skill Development Activities Suggested**

- The students with the help of the course teacher can take up technical –activities which will enhance their skill or the students should interact with industry (small, medium and large), understand their problems or foresee what can be undertaken for study in the form of research/testing/projects, and for creative and innovative methods to solve the identified problem. The prepared report shall be evaluated for CIE marks.

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to :

<b>Sl. No.</b>	<b>Description</b>	<b>Blooms Level</b>
C01	Illustrate the working of different internetworking techniques	L2
C02	Explain the concept of UDP,TCP and RTP in networking	L2
C03	Demonstrate End-to-End Data & Network Security(can be attained through assignment or CIE)	L3
C04	Evaluate the existing network and improve its quality of service (can be attained through assignment or CIE)	L3

**Program Outcome of this course**

Sl. No.	Description	POs
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and business systems to the solution of complex engineering and societal problems.	PO1
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering and business problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	PO2
3	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.	PO3
4	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.	PO4
5	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	PO5
6	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 and business practices.	PO6
7	Environment and sustainability: Understand the impact of the professional engineering solutions in business societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	PO7
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering and business practices.	PO8
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	PO9
10	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.	PO10
11	Project management and finance: Demonstrate knowledge and understanding of the engineering, business 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.	PO11
12	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.	PO12

Mapping of COS and POs												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	X	X										
CO2		X										
CO3			X		X							
CO4			X	X								

ADVANCED ALGORITHMS			
Course Code	22VSC14	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	2:0:2	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning objectives:</b> <ul style="list-style-type: none"><li>• Select advanced / novel algorithm design strategies and techniques.</li><li>• Recognize advanced topics in algorithmic and complexity theory.</li><li>• Interpret sturdy / open problems in algorithmic or complexity theory by analyzing known approaches and their limitations</li></ul>			
<b>Module-1</b>			
<b>Analysis Techniques:</b> Growth of Functions: Asymptotic notations; Standard notations and common functions; Recurrences and Solution of Recurrence equations- The substitution method, The recurrence – tree method, The master method; Amortized Analysis: Aggregate, Accounting and Potential Methods.			
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation		
<b>Module-2</b>			
<b>Graph Algorithms:</b> Bellman - Ford Algorithm; Single source shortest paths in a DAG; Johnson’s Algorithm for sparse graphs; Flow networks and Ford-Fulkerson method; Maximum bipartite matching. Polynomials and the FFT: Representation of polynomials; The DFT and FFT, Elementary number-theoretic notions.			
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation		
<b>Module-3</b>			
<b>Number -Theoretic Algorithms:</b> Elementary notions; GCD; Modular Arithmetic; Solving modular linear equations; The Chinese remainder theorem; Powers of an element; RSA cryptosystem; Primality testing; Integer factorization			
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation		
<b>Module-4</b>			
<b>String-Matching Algorithms:</b> Naïve string Matching; Rabin - Karp algorithm; String matching with finite automata; Knuth-Morris-Pratt algorithm; Line-segment properties.			
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation		
<b>Module-5</b>			
<b>Probabilistic and Randomized Algorithms:</b> Probabilistic algorithms; Randomizing deterministic algorithms, Monte Carlo and Las Vegas algorithms; Probabilistic numeric algorithms			
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation		

### **Assessment Details (both CIE and SEE)**

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#### **Continuous Internal Evaluation:**

1. Three Unit Tests each of **20 Marks**
2. Two assignments each of **20 Marks** or one **Skill Development Activity of 40 marks** to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

**CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

#### **Semester End Examination:**

1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
2. The question paper will have ten full questions carrying equal marks.
3. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
4. Each full question will have a sub-question covering all the topics under a module.
5. The students will have to answer five full questions, selecting one full question from each module

#### **Suggested Learning Resources:**

##### **Text Books:**

1. Introduction to Algorithms T. H Cormen, C E Leiserson, R L Rivest and C Stein PHI 3rd Edition, 2010
2. Algorithms Kenneth A. Berman Cengage Learning 2002.

##### **Reference books:**

1. Fundamentals of Computer Algorithms Ellis Horowitz, Sartaj Sahni, S.Rajasekharan Universities press 2nd Edition, 2007

#### **Web links and Video Lectures (e-Resources):**

- <https://www.youtube.com/watch?v=0JUN9aDxVml>
- <https://nptel.ac.in/courses/106104019>

#### **Skill Development Activities Suggested**

- The students with the help of the course teacher can take up technical –activities which will enhance their skill or the students should interact with industry (small, medium and large), understand their problems or foresee what can be undertaken for study in the form of research/testing/projects, and for creative and innovative methods to solve the identified problem. The prepared report shall be evaluated for CIE marks.

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to :

<b>Sl. No.</b>	<b>Description</b>	<b>Blooms Level</b>
C01	Explain the key techniques and theory behind the type of random variable and distribution	L2
C02	Apply effectively the various algorithms for applications involving probability and statistics in computing	L2
C03	Design and build solutions for a real world problem by applying relevant distributions(can be attained through assignment or CIE)	L3
C04	Apply a range of appropriate algorithms to example problems(can be attained through assignment or CIE)	L3



**Program Outcome of this course**

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3	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.	PO3
4	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.	PO4
5	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	PO5
6	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 and business practices.	PO6
7	Environment and sustainability: Understand the impact of the professional engineering solutions in business societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	PO7
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering and business practices.	PO8
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	PO9
10	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.	PO10
11	Project management and finance: Demonstrate knowledge and understanding of the engineering, business 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.	PO11
12	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.	PO12

**Mapping of COS and POs**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	X											
CO2		X										
CO3			X		X							
CO4			X	X								

Principles of Artificial Intelligence and Machine Learning			
Course Code	22VSC15/22VSA15	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	2:0:2	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning objectives:</b> <ul style="list-style-type: none"><li>Explain the concept of Artificial Intelligence and its relevance and application to real world problems machine learning and apply them</li><li>Interpret various problem solving paradigms and knowledge representation.</li><li>Select comprehend machine learning techniques for solving problems</li><li>Choose problem solving planning techniques and apply appropriately</li></ul>			
<b>Module-1</b>			
Introduction to AI, Problem Solving: Production System, State Space search, control strategies, Characteristics of the problem, Exhaustive searches: Depth first iterative deepening, bidirectional search, Heuristic search techniques: General purpose heuristics, branch and bound search, Hill climbing, Beam Search, A* algorithm, Optimal Solution by A* algorithm, Iterative – deepening A*, Constraint Satisfaction			
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation		
<b>Module-2</b>			
Problem reduction and Game playing: Problem Reduction, Game Playing, Bounded Look Ahead Strategy, Alpha Beta Pruning Logic concepts: Propositional Calculus, Propositional logic, Natural deduction system, Predicate Logic: Predicate Calculus, First order predicate calculus, interpretation of Formulae in FOL, Satisfiability and			
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation		
<b>Module-3</b>			
Advanced problem-solving paradigm: planning, Types of Planning Systems, logic based planning, linear planning, means ends analysis, Non-linear planning strategies, learning plans Knowledge representation: Approaches, Knowledge representation using Semantic Network, Extended Semantic Networks for Knowledge representation, Use of frames for Knowledge representation			
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation		
<b>Module-4</b>			
Machine Learning Paradigms: Machine learning system, supervised and unsupervised learning, Bayesian Network, Bayes’ theorem, Inductive, deductive learning, Clustering			
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation		
<b>Module-5</b>			
Support vector Machine, case-based reasoning and learning, Artificial Neural Network (ANN): Single Layer, Multilayer. RBF, Design issues in ANN, Recurrent Networks			
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation		

### **Assessment Details (both CIE and SEE)**

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4. Each full question will have a sub-question covering all the topics under a module.
5. The students will have to answer five full questions, selecting one full question from each module

#### **Suggested Learning Resources:**

##### **Text Books:**

1. Artificial Intelligence: SarojKaushik Cengage Learning 2014 Edition

##### **Reference Books:**

- 1 Artificial Intelligence: Structures, and Strategies for Complex Problem Solving George F Luger Pearson Addison Wesley 6th Ed, 2008
- 2 Artificial Intelligence E Rich, K Knight, and S B Nair Tata Mc-Graw Hill 3rd Ed, 2009
- 3 Artificial Intelligence: A Modern Approach Stuart Russell and Peter Norvig Prentice Hall 3rd, 2009

#### **Web links and Video Lectures (e-Resources):**

- <http://www.aaai.org>
- <http://www.eccai.org>
- <http://www.ai.mit.edu>
- [http://www.dfki.de/web/welcome?set\\_language=en&cl=en](http://www.dfki.de/web/welcome?set_language=en&cl=en)

#### **Skill Development Activities Suggested**

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**Course outcome (Course Skill Set)**

At the end of the course the student will be able to :

<b>Sl. No.</b>	<b>Description</b>	<b>Blooms Level</b>
C01	Apply various problem solving and planning approaches (can be attained through assignment or CIE)	L4
C02	Illustrate foundation principles, mathematical tools and paradigms of AI	L2
C03	Apply problem solving techniques to solve real world problems(can be attained through assignment or CIE)	L3
C04	Develop a good understanding of fundamental principles of machine learning and analyze them	L4

**Program Outcome of this course**

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**Mapping of COS and POs**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	x	x		x								x
CO2	x							x				
CO3	x	x	x	x	x							
CO4	x		x	x	x							