

Tulsiramji Gaikwad-Patil College of Engineering & Technology, Nagpur

(An Autonomous Institution Affiliated to RTM Nagpur University, Nagpur) SCHEME

OF INSTRUCTION & SYLLABI

Programme: Computer Science and Engineering

Scheme of Instructions: Third Year B.Tech. in Computer Science and Engineering

Semester-V

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hrs/Wk	Credits	Exam Scheme				
									CT-1	CT-2	CA	ESE	TOTAL
1	PCC	BCS33501	Computer Network	3	-	-	3	3	15	15	10	60	100
2	PCC	BCS33502	Design and Analysis of Algorithms	3	-	-	3	3	15	15	10	60	100
3	PCC	BCS33503	Software Engineering	3	-	-	3	3	15	15	10	60	100
4	PEC	BCS33505-07	Program Elective-I	4	-	-	4	4	15	15	10	60	100
5	MDM	BEC33510	Microprocessor and Micro Controller	4	-	-	4	4	15	15	10	60	100
6	OEC	BXXXX01	Open Elective-III	2	-	-	2	2	7	8	5	30	50
6	PCC	BCS33508	Computer Network Lab	-	-	2	2	1	-	-	25	25	50
7	PCC	BCS33509	Design and Analysis of Algorithms Lab	-	-	2	2	1	-	-	25	25	50
Total				19		4	23	21	82	83	105	380	650

L-Lecture SL-Self Learning P-Practical NHL-Notional Hrs/Wk (Total Notional Hrs)
Class Test 2 ESE: End Semester Examination (For Laboratory End Semester performance)




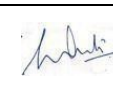
CT1-Class Test I

TA/CA-Teacher Assessment/Continuous Assessment

CT2-

Course Category	BSC/ESC (Basic Science Course/Engineering Science Course.)	PCC (Programme Core courses)	PEC (Programme Elective courses)	OEC (Open Elective Course)	Multi-disciplinary courses	VSEC (Skill Course)	VEC (Value Education Courses)	Humanities Social Science & Management		Experiential Learning Courses	CC (Liberal Learning Courses)
								AEC (Ability Enhancement Course)	IKS (Indian Knowledge System)		
Credits		11	4	2	4	-	-	-	-	-	
Cumulative Sum	16/13	32	4	8	8	6	4	10		2	4

PROGRESSIVE TOTAL CREDITS: 87+21=108

				May 2025	1.00	Applicable for AY 2025-26 Onwards
Chairperson	Dean Academics	Vice Principal	Principal	Date of Release	Version	





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OF INSTRUCTION & SYLLABI
Programme: Computer Science and Engineering
Scheme of Instructions: Third Year B.Tech. in Computer Science and Engineering
Semester-VI

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hrs/Wk	Credits	Exam Scheme				
									CT-1	CT-2	CA	ESE	TOTAL
1	PCC	BCS33601	Compiler Design	3	-	-	3	3	15	15	10	60	100
2	PCC	BCS33602	Data Science and Analytics	3	-	-	3	3	15	15	10	60	100
3	VSEC	BCS33603	Software Laboratory- II (Software Testing Manual/Automation)	-	-	4	4	2	-	-	50	50	100
4	PEC	BCS33604-06	Program Elective-II	4	-	-	4	4	15	15	10	60	100
5	PEC	BCS33607-09	Program Elective-III	4	-	-	4	4	15	15	10	60	100
6	MDM	BEC33611	Embedded System	2	-	-	2	2	-	-	25	25	50
7	PCC	BCS33610	Compiler Design Lab	-	-	2	2	1	-	-	25	25	50
8	PCC	BCS336011	Data Science and Analytics Lab	-	-	2	2	1	-	-	25	25	50
			Total	16		8	24	20	60	60	165	365	650

L-Lecture SL-Self Learning P-Practical NHL-Notional Hrs/Wk (Total Notional Hrs) CT1-Class Test 1 TA/CA-Teacher Assessment/Continuous Assessment CT2-Class Test 2 ESE-End Semester Examination (For Laboratory End Semester Performance)

Course Category	BSC/ESC (Basic Science Course/Engineering Science Course)	PCC (Programme Core courses)	PEC (Programme Elective courses)	OEC (Open Elective Course)	Multi-disciplinary courses	VSEC (Skill Course)	VEC (Value Education Courses)	Humanities Social Science & Management		Experiential Learning Courses	CC (Liberal Learning Courses)
								AEC (Ability Enhancement Course)	IKS (Indian Knowledge System)		
Credits		8	8	-	2	2	-	-	-	-	
Cumulative Sum	16/13	40	12	8	10	8	4	10		2	4

PROGRESSIVE TOTAL CREDITS: 107+20=127

				May 2025	1.00	Applicable for AY 2025-26 Onwards
Chairperson	Dean Academics	Vice Principal	Principal	Date of Release	Version	

TULSIRAMJIGAIKWADPATILCollegeofEngineering&Technology,Nagpur




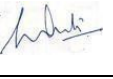
SCHEMEOFINSTRUCTION&SYLLABI



Program:ComputerScience&Engineering

**ListofElectivesofferedby
ComputerScience&Engineering**

Course Code	Professional Elective- I
	SemesterV
BCS33506	Artificial Intelligence
BCS33507	PrinciplesofDistributedSystems
BCS33508	Design Patterns
BCS33509	Introductionto Data Science





Course Code	Professional Elective- II	CourseCode	ProfessionalElective-III
	SemesterVI		SemesterVI
BCS33605	Neural Network and Fuzzy Logic	BCS33609	TCP/IP
BCS33606	CloudComputing	BCS33610	Computer Graphics
BCS33607	SoftwareProjectManagement	BCS33611	Network Security
BCS33608	Data Visualization Techniques	BCS33612	BlockchainandDistributed Ledger Technology



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		Tulsiramji Gaikwad-Patil College of Engineering and Technology WardhaRoad,Nagpur-441108 NAACAccredited(A+Grade) An Autonomous Institute affiliated to RTMNU Nagpur			
Third Year (Semester-VI) B.Tech. (CSE)					
Course Code : BCS33601 (Compiler Design)					
TeachingScheme			ExaminationScheme		
Lectures	3Hrs/week		CT-1	15 Marks	
Tutorial	-		CT-2	15 Marks	
TotalCredit	3		CA	10 Marks	
			ESE	60 Marks	
			Total	100 Marks	
			Duration Of ESE:03 Hrs 00Min.		
Course Objective:					
1	Understand phases of compiler , Generate scanner for simple tokens using lex.				
2	Design parser for simple CFG , Generate parser using Bison/YACC.				
3	Generate intermediate code for basic programming constructs.				
4	Perform optimization on intermediate code for space and time.				
5	Generate machine code for small segments of Three address code and Symbol Table				
Course Contents					
Unit I	Introduction to Compiler Structure of a Compiler, Lexical Analysis, Role of Lexical Analyzer , Input Buffering, Specification of Tokens , Recognition of Tokens , Design of a Lexical Analyzer Generator, LEX.				
Unit II	Syntax Analysis The role of the Parser, Context-free grammars, Writing a Grammar, Top-Down Parsing, Bottom-Up Parsing, Operator-precedence Parsing, LR Parsers, Using Ambiguous Grammars , Parser Generators.				
Unit III	Semantic Analysis Definitions - Syntax directed definitions , Construction of Syntax Trees , Bottom-Up Evaluation of, S-attributed definition, L-attribute definition, Top-Down Translation, Intermediate Languages, Declarations, Assignment Statements, Boolean Expressions ,Case Statements, Back patching, Procedure Calls.				
Unit IV	Code optimization Sources of optimization, loop optimization, control flow analysis, data flow analysis, Live variables , Induction Variable, Common subexpression elimination, dead code elimination Introduction to global data flow analysis, Code Improving transformations ,Data flow analysis of structure flow graph Symbolic debugging of optimized code.				
Unit V	Code Generation Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, Register allocation and Assignment, The DAG Representation of Basic Blocks, Generating Code from DAG.				

Text Books	
1	Compilers–Principles, Techniques and Tools; Aho, Sethi, and Ullman; Second Edition, Pearson Education, 2008
2	Principles of Compiler Design; Alfred V. Aho and Jeffery D. Ullman; Narosa Publishing House, 1977
Reference Books	
1	Principles of Compiler Design, V. Raghavan, Tata McGraw Hill, 2009.
2	Compiler Design using Flex and Yacc; Vinu V. Das; PHI Publication, 2008.
Useful Links	
1	https://archive.nptel.ac.in/courses/106/104/106104148/
2	http://www.digimat.in/nptel/courses/video/106104148/L01.html
3	https://www.geeksforgeeks.org/last-minute-notes-compiler-design-gq/
4	https://www.tutorialspoint.com/compiler_design/compiler_design_quick_guide.htm





	Course Outcomes	CL	Class Session
1	Understand the major phases of compilers and use the knowledge of the Lex tool	2	9
2	Develop the parsers and experiment with the knowledge of different parsers design without automated tools.	3	9
3	Construct intermediate code for basic programming constructs in C/PASCAL	6	9
4	Analyze TAC for space and time	6	9
5	Develop machine code for small segments of TAC and Symbol Table	2,3	9



				Aug, 2023	1.00	Applicable for AY 2023-24 Onwards
Chairperson	Dean Academics	Vice Principal	Principal	Date of Release	Version	

		Tulsiramji Gaikwad-Patil College of Engineering and Technology Wardha Road, Nagpur-441108 NAAC Accredited (A+ Grade) An Autonomous Institute affiliated to RTMNU Nagpur			
Third Year (Semester-VI) B.Tech. (CSE)					
Course Code: BCS33602 (Data Science and Analytics)					
Teaching Scheme				Examination Scheme	
Lectures	3 Hrs/week			CT-1	15 Marks
Tutorial	-			CT-2	15 Marks
Total Credit	3			TA	10 Marks
				ESE	60 Marks
		Total	100 Marks	Duration of ESE :03 Hrs 00Min.	
Course Objective:					
1	To understand the fundamentals of Basics of Data Science, its evolution and real-world applications.				
2	To Summarize techniques for data collection and pre-processing to ensure data quality.				
3	To Develop the ability to explore and summarize datasets using statistical techniques and visualization tools for better decision-making.				
4	To Analyze machine learning model development techniques and enable them to build and optimize predictive models.				
5	To Demonstrate to assess model performance, fine-tune parameters, and deploy models for real-world applications while ensuring robustness and reliability.				
Course Contents					
Unit I	Introduction to Data Science Evolution of Data Science, Data Science Roles, Stages in a Data Science Project, Applications of Data Science in various fields, Data Security Issues, Big data and cloud computing in Data Science.				
Unit II	Data Collection and Data Pre-Processing Data Collection Overview, Data Collection Strategies, Data Pre-Processing Overview, Data Cleaning, Data Integration and Data Transformation, Data Reduction, Data Discretization, Data Quality Issue, Handling Missing Data and Outliers, Feature Scaling and Normalization.				
Unit III	Exploratory Data Analytics Introduction to Exploratory Data Analytics, Descriptive Statistics, Mean, Standard Deviation, Skewness and Kurtosis, Box Plots, Pivot Table, Heat Map, Correlation Statistics, ANOVA. Model Development, Probability Distributions, Hypothesis Testing.				
Unit IV	Model Development Simple and Multiple Regression, Model Evaluation using Visualization, Residual Plot, Distribution Plot, Polynomial Regression and Pipelines, Feature Engineering, Introduction to Machine Learning Models (Supervised vs. Unsupervised Learning), Logistic Regression and Linear Regression classification Models, Decision Trees and Random Forest, Support Vector Machines (SVM), Neural Networks (Basic Concepts).				

Unit V	Model Evaluation Generalization Error, Out-of-Sample Evaluation Metrics, Cross Validation, Overfitting, Underfitting and Model Selection, Prediction by using Ridge Regression, Testing Multiple Parameters by using Grid Search make another syllabus add some more important topics, Hyperparameter Tuning, Bias-Variance Tradeoff, Model Deployment and Monitoring
Text Books	
T.1	Cathy O'Neil and Rachel Schutt, "Doing Data Science", O'Reilly, 2015
T.2	David Dietrich, Barry Heller, Beibei Yang, "Data Science and Big data Analytics", EMC 2013
T.3	JojoMoolayil, "Smarter Decisions: The Intersection of IoT and Data Science", PACKT, 2016.
Reference Books	
1	"Essential Math for Data Science", Thomas Nield
2	"A Hands on Introduction to Data Science", Chirag Shah, Cambridge University Press
Useful Links	
1	https://www.datacamp.com/
2	https://www.coursera.org

Code	Course Outcomes	CL	Class Session
BCS33602.1	Understand the knowledge of basic concepts of data science and key issues	2	9
BCS33602.2	Apply data collection and data pre-processing techniques in data science.	3	9
BCS33602.3	Analyze fundamentals of Exploratory Data Analytics.	4	9
BCS33602.4	Implement regression models using appropriate software tools.	3	9
BCS33602.5	Apply appropriate evaluation metrics based on the problem domain and goals.	3	9





				May 2025	1.00	Applicable for AY2025-26 Onwards
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	Tulsiramji Gaikwad-Patil College of Engineering and Technology Wardha Road, Nagpur-441 108 An Autonomous Institute Affiliated to RTM Nagpur University NAAC Accredited (A+ Grade)					
Program: Third Year B.Tech. Computer Science and Engineering						
Semester	Course Code	Name of Course	L	T	P	Credits
VI	BCS33603	Software Testing manual/Automation	-	-	4	2
Pre-Requisites:						
Course Objectives:						
1.	To examine basic functions of Software testing					
2.	To Understand software testing principles					
3.	To Develop and Test Interactive UI Components:					
4.	To Implement Various Testing Techniques					

1	Understanding principles and concepts of software testing, including the purpose and goals of testing, the types of testing
2	Study of Reviews (Writing Test cases, Testing Framework, Test Document)
3	Implement Construction of CFG & Deriving Test Cases
4	Implementation of Test Cases using Unit Testing ,Integration & System Testing
5	State Transition Test, Cause Effect Graphing and Decision Table Technique
6	Study of Automation tools and Building test cases
7	Using Base URL to Run Test Cases in Different Domains
8	Selenium commands- selenese, Matching Text Patterns, Performance Testing Concept Load Testing ,Stress Testing
9	Web driver implicit & Explicit wit cross browser tesing API Testing
10	Implementing Automated Testing with Tools like Selenium

Course Outcome-





1	Identify various types of software testing and their purposes in the software development lifecycle.
2	Analyze different testing scenarios to determine the most effective testing strategies.
3	Evaluate the performance and security of a user registration application through various testing techniques
4	Implement access control mechanisms to secure data members in applications.

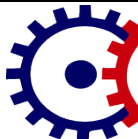

				May 2025	1.00	Applicable for AY2025-26 Onwards
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		Tulsiramji Gaikwad-Patil College of Engineering and Technology Wardha Road, Nagpur- 441108 NAAC Accredited (A+ Grade) An Autonomous Institute affiliated to RTMNU Nagpur			
Third Year (Semester-VI) B.Tech. (CSE)					
Course Code:BCS33605(Neural Network and FuzzyLogic)					
Teaching Scheme				Examination Scheme	
Lectures	4 Hrs/week			CT-1	15 Marks
Tutorial	-			CT-2	15 Marks
Total Credit	4			CA	10 Marks
				ESE	60 Marks
		Total	100 Marks	Duration of ESE: 03Hrs 00Min.	
Course Objective:					
1	To understand the basics of Neural Networks.				
2	To analyze fundamental concepts of Artificial Neural Networks.				
3	To identify the concepts of Competitive and Special Neural Networks				
4	To apply set operations and membership functions for problems involving both precise and imprecise information.				
5	To demonstrate comprehensive understanding of fuzzy logic system components.				
Course Contents					
Unit I	Introduction to Neural Networks Introduction, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, The Perceptron, Backpropagation Network, Hodgkin-Huxley Neuron Model, Integrate-and-Fire Neuron Model, Spiking Neuron Model, Characteristics of ANN, McCulloch-Pitts Model, Applications of ANN.				
Unit II	Essentials of Artificial Neural Networks Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised Reinforcement), Learning Rules, Types of Application				
Unit III	Competitive and Special Neural Networks Neural network based on competition: fixed weight competitive nets, Kohonen self-organizing maps and applications, learning vector quantization, counter propagation nets and applications. Special Neural Network: Cognitron and Neocognitron Architecture, training algorithm and application-fuzzy associate memories, fuzzy system architecture, comparison of fuzzy and neural systems.				
Unit IV	Classical & Fuzzy Sets Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.				
Unit V	Fuzzy Logic System Components Fuzzification, Membership value assignment: Inference, rank ordering, angular fuzzy sets development of rule base and decision-making system, Defuzzification to crisp sets,				

	Defuzzification methods, Fuzzy measures, Fuzzy integrals, Fuzziness and fuzzy resolution.
Text Books	
T1	Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan and Rai – PHI Publication
T2	Introduction to Neural Networks using MATLAB 6.0 - S.N.Sivanandam, S.Sumathi, S.N.Deepa, TMH, 2006
Reference Books	
R1	Neural Networks – James A Freeman and Davis Skapura, Pearson Education, 2002.
R2	Neural Networks and Fuzzy Logic System by Bart Kosko, PHI Publications.
Useful Links	
1	Fuzzy Logic and Neural Networks - Course (nptel.ac.in)
2	NOC Fuzzy Logic and Neural Networks (nptel.ac.in)




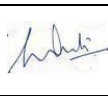
Sr. No.	Course Outcomes	CL	Class Session
1	Explain the basics of neural networks.	2	9
2	Illustrate fundamental concepts of ANN including operations, activation functions, learning rule.	2	9
3	Apply competitive and special neural networks (Kohonen, LVQ, Counter propagation, Cognitron, Neocognitron, Fuzzy AM) for problem-solving.	3	9
4	Analyze the principles of classical and fuzzy sets, including their properties, operations, relations, uncertainty, and membership functions.	4	9
5	Apply fuzzification, Membership value assignment, Defuzzification.	3	9



				May 2025	1.00	Applicable for AY2025-26 Onwards
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		Tulsiramji Gaikwad-Patil College of Engineering and Technology Wardha Road, Nagpur- 441108 NAAC Accredited (A+ Grade) An Autonomous Institute affiliated to RTMNU Nagpur			
Third Year (Semester-VI) B. Tech. (CSE)					
Course Code: BCS33606 (Cloud Computing)					
Teaching Scheme				Examination Scheme	
Lectures	4 Hrs/week			CT-1	15 Marks
Tutorial	-			CT-2	15 Marks
Total Credit	4			CA	10 Marks
				ESE	60 Marks
		Total	100 Marks	Duration of ESE: 03Hrs 00Min.	
Course Objective:					
1	Understand the fundamental concepts of cloud computing, including its evolution, principles, and characteristics.				
2	Analyze cloud-enabling technologies such as virtualization, REST, and service-oriented architecture.				
3	Evaluate cloud architecture, services, and storage mechanisms to design efficient cloud-based solutions.				
4	Apply resource management techniques and security strategies in cloud environments.				
5	Explore modern cloud technologies, advancements, and their applications in real-world scenarios.				
Course Contents					
Unit I	Introduction to Cloud Computing Definition of Cloud, Evolution of Cloud Computing, Underlying Principles of Parallel and Distributed Computing, Cloud Characteristics, Elasticity in Cloud, On-demand Provisioning.				
Unit II	Cloud Enabling Technologies and Service-Oriented Architecture REST and Systems of Systems, Web Services, Publish-Subscribe Model, Basics of Virtualization, Types of Virtualization, Implementation Levels of Virtualization, Virtualization Structures, Tools and Mechanisms, Virtualization of CPU, Memory, and I/O Devices, Virtualization Support and Disaster Recovery.				
Unit III	Cloud Architecture, Services, and Storage Layered Cloud Architecture Design, NIST Cloud Computing Reference Architecture, Public, Private, and Hybrid Clouds, IaaS, PaaS, SaaS, Architectural Design Challenges, Cloud Storage, Storage-as-a-Service, Advantages of Cloud Storage, Cloud Storage Providers (S3, Google Cloud Storage).				
Unit IV	Resource Management and Security in Cloud Inter-Cloud Resource Management, Resource Provisioning and Resource Provisioning Methods, Global Exchange of Cloud Resources, Security Overview, Cloud Security Challenges, Software-as-a-Service Security, Security Governance, Virtual Machine Security, IAM (Identity and Access Management), Security Standards, AWS Configuration, Cloud Resource Manager.				
Unit V	Cloud Technologies and Advancements Hadoop and MapReduce, Virtual Box, Google App Engine, Programming Environment for Google App Engine, OpenStack, Federation in the Cloud, Four Levels of Federation, Federated Services and Applications, Future of Federation.				

Text Books	
T1	Ritting house, John W and James F. Ransome, Cloud Computing: Implementation, Management and Security, CRC Press, 2017.
T2	Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, “Distributed and Cloud Computing, From Parallel Processing to the Internet of Things”, Morgan Kaufmann Publishers, 2012.
Reference Books	
R1	Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, Mastering Cloud Computing, Tata Mcgraw Hill, 2013.
R2	Toby Velte, Anthony Velte, Robert Elsenpeter, “Cloud Computing A Practical Approach, Tata Mcgraw Hill, 2009.
Useful Links	
1	https://nptel.ac.in/courses/106105167
2	https://nptel.ac.in/courses/106104182





Sr. no.	Course Outcomes	CL	Class Session
1	Explain the concepts of cloud computing, its evolution, characteristics, and elasticity	2	9
2	Illustrate the principles of parallel and distributed computing and their role in cloud environments.	3	9
3	Analyze service-oriented architecture, REST, and virtualization techniques for cloud computing.	4	9
4	Implement resource management techniques and security policies in cloud environments.	5	9
5	Utilize modern cloud platforms such as Hadoop, OpenStack, and Google App Engine for cloud applications.	6	9



				Aug,2023	1.00	Applicable for AY2023-24 Onwards
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Third Year (Semester-VI) B.Tech. (CSE)				
Course Code: BCS33502 (Software Project Management)				
Teaching Scheme			Examination Scheme	
Lectures	4 Hrs/week		CT-1	15 Marks
Tutorial	-		CT-2	15 Marks
Total Credit	4		CA	10 Marks
			ESE	60 Marks
		Total	100 Marks	
		Duration of ESE: 03Hrs 00Min.		
Course Objective:				
1	To Summarize the Artifacts of the Software Process, including Management, Engineering, and Programmatic Artifacts, and their role in software development.			
2	To Provide a comprehensive understanding of Model-Based Software Architectures from both Management and Technical Perspectives.			
3	To acquire analytical skills to evaluate various Interaction Planning Processes and assess their impact on project efficiency, risk mitigation, and overall success.			
4	To evaluate Life Cycle Expectations and their influence on software quality, project performance, and overall development efficiency.			
Course Contents				
Unit I	Conventional Software Management: The waterfall Model, Conventional Software Management Performance, Evolution of Software Economics: software Economics Pragmatic Software Cost Estimation. Improving Software Economics: Reducing Software Product Size, Improving Software Processes, Improving Team Effectiveness, Improving Automation, Achieving Required Quality, Peer Inspections.			
Unit II	Conventional and Modern Software Management: Principles of Conventional Software Engineering, Principles of Modern Software Management, Transitioning to an interactive Process. Life Cycle Phases: Engineering and Production Stages Inception, Elaboration Construction, Transition phases.			
Unit III	Artifacts of the Process: The Artifact Sets. Management Artifacts, Engineering Artifacts, Programmatic Artifacts. Model Based Software Architectures: A Management Perspective and Technica Perspective.			
Unit IV	Flows of the Process: Software Process Workflows. Inter Trans Workflows. Checkpoints of the Process: Major MileStones, Minor Milestones, Periodic Status Assessments. Interactive Process Planning: Work Breakdown Structures, Planning Guidelines, Cost and Schedule Estimating. Interaction Planning Process, Pragmatic Planning.			

Unit V	Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, and Evolution of Organizations. Process Automation: Building Blocks, the Project Environment. Project Control and Process Instrumentation: Server Care Metrics, Management Indicators, Quality Indicators, Life Cycle Expectations Pragmatic Software
Text Books	
T1	Walker Rayce, “Software Project Management”, 1998, PEA.
T2	Henrey, “Software Project Management”, Pearson.
Reference Books	
R1	Richard H.Thayer.” Software Engineering Project Management”, 1997, IEEE Computer Society.
R2	Shere K.D.: “Software Engineering and Management”, 1998, PHI.
Useful Links	
1	https://onlinecourses.nptel.ac.in/noc19_cs70/preview
2	https://onlinecourses.nptel.ac.in/noc24_mg01/preview





Sr. no.	Course Outcomes	CL	Class Session
1	Understand the fundamentals of Conventional Software Management and analyze the limitations of the Waterfall Model.	2	9
2	Apply the principles of Modern Software Management to improve software development practices.	3	9
3	Analyze the role of Management, Engineering, and Programmatic Artifacts in the software development lifecycle.	4	9
4	Evaluate different Interaction Planning Processes and assess their impact on project efficiency, risk management, and decision-making.	5	9
5	Design an effective project management framework by integrating organizational structures, process automation strategies, and process instrumentation techniques for efficient project execution.	6	9



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Third Year (Semester-VI) B.Tech. (CSE)					
Course Code:BCS33609(TCP/IP)					
Teaching Scheme				Examination Scheme	
Lectures	4 Hrs/week			CT-1	15 Marks
Tutorial	-			CT-2	15 Marks
Total Credit	4			CA	10 Marks
				ESE	60 Marks
				Total	100 Marks
				Duration of ESE: 03Hrs 00Min.	
Course Objective:					
1	To understand the fundamental concepts, architectures, standards, and emerging technologies shaping modern computer networks, including the Internet and IoT.				
2	To Analyze skills in network fundamentals, IP addressing, configuration, management, troubleshooting, and security best practices.				
3	To Apply fundamental network protocols, IP addressing, configuration, management, troubleshooting, and security practices.				
4	To Illustrate the principles, technologies, security considerations, and quality of service mechanisms for delivering multimedia content over IP networks.				
5	To Examine the architecture, security features, quality of service mechanisms, and transition strategies of IPv6.				
Course Contents					
Unit I	Introduction to Network Architecture and Technologies Network architecture, Standards, TCP/IP Model Overview, Internetworking concept, Internet Backbones, NAPs, ISPs, RFCs and Internet Standards, Software-Defined Networking, Network Function Virtualization, Internet of Things IOT Networking				
Unit II	TCP/IP Protocol Suite and Network Administration Network Protocols and Services, IP Addressing and Subnetting, Network Interfaces and IP Configuration, DHCP Configuration and Management, DNS Configuration and Troubleshooting, Network Documentation and Management, Backup and Recovery, Network Performance Monitoring, Incident Response and Troubleshooting Logs				
Unit III	TCP/IP Transport Layer Protocols and Services Layers of the TCP/IP Model, Role of the Transport Layer, Transmission Control Protocol (TCP), Characteristics of TCP, Connection-Oriented Communication, Reliable Data Transfer, Flow Control and Congestion Control, Error Detection and Correction, User Datagram Protocol (UDP), Characteristics of UDP, Connectionless Communication, Low Latency and Overhead, Transport Layer Services: Multiplexing and Demultiplexing, Flow Control and Congestion Control, Data Segmentation and Reassembly				
Unit IV	TCP/IP Multimedia Networking and Security Multimedia introduction, Digitizing audio & Video, Compression, Streaming, RTP, RTCP, Voiceover IP, Email Security, Internet Security, Multimedia over IP Networks, Quality of Service (QoS) for Multimedia, Content Delivery Networks, Secure Real-time Transport Protocol.				
Unit V	TCP/IP IPv6 Networking and IP Security IP security protocol, IPv6 addresses, Packet format, Multicast, Anycast, ICMPv6, Interoperation between IPv4 and IPv6, QoS, Auto configuration, Secure Neighbor Discovery, Network Address				

	Translation for IPv6
Text Books	
T1	Computer Networks by Andrew S. Tanenbaum and David J. Wetherall
T2	TCP/IP Protocol Suite by Behrouz Forouzan
Reference Books	
R1	"TCP/IP Illustrated, Volume 1: The Protocols" by W. Richard Stevens and Kevin R. Fall
R2	"Computer Networks: A Systems Approach" by Larry L. Peterson and Bruce S. Davie
Useful Links	
1	https://onlinecourses.nptel.ac.in/noc22_cs19/preview
2	https://archive.nptel.ac.in/courses/106/105/106105084




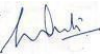
Sr. no.	Course Outcomes	CL	Class Session
1	Understand core network architectures, standards, TCP/IP, internetworking, infrastructure, RFCs, and emerging networking technologies like SDN, NFV, and IoT.	2	9
2	Apply network protocols, IP addressing, configuration, core services, management, and troubleshooting techniques	3	9
3	Analyze the layers of the TCP/IP model, the role and characteristics of TCP and UDP, and transport layer services like multiplexing, flow, and congestion control.	4	9
4	Outline multimedia digitization, streaming, security, and quality of service over IP networks.	4	9
5	Interpret IPv6 addressing, core features, interoperability, and security aspects.	5	9



				May 2025	1.00	Applicable for AY2025-26 Onwards
Chairperson	Dean Academics	Vice Principal	Principal	Date of Release	Version	

	Tulsiramji Gaikwad-Patil College of Engineering and Technology Wardha Road, Nagpur- 441108 NAAC Accredited (A+ Grade) An Autonomous Institute affiliated to RTMNU Nagpur			
Third Year (Semester-VI) B.Tech. (CSE)				
Course Code: BCS33610 Computer Graphics				
Teaching Scheme			Examination Scheme	
Lectures	4 Hrs/week		CT-1	15 Marks
Tutorial	-		CT-2	15 Marks
Total Credit	4		CA	10 Marks
			ESE	60 Marks
		Total	100 Marks	
		Duration of ESE: 03Hrs 00Min.		
Course Objective:				
1	To Understand the Fundamentals of Computer Graphics.			
2	To Analyze Proficiency in Drawing and Clipping Algorithms.			
3	To Apply Geometric Transformations and Viewing Techniques.			
4	To Explore Geometric Modeling Techniques.			
5	To Demonstrate Visible Surface Determination and Rendering Techniques.			
Course Contents				
Unit-I	Introduction: Introduction to graphics systems, basic elements of computer graphics, applications, and the architecture of raster and random scan display devices, as well as input/output devices.			
Unit-II	Drawing and Clipping Primitives: Raster scan line, circle and ellipse drawing algorithms, polygon filling, line clipping, and polygon clipping algorithms.			
Unit-III	Transformation and Viewing: Deals with 2D and 3D geometric transformations, 2D and 3D viewing transformations (parallel and perspective projections), and vanishing points.			
Unit-IV	Geometric Modeling: Focuses on polygon mesh representation and cubic polynomial curves (Hermite and Bezier)			
Unit-V	Visible Surface Determination and Surface Rendering: Includes the Z-buffer algorithm, list-priority algorithm, and area subdivision algorithm for visible surface determination. Also covers illumination and shading models, the RGB color model, and basics of computer animation.			
Text Books				
T1	D. Hearn, M. Baker, "Computer Graphics – C Version", 2nd Edition, Pearson Education, 2002, ISBN81-7808-794-4			
T2	Grigore C. Burdea, Philippe Coiffet, Virtual Reality Technology second edition, Wiley India Edition, ISBN 81-265-0789-6			
T3	Fundamentals of Computer Graphics, By Peter Shirley, Michael Ashikhmin, Steve Marschner · 2009, ISBN:9781439865521, 1439865523			
Reference Books				

R1	D Rogers, "Procedural Elements for Computer Graphics", 2nd Edition, Tata McGraw Hill Publication, 2001, ISBN 0-07-047371-4.
R2	J Foley. V. Dam, S. Feiner. J. Hughes, "Computer Graphics Principles and Practice", 2nd Edition, Pearson Education, 2003, ISBN 81-7808-038-9
R3	Foley, "Computer Graphics Principles & Practice in C", 26, ISBN 9788131705056. Pearson Edu
Useful Links	
1	https://nptel.ac.in/course/106/101/106101060/
2	https://nptel.ac.in/courses/106/106/106106131/

Sr. no.	Course Outcomes	CL	Class Session
1	Understand the Computer graphics systems and display technologies	2	9
2	Implement fundamental drawing and clipping algorithms	3	9
3	Apply geometric transformations and viewing techniques in 2D and 3D graphics	3	9
4	Develop geometric models using curves and polygon meshes	6	9
5	Demonstrate rendering techniques for realistic graphics and animation	3	9





				May 2025	1.00	Applicable for AY2025-26 Onwards
Chairperson	Dean Academics	Vice Principal	Principal	Date of Release	Version	

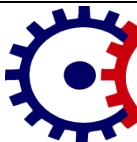

	Tulsiramji Gaikwad-Patil College of Engineering and Technology Wardha Road, Nagpur-441108 NAAC Accredited (A+Grade) An Autonomous Institute affiliated to RTMNU Nagpur		
Third Year (Semester-VI) B.Tech. (CSE)			
Course Code: BCS33611(Network Security)			
Teaching Scheme		Examination Scheme	
Lectures	3Hrs/week	CT-1	15 Marks
Tutorial	-	CT-2	15 Marks
Total Credit	4	TA	10 Marks
		ESE	60 Marks
		Total	100 Marks
		Duration of ESE:03 Hrs 00Min.	
Course Objective:			
1	To understand the fundamental concepts and models of network security.		
2	To analyze the architecture and protocols of TCP/IP and their associated vulnerabilities.		
3	To explore real-time communication security mechanisms and various protocol-based and media-based network attacks.		
4	To apply different security techniques such as firewalls, VPNs, IPSec, and authentication protocols.		
5	To construct secure communication systems with practical tools such as IDS/IPS, proxy servers, and encryption tools..		
Course Contents			

Unit I	<p>Introduction to Network security: Model for Network security, Model for Network access security, Real-time Communication Security: Introduction to TCP/IP protocol stack, Implementation layers for security protocols and implications, IPsec: AH and ESP, IPsec: IKE.</p>
Unit II	<p>Media- Based-Vulnerabilities, Network Device Vulnerabilities, Back Doors, Denial of Service (DoS), Spoofing, Man-in-the-Middle, and replay, Protocol -Based Attacks, DNS Attack, DNS Spoofing, DNS Poisoning, ARP Poisoning, TCP/IP Hijacking, Virtual LAN (VLAN), Demilitarization Zone (DMZ) , Network Access Control (NAC), Proxy Server , Honey Pot , Network Intrusion Detection Systems (NIDS) and Host Network Intrusion Prevention Systems Protocol Analyzers, Internet Content Filters, Integrated Network Security Hardware .</p>
Unit III	<p>Authentication: Kerberos, X.509 Authentication Service, Scanning: Port Scanning, Port Knocking- Advantages, Disadvantages. Peer to Peer security. Electronic Mail Security: Distribution lists, Establishing keys, Privacy, source authentication, message integrity, non-repudiation, proof of submission, proof of delivery, message flow confidentiality, anonymity, Pretty Good Privacy (PGP).</p>
Unit IV	<p>Firewalls and Web Security: Packet filters, Application-level gateways, Encrypted tunnels, Cookies. Assignments on latest network security techniques, Security applications in wireless sensor network and wireless Communication networks</p>

Unit V	Security Practices and System Security Vernam Cipher (One Time Pad), Electronic Mail security, IP Security, Web Security, System Security: Intruders, Malicious Software, viruses, Firewalls.
Text Books	
T1	William Stallings, Cryptography and Network Security: Principles and Practice, PHI 3rd Edition, 2006
T2	Cryptography and networks security principles & practice by William Stalings (Pearson Education prentice Hall).
Reference Books	
1	C K Shyamala, N Harini and Dr. T R Padmanabhan: Cryptography and Network Security, Wiley India Pvt.Ltd
2	Behrouz A.Foruzan, Cryptography and Network Security, Tata McGraw Hill 2007.
UsefulLinks	
1	1 https://www.geeksforgeeks.org/easy-key-management-in-cryptography/ 2
2	https://www.forcepoint.com/cyber-edu/network-security





	Course Outcomes	CL	Class Session
1	Explain core concepts of network security including models, protocols, and system vulnerabilities.	2	9
2	Identify and differentiate various network attacks such as DoS, spoofing, ARP poisoning, and TCP/IP hijacking.	4	9
3	Apply encryption techniques like IPsec, Kerberos, PGP, and TLS for securing email and web communications.	3	9
4	Evaluate the effectiveness of security solutions such as firewalls, NAC, IDS/IPS, and honeypots in different scenarios.	5	9
5	Demonstrate secure network architectures incorporating DMZ, VLANs, proxy servers, and integrated hardware.	3	9

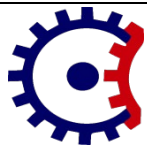
				May 2025	1.00	Applicable for AY2025-26 Onwards
Chairperson	Dean Academics	Vice Principal	Principal	Date of Release	Version	

	Tulsiramji Gaikwad-Patil College of Engineering and Technology Wardha Road, Nagpur- 441108 NAAC Accredited (A+ Grade) An Autonomous Institute affiliated to RTMNU Nagpur			
Third Year (Semester-VI) B. Tech. (CSE)				
Course Code: BCS33612 (Block Chain & Distributed Ledger System)				
Teaching Scheme			Examination Scheme	
Lectures	4 Hrs/week		CT-1	15 Marks
Tutorial	-		CT-2	15 Marks
Total Credit	4		CA	10 Marks
			ESE	60 Marks
		Total	100 Marks	
		Duration of ESE: 03Hrs 00Min.		
Course Objective:				
1	Understand the fundamental concepts, architecture, and design principles of blockchain technology.			
2	Analyze the role and implementation of Distributed Ledger Technology (DLT) in different blockchain applications.			
3	Evaluate various blockchain ecosystems and their governance models.			
4	Apply smart contract concepts and lifecycle for real-world use cases.			
5	Examine blockchain protocols, token economies, and their legal frameworks.			
Course Contents				
Unit I	Foundations of Blockchain: Blockchain Architecture, Blockchain Design Principles, Blockchain Ecosystem, Challenges and Applications, The Consensus Problem, Asynchronous Byzantine Agreement, AAP Protocol and Its Analysis, Peer-to-Peer Network, Abstract Models: GARAY Model, RLA Model, Proof of Work (PoW), Proof of Stake (PoS) , Based Chains, Hybrid Models.			
Unit II	Distributed Ledger Technology (DLT): Origin of Ledgers, Types and Features of DLT, Role of Consensus Mechanism, DLT Ecosystem, Distributed Ledger Implementations, Blockchain and Ethereum, Public and Private Ledgers, Registries and Ledgers, Practitioner Perspective: Keyless Technologies, Transparency as a Strategic Risk, Transparency as a Strategic Asset, Usage of Multiple IDs, Zero Knowledge Proofs, Implementation of Public and Private Blockchain.			
Unit III	Types of Blockchain Ecosystem: One-Leader Ecosystem, Joint Venture or Consortia Ecosystems, Regulatory Blockchain Ecosystems, Components in Blockchain Ecosystem: Leaders, Core Group, Active Participants, Users, Third-Party Service Providers, Governance for Blockchain Ecosystems.			
Unit IV	Smart Contracts: Anatomy of Smart Contracts, Life Cycle of Smart Contracts, Usage Patterns of Smart Contracts, DLT-Based Smart Contracts Use Cases: Healthcare Industry, Property Transfer.			

Unit V	Blockchain Protocols: Ethereum Tokens, Augur, Golem, Understanding Ethereum Tokens, App Coins and Protocol Tokens, Blockchain Token Securities Law Framework, Token Economy, Token Sale Structure Ethereum Subreddit.
Text Books	
T1	Dhillon, V., Metcalf, D., and Hooper, M, Blockchain enabled applications, 2017, 1st Agenda Item 65/39 - Annexure - 35 Proceedings of the 65th Academic Council (17.03.2022) 1042Edition, CA: Apress, Berkeley.
T2	Bashir, Mastering Blockchain: Distributed ledger technology, decentralization, and smart contracts explained, 2nd Edition, 2nd Revised edition edition. Birmingham: Packt Publishing, 2018.
Reference Books	
R1	Dhillon, V., Metcalf, D., and Hooper, M, Blockchain enabled applications, 2017, 1st Agenda Item 65/39 - Annexure - 35 Proceedings of the 65th Academic Council (17.03.2022) 1042Edition, CA: Apress, Berkeley.
R2	Bashir, Mastering Blockchain: Distributed ledger technology, decentralization, and smart contracts explained, 2nd Edition, 2nd Revised edition edition. Birmingham: Packt Publishing, 2018.
Useful Links	
1	https://nptel.ac.in/courses/106105235
2	https://www.hyperledger.org/use/tutorials

Sr. no.	Course Outcomes	CL	Class Session
1	Explain the fundamentals of blockchain, including architecture, design principles, and ecosystems.	2	9
2	Demonstrate the role of Distributed Ledger Technology (DLT) and its implementation in blockchain.	3	9
3	Differentiate between various blockchain ecosystems and governance models.	4	9
4	Design smart contract-based applications for industries such as healthcare and property transfer.	5	9
5	Evaluate blockchain token protocols, security frameworks, and token sale structures.	6	9

				Aug,2023	1.00	Applicable for AY2023-24 Onwards
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Tulsiramji Gaikwad-Patil College of Engineering and Technology

Wardha Road, Nagpur-441108

NAAC Accredited(A+Grade)

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Second Year(Semester-IV) B.Tech. (CSE)

Course Code: BCS33610 (Compiler Design Lab)

Teaching Scheme

Lectures 2Hrs/week

Tutorial -

Total Credit 1

Examination Scheme

CA 25 Marks

ESE 25 Marks

Total 50 Marks

Duration of PCC: 02 Hrs. 00 Min.

Course Objective:

- 1 Understand phases of Compiler , Generate scanner for simple tokens using lex.
- 2 Design parser for simple CFG, Generate parser using Bison/YACC.
- 3 Generate intermediate code for basic programming constructs.
- 4 Perform optimization on intermediate code for space and time.
- 5 Generate machine code for small segments of Three address code and Symbol Table

Sr. No.

List of Experiment

- 1 Write a C program to identify different types of Tokens in a given Program.
- 2 Write a Lex Program to implement a Lexical Analyzer using LEX tool.
- 3 Write a C program to implement a Recursive Descent Parser.
- 4 Write a C program for eliminating the left recursion and left factoring of a given grammar
- 5 Write a C program to Simulate Lexical Analyzer to validating a given input String.
- 6 Write a C program to implement the Brute force technique of Top down Parsing
- 7 Write a C program for implementation of LR parsing algorithm to accept a given input string.
- 8 Write a C program for generating the three address code of a given expression/statement.
- 9 Write a C program for implementation of a Code Generation Algorithm of a given expression/statement.
- 10 Write a C program to execute Code optimization.

Text Books





- 1 Compilers–Principles, Techniques and Tools; Aho, Sethi, and Ullman; Second Edition, Pearson Education, 2008
- 2 Principles of Compiler Design; Alfred V. Aho and Jeffery D. Ullman; Narosa Publishing House, 1977



Reference Books





- 1 Principles of Compiler Design , V. Raghavan, Tata McGraw Hill, 2009.
- 2 Compiler Design using Flex and Yacc; Vinu V. Das; PHI Publication, 2008.

Useful Links

1	https://nptel.ac.in/courses/106/105/106105214/
2	https://www.youtube.com/

				Aug,2023	1.00	Applicable or AY 2023- 24 Onwards
Chairperson	Dean Academics	Vice Principal	Principal	Date of Release	Version	

		Tulsiramji Gaikwad-Patil College of Engineering and Technology Wardha Road, Nagpur-441108 NAAC Accredited (A+ Grade) An Autonomous Institute affiliated to RTMNU Nagpur			
Third Year (Semester-VI) B.Tech. (CSE)					
Course Code:BCS336011(Data Science and Analytics Lab)					
Teaching Scheme				Examination Scheme	
Lectures	2Hrs/week			CA	25 Marks
Total Credit	3			ESE	25 Marks
				Total	50 Marks
Duration of CSE :03 Hrs 00Min.					
List of Experiment					
1	Implementing Numpy arrays.				
2	Implement Pandas data frames.				
3	Develop python program for Basic plots using Matplotlib.				
4	Perform data preprocessing and cleaning techniques.				
5	Develop python program for Frequency distributions.				
6	Develop Python programs to understand and visualize normal distribution.				
7	Python program to compute the correlation coefficient between two variables.				
8	Analyze and visualize the relationship between variables using correlation and scatter plots.				
9	Develop python program for Simple Linear Regression.				
10	Develop python program for Multiple Linear Regression.				
Text Books					
T.1	Cathy O'Neil and Rachel Schutt, "Doing Data Science", O'Reilly, 2015				
T.2	David Dietrich, Barry Heller, Beibei Yang, "Data Science and Big data al cs", EMC 2013				
T.3	JojoMoolayil, "Smarter Decisions: The Intersection of 10T and Data Science", PACKT,2016,				
Useful Links					
1	https://www.datacamp.com/				
2	https://www.coursera.org				

				May 2025	1.00	Applicable orAY2025- 26 Onwards
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