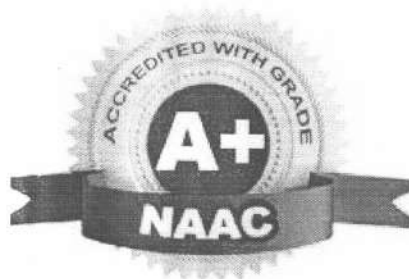




TULSIRAMJI GAIKWAD-PATIL
College of Engineering & Technology

Mohgaon, Wardha Road, Nagpur - 441 108

An Autonomous Institute



**DEPARTMENT OF COMPUTER SCIENCE &
ENGINEERING**

Teaching Scheme & Syllabus

From

Academic Year 2023-24

Tulsiramji Gaikwad-Patil College of Engineering & Technology, Nagpur
An Autonomous Institute Affiliated to RTM Nagpur University

SCHEME OF INSTRUCTION & SYLLABI

Programme: Computer Science & Engineering

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

Semester – V

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hrs./Wk	Credits	EXAM SCHEME				
									CT1	CT2	TA/CA	ESE	TOTAL
1	PCC	BCS3501	Design and Analysis of Algorithms	4	-	-	4	4	15	15	10	60	100
2	PCC	BCS3502	Data Science and Analytics	4	-	-	4	4	15	15	10	60	100
3	PCC	BCS3503	Design and Analysis of Algorithms Lab	-	-	2	2	1	-	-	25	25	50
4	PCC	BCS3504	Data Science and Analytics Lab	-	-	2	2	1	-	-	25	25	50
5	PROJ	BCS3505	Micro Project II	-	-	2	2	1			25	25	50
6	PEC	BCS3506-09	Professional Elective-I	3	-	-	3	3	15	15	10	60	100
7	PEC	BCS3510-13	Professional Elective-II	3	-	-	3	3	15	15	10	60	100
8	OEC	BSSXX01-14	Open Elective-I	3	-	-	3	3	15	15	10	60	100
9	MCC	BAU3505	Heritage	2	-	-	2	Audit	-	-	-	-	-
			Total	19	-	6	25	20	75	75	125	375	650

L- Lecture

T-Tutorial

P-Practical

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	HSMC (Hum., Soc. Sc, Mgmt.)	BSC (Basic Sc.)	ESC (Engg. Sc.)	PCC (Programme Core courses)	PEC (Programme Elective courses)	OEC (Open Elective courses from other discipline)	Project / Seminar / Industrial Training	MCC (Mandatory Courses)
Credits	--	--	--	10	06	03	01	Yes
Cumulative Sum	6	26	18	41	06	03	02	--

PROGRESSIVE TOTAL CREDITS: 82+20 = 102


HOD CSE (CSE)
Tulsiramji Gaikwad-Patil College
of Engineering & Technology
Warananagar, Warananagar Road, Nagpur


Dean/Director Academics


Vice-Principal


Principal 12/09/23



Tulsiramji Gaikwad-Patil College of Engineering and Technology

Wardha Road, Nagpur-441108

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Program: B.Tech. Third Year (Semester-V) (CSE)

Course Code: BCS3501 (Design and Analysis of Algorithms)

Teaching Scheme		Examination Scheme	
Lecture	4Hrs/week	CT1	15 Marks
Tutorial	--	CT2	15 Marks
Total credit	4	CA	10 Marks
		ESE	60 Marks
		Total	100 Marks
		Duration of CSE :03Hrs 00Min.	

Course Contents

Unit I	Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and Space Complexity of algorithm. Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem. Principles of designing algorithms. Introduction to Fundamental Algorithmic Strategies
Unit II	Divide and Conquer- basic strategy, Strassen's matrix multiplication, Maximum sub-array problem, Closest pair of points problem, Convex hull problem. Greedy method – basic strategy, fractional knapsack problem, Minimum cost spanning trees, Huffman Coding, activity selection problem, Find maximum sum possible equal to sum of three stacks, K Centers Problem.
Unit III	Dynamic Programming -basic strategy, Bellman ford algorithm, all pairs shortest path, multistage graphs, optimal binary search trees, traveling salesman problem, String Editing, Longest Common Subsequence problem, 0/1 Knapsack Problem, Chained Matrix Multiplication
Unit IV	Backtracking: General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles. Branch and Bound: General method, applications - Traveling salesman problem, 0/1 knapsack problem-LC Branch and Bound solution, FIFO Branch and Bound solution.
Unit V	NP-Hard and NP-Complete problems: Basic concepts, Non-deterministic algorithms, NP - Hard and NP- Complete classes, NP-Hard problems, Cook's theorem.

Text Books

T1	Design & Analysis of Computer Algorithms by Aho, Pearson education. Horowitz, Sahani, Rajsekharam
T2	Thomas H. Cormen et.al. "Introduction to Algorithms", Prentice Hall of India.
T3	.Horowitz and Sahani, Fundamentals of computer Algorithms, Galgotia, ISBN 81-7371-612-9.



Reference Books

R1	R. C. T. Lee, SS Tseng, R C Chang, Y T Tsai, Introduction to Design and Analysis of Algorithms, A Strategic approach, Tata McGraw Hill,
R2	Anany Levitin, Introduction to the Design & Analysis of Algorithm, Pearson, ISBN 81-7758-835-4.
R3	Algorithm Design: Foundations, Analysis and Internet examples, M.T. Goodrich and

	R.Tomassia, John Wiley and sons.
Useful Links	
1	https://nptel.ac.in/courses/106/101/106101060/
2	https://nptel.ac.in/courses/106/106/106106131/



	Course Outcomes	CL	Class Sessions
BCS3501.1	Analyze recurrence relations for algorithms by using mathematical formulation and complexity analysis.	4	9
BCS3501.2	Implement algorithms for fundamental problem-solving paradigms.	3	9
BCS3501.3	Analyze Dynamic programming Paradigms to solve problems.	4	9
BCS3501.4	Implement efficient solutions for computational challenges.	3	9
BCS3501.5	Execute solutions of NP class problems using algorithm.	3	9




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Program: B.Tech. Third Year (Semester-V) (CSE)			
Course Code: BCS3502 (DATA SCIENCE AND ANALYTICS)			
Teaching Scheme		Examination Scheme	
Lecture	4Hrs/week	CT1	15 Marks
Tutorial	--	CT2	15 Marks
Total credit	4	CA	10 Marks
		ESE	60 Marks
		Total	100 Marks
		Duration of CSE :03Hrs 00Min.	
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.		
Unit II	Data Collection and Data Pre-Processing Data Collection Strategies, Data Pre-Processing Overview, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization.		
Unit III	Exploratory Data Analytics Descriptive Statistics, Mean, Standard Deviation, Skewness and Kurtosis, Box Plots, Pivot Table, Heat Map, Correlation Statistics, ANOVA.		
Unit IV	Model Development Simple and Multiple Regression, Model Evaluation using Visualization, Residual Plot, Distribution Plot, Polynomial Regression and Pipelines, Measures for In-sample Evaluation, Prediction and Decision Making, Feature Engineering.		
Unit V	Model Evaluation Generalization Error, Out-of-Sample Evaluation Metrics, Cross Validation, Overfitting, Under Fitting and Model Selection, Prediction by using Ridge Regression, Testing Multiple Parameters by using Grid Search		
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			
R.1	“Essential Math for Data Science”, Thomas Nield		
R.2	“A Hands on Introduction to Data Science”,Chirag Shah,Cambridge University Press		

Code	Course Outcomes	CL	Class Sessions
BCS3502.1	Understand the knowledge of basic concepts of data science and key issues	2	9
BCS3502.2	Apply data collection and data pre-processing techniques in data science.	3	9
BCS3502.3	Analyze fundamentals of Exploratory Data Analytics.	4	9
BCS3502.4	Implement regression models using appropriate software tools.	3	9
BCS3502.5	Apply appropriate evaluation metrics based on the problem domain and goals.	3	9

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Program: B.Tech. Third Year (Semester-V) (CSE)				
Course Code: BCS3503 (Design and Analysis of Algorithms Lab)				
Teaching Scheme			Examination Scheme	
Practical	2 Hrs/week		CA	25 Marks
Total credit	1		ESE	25 Marks
			TOTAL	50 Marks
			Duration of CSE :03Hrs 00Min.	
List of Experiment				
1	Sort a given set of elements using the quick sort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.			
2	Implement a merge sort algorithm to sort a given set of elements and determine the time required to sort the elements.			
3	Implement algorithm for Strassen's matrix multiplication.			
4	Implement algorithm for Huffman coding			
5	Implement a program of Floyd Warshall's Algorithm			
6	Implement 0/1 Knapsack problem using Dynamic Programming.			
7	Find a subset of a given set $S = \{s_1, s_2, \dots, s_n\}$ of n positive integers whose sum is equal to a given positive integer d. For example, if $S = \{1, 2, 5, 6, 8\}$ and $d = 9$ there are two solutions $\{1, 2, 6\}$ and $\{1, 8\}$. A suitable message is to be displayed if the given problem instance doesn't have a solution.			
8	Implement N Queen's problem using Back Tracking.			
9	Implement Non-deterministic algorithms			
10	Verify Cook's theorem			
Text Books				
R1	Introduction to Algorithms,3rd Edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest, and C.Stein, PHI Pvt.Ltd.			
R2	Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson Education,2004.			
R3	Algorithm Design: Foundations, Analysis and Internet examples, M.T.Goodrich and R.Tomassia, John Wiley and sons.			
Usefull links				
1	https://nptel.ac.in/courses/106/101/106101060/			
2	https://nptel.ac.in/courses/106/106/106106131/			

	Course Outcomes	CL	Class Sessions
BCS3503.1	Analyze recurrence relations for algorithms by using mathematical formulation and complexity analysis.	4	9
BCS3503.2	Implement algorithms for fundamental problem-solving paradigms.	3	9
BCS3503.3	Analyze Dynamic programming Paradigms to solve problems.	4	9
BCS3503.4	Implement efficient solutions for computational challenges.	3	9
BCS3503.5	Execute solutions of NP class problems using algorithm.	3	9

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Program: B.Tech. Third Year (Semester-V) (CSE)				
Course Code: BCS3504 (DATA SCIENCE AND ANALYTICS)				
Teaching Scheme			Examination Scheme	
Practical	2 Hrs/week		CA	25 Marks
Total credit	1		ESE	25 Marks
			TOTAL	50 Marks
		Duration of CSE :03Hrs 00Min.		
List of Experiment				
1	Implement Numpy arrays.			
2	Implement Pandas data frames.			
3	Develop python program for Basic plots using Matplotlib.			
4	Develop python program for Frequency distributions.			
5	Develop python program for Variability.			
6	Develop python program for Averages.			
7	Develop python program for Normal Curves.			
8	Develop python program for Correlation and scatter plots.			
9	Develop python program for Correlation coefficient.			
10	Develop python program for Simple 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 Analytics", EMC 2013			
T.3	JojoMoolayil, "Smarter Decisions : The Intersection of IoT and Data Science", PACKT, 2016.			
Usefull links				
1	https://nptel.ac.in/courses/106/101/106101060/			
2	https://nptel.ac.in/courses/106/106/106106131/			

Code	Course Outcomes	CL	Class Sessions
BCS3504.1	Understand the knowledge of basic concepts of data science and key issues	2	9
BCS3504.2	Apply data collection and data pre-processing techniques in data science.	3	9
BCS3504.3	Analyze fundamentals of Exploratory Data Analytics.	4	9
BCS3504.4	Implement regression models using appropriate software tools.	3	9
BCS3504.5	Apply appropriate evaluation metrics based on the problem domain and goals.	3	9

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SCHEME OF INSTRUCTION & SYLLABI

Program: Computer Science & Engineering

**List of Electives offered by
Computer Science & Engineering**

Course Code	Professional Elective- I	Course Code	Professional Elective- II
	Semester V		Semester V
BCS3506	Web Technology	BCS3510	TCP/IP
BCS3507	Design Patterns	BEC3511	Microprocessor and Microcontroller
BCS3508	Computer Graphics	BCS3512	Advance Java Programming
BCS3509	Artificial Intelligence	BCS3513	Parallel and Distributed Database

Course Code	Professional Elective- III	Course Code	Professional Elective- IV
	Semester VI		Semester VI
BCS3606	Advance Web Technology	BCS3610	Advances in Computer Networks
BCS3607	Software Testing and Quality Assurance	BCS3611	Real Time Operating System
BCS3608	Image Processing	BCS3612	DevOps
BCS3609	Neural Network and Fuzzy Logic	BCS3613	Cloud Computing

Course Code	Professional Elective- V	Course Code	Professional Elective- VI
	Semester VII		Semester VII
BCS4706	Web Intelligence and Big Data	BCS4710	Ad-Hoc and Sensor Networks
BCS4707	Software Project Management	BEC4711	Embedded Systems
BCS4708	Fundamentals of Augmented and Virtual Reality	BCS4712	AWS
BCS4709	Deep Learning	BCS4713	Internet-of-Things (IoT)


HOD
 Deptt. of Computer Science & Engineering (CSE)
 Tulsiramji Gaikwad-Patil College
 of Engineering & Technology
 Mohagaon, Wardha Road, Nagpur





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Program: B.Tech. Third Year (Semester-V) (CSE)

Course Code: BCS3506 (Web Technology)

Teaching Scheme

Lecture 3Hrs/week

Tutorial -

Total credit 3

Examination Scheme

CT1 15 Marks

CT2 15 Marks

CA 10 Marks

ESE 60 Marks

Total 100 Marks

Duration of CSE :03Hrs 00Min

Course Contents

Unit I

Web Foundations: The Evaluation of the Web, History of the Web, Internet Application , Networks, TCP/IP, Higher Level Protocols, Components of the Web, Web Search Engines, Web Servers, Application Servers, Internet Organization Who's Who.

Unit II

HTML - History of HTML, Title and Footers, Text Formatting, Emphasizing Material in a Web Page List, Text Styles, Other Text Effects, Lists, Adding Graphics to HTML Documents, Tables, Linking Documents ,images, forms, Frames.

Unit III

Cascading Style Sheets:- Introduction CSS, Creating Style Sheets, Common Tasks with CSS, Colours - Colour Properties, Image Properties, Position Properties, Background Properties, The Font Family, Layer Tag
XML: Introduction to XML, Features of XML, Defining XML tags, their attributes and values, Document Type Definition, XML Schemes, Document Object Model.

Unit IV

JavaScript : Introduction JavaScript, **JavaScript in Web pages:-** Netscaps and JavaScript, Client side JavaScript, **Basic Programming Techniques:-** Data Types and Literal, Boolean, String, Null, Type Casing, Operators and Expressions in JavaScript, Conditional Checking, Dialog Boxes.

Unit V

PHP: Introduction, PHP Basics, String Processing and Regular Expressions, Form Processing and Business Logic, Dynamic Content, Operator Precedence, PHP Security.

Text Books

T.1

Web Technologies Black Book: HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Kogent Learning Solutions Inc., Dreamtech Press, 2009

T.2

The Complete Reference PHP — Steven Holzner, Tata McGraw-Hill

T. 3

M. Srinivasan, Web Technology: Theory and Practice, Pearson India, 2012.

T.4

Web Technology , Firewall Media Ramesh Bangia

Reference Books

R.1

Web Programming, building internet applications, Chris Bates 2" edition, Wiley Dreamtech

R.2	Java Server Pages —Hans Bergsten, SPD O'Reilly,
R.3	Internet and World Wide Web — How to program. Dietel and Nieto, Pearson.
Useful Links	
1	https://nptel.ac.in/courses/106/105/106105084/
2	https://nptel.ac.in/courses/106/105/106105084/
3	https://nptel.ac.in/courses/106/105/106105084/

	Course Outcomes	CL	Class Sessions
BCS3506.1	Analyze the impact of search engines on information access and user behavior.	2	9
BCS3506.2	Implement the relative and absolute URLs for linking to internal and external resources.	2	9
BCS3506.3	Understand concept of CSS, XM.	2	9
BCS3506.4	Applying scripting language on client side & form.	3	9
BCS3506.5	Applying the fundamental knowledge of PHP.	2	9

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Program: B.Tech. Third Year (Semester-V) (CSE)

Course Code: BCS3507 (Design Pattern)

Teaching Scheme		Examination Scheme	
Lecture	3Hrs/week	CT1	15 Marks
Tutorial	-	CT2	15 Marks
Total credit	3	CA	10 Marks
		ESE	60 Marks
		Total	100 Marks
		Duration of ESE:3 Hrs 00 Mins	

Course Contents

Unit I	Introduction to Design Patterns and Observer Pattern: Basics of Design patterns, Description of design patterns, Catalog and organization of catalog, design patterns to solve design problems, selection of design pattern, Use of design patterns.
Unit II	Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton, Creational Patterns
Unit III	Structural Pattern: Adapter, Bridge, Composite, Decorator, Façade, Flyweight, Proxy, Discussion of Structural Patterns
Unit IV	Behavioral Patterns: Chain of Responsibility, Command, Interpreter, Iterator, Mediator, Memento, Observer, State, Strategy, Template Method, Visitor, Discussion of Behavioral Patterns Architectural Pattern: MVC pattern.
Unit V	A Case Study: Designing a Document Editor: Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations, Spelling Checking, and Hyphenation. Complexity Analysis of Design Patterns, Methods to analyze the complexity of design pattern

Text Books

T.1	Head First Design Patterns, by Eric Freeman and Elisabeth Freeman
T.2	Design Patterns Explained, by Shalloway and Trott

Reference Books

R.1	Introduction to design Patterns in C++ with by Alan Ezust, Paul Ezust
R.2	Design Patterns: Elements of Reusable Object-Oriented Software' Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides

Useful Links	
1	https://nptel.ac.in/courses/106/101/106101061/
2	http://nptelvideos.com/video.php?id=916

	Course Outcomes	CL	Class Sessions
BCS3507.1	Understand needs of design pattern and use of design pattern.	2	9
BCS3507.2	Integrate design problems and work with creational design patterns.	4	9
BCS3507.3	Integrate design problems and work with Structural design patterns.	4	9
BCS3507.4	Integrate design problems and work with Behavioral design patterns.	4	9
BCS3507.5	Analyze the methods to analyze the complexity of design pattern	4	9

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Program: B.Tech. Third Year (Semester-V) (CSE)

Course Code: BCS3508(Computer Graphics)

Teaching Scheme		Examination Scheme	
Lecture	3Hrs/week	CT1	15 Marks
Tutorial	-	CT2	15 Marks
Total credit	3	CA	10 Marks
		ESE	60 Marks
		Total	100 Marks
		Duration of ESE:3 Hrs 00 Mins	

Course Contents

Unit I	Computer Graphics Basic, OpenGL and Line, Circle Drawing: Introduction CG :Introduction to computer graphics, basics of graphics systems, raster and random scan, basic display processor. OpenGL: Introduction – Graphics function, OpenGL Interface, primitives and attributes, Control functions, programming events. Line Drawing: DDA Line drawing algorithm, Bresenham Line drawing algorithm. Circle Drawing: Bresenham circle drawing algorithm. Character Generation: Stroke principle, starburst principle, bitmap method. Introduction to aliasing and anti-aliasing
Unit II	Polygons, 2D Transformations: Polygons: Polygons and its types, inside test. Polygon filling methods: Seed Fill – Flood fill and Boundary Fill, Scan-line Fill algorithms. 2D Transformations: Translation, Scaling, Rotation, Reflection and Shearing, Matrix representation and homogeneous coordinate system, composite transformations.
Unit III	Windowing, Clipping, 3D Transformation, Projections: Windowing: Concept of window and viewport, viewing transformations Line Clipping: Cohen Sutherland method . Polygon Clipping: Sutherland Hodgeman method 3D Transformation: Translation, scaling, rotation. Projections: Types of projections- Parallel, Perspective. Parallel: oblique – Cavalier, Cabinet, Orthographic – isometric, diametric, trimetric. Perspective: vanishing points .
Unit IV	3D Rendering and Modeling: Segments: Introduction, Segment table, segment creation, closing, deleting, renaming, and visibility. Illumination models: Light sources, ambient light, diffuse light, specular reflection, the Phong model, combined diffuse and specular reflections with multiple light sources. Color Models: CIE Chromaticity Diagram, Color Gamut, RGB, CMY, YCbCr, HSV color models. Shading Algorithms: Constant intensity shading, Halftone, Gourand and Phong Shading.
	Curves, fractals and Animation: Curves: Introduction, interpolation and approximation, Spline Interpolation Methods – hermite interpolation, Bezier curves, B-Splines. Fractals: Introduction, Classification, fractal Dimension, Fractal dimension and surfaces, Hilbert curve, Koch Curve.

Unit V	Animation: Basics of animation, types of animation, principles of animation, design of animation sequences, animation languages, key frame, morphing, and motion specification. Methods of controlling animation, frame-by-frame animation techniques, real-time animation techniques.
Text Books	
T.1	D. Hearn, M. Baker, "Computer Graphics – C Version", 2nd Edition, Pearson Education, 2002, ISBN 81 – 7808 – 794 – 4
T.2	Grigore C. Burdea, Philippe Coiffet, "Virtual Reality Technology", second edition, WileyIndia Edition, ISBN 81-265-0789-6
T.3	D. Hearn, M. Baker, "Computer Graphics – C Version", 2nd Edition, Pearson Education, 2002, ISBN 81 – 7808 – 794 – 4
Reference Books	
R.1	D. Rogers, "Procedural Elements for Computer Graphics", 2nd Edition, Tata McGrawHill Publication, 2001, ISBN 0 – 07 – 047371 – 4.
R.2	J. Foley, V. Dam, S. Feiner, J. Hughes, "Computer Graphics Principles and Practice", 2nd Edition, Pearson Education, 2003, ISBN 81 – 7808 – 038 – 9
R.3	Foley, "Computer Graphics: Principles & Practice in C", 2e, ISBN 9788131705056, Pearson Edu.
Usefull links.	
1	https://nptel.ac.in/courses/106/101/106101060/
2	https://nptel.ac.in/courses/106/106/106106131/

	Course Outcomes	C L	Class Sessions
BCS3508.1	Apply mathematical and logical aspects for developing elementary graphics operations like scan conversion of points, lines, circle, and apply it for problem solving	3	9
BCS3508.2	Understand the concept of polygon and Translation in 2D	2	9
BCS3508.3	Apply techniques of geometrical transforms to produce, position and manipulate objects in 2dimensional and 3-dimensional space respectively.	3	9
BCS3508.4	Analyze mapping from a world coordinates to device coordinates, clipping, and projections in order to produce 3D images on 2D output device	4	9
BCS3508.5	Apply concepts of rendering, shading, animation, curves and fractals using computer graphics tools in design.	3	9

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Program: B.Tech. Third Year (Semester-V) (CSE)

Course Code: BCS3509 (Artificial Intelligence)

Teaching Scheme		Examination Scheme	
Lecture	3Hrs/week	CT1	15 Marks
Tutorial	-	CT2	15 Marks
Total credit	3	CA	10 Marks
		ESE	60 Marks
		Total	100 Marks
		Duration of ESE: 3 Hrs 00 Mins	

Course Contents

Unit I	Fundamentals of Artificial Intelligence: Introduction of AI History & Applications, A.I. Representation, Non-AI & AI Techniques, Representation of Knowledge, Knowledge Base Systems, State Space Search, Production Systems, Problem Characteristics, types of production systems, Intelligent Agents and Environments, concept of rationality, problem solving agents, problem formulation
Unit II	Search Techniques: Formulation of real world problems, Uninformed Search techniques, Informed Heuristic Based Search, Generate & test, Hill Climbing, Best First Search, A* and AO* Algorithm, Constraint satisfaction, Game playing: Minimax Search, Alpha-Beta Cutoffs, Waiting for Quiescence, Comparison of Uninformed and Informed search Strategies
Unit III	Knowledge representation: Knowledge representation Issues: First order logic, Predicate Logic, Structured Knowledge Representation: Forward Chaining, Backward Chaining, Proof methods, substitution and unification, conversion to clause form, normal forms, resolution, refutation, deduction, theorem proving, inferencing, monotonic and non monotonic reasoning, Semantic Nets, Frames, and Scripts, Ontology.
Unit IV	Uncertainty: Handling uncertain knowledge, rational decisions, basics of probability, axioms of probability, Baye's Rule and conditional independence, Bayesian networks, Exact and Approximate inference in Bayesian Networks, Markov processes and Hidden Markov models, Fuzzy Logic.
Unit V	Learning & Expert System: Learning: What is learning?, Knowledge and learning, Learning in Problem Solving, Learning from example, learning probabilistic models, Formal Learning Theory. Expert Systems: Fundamental blocks, Knowledge Engineering, Knowledge Acquisition, Knowledge Based Systems, Automated Reasoning, Understanding Natural language

Text Books

T.1	Elaine Rich and Kevin Knight: "Artificial Intelligence." Tata McGraw Hill
T.2	Stuart Russell & Peter Norvig: "Artificial Intelligence: A Modern Approach", Pearson Education, 2nd Edition.

Reference Books	
R.1	Eugene, Charniak, Drew McDermott: "Introduction to Artificial Intelligence.", Addison Wesley
R.2	Russell & Norvig, Artificial Intelligence: A Modern Approach, Pearson Education
R.3	Patterson: —Introduction to AI and Expert Systems, PHI
Useful Links	
1	https://nptel.ac.in/courses/106/105/106105077/
2	https://nptel.ac.in/courses/106/102/106102220/

	Course Outcomes	CL	Class Sessions
BCS3509.1	Apply the fundamentals of artificial Intelligence.	3	9
BCS3509.2	Analysis of uninformed search & informed search algorithms on.	4	9
BCS3509.3	Analyze problems using Propositional and First order logic.	4	9
BCS3509.4	Classify certain and uncertain factors in AI problems.	4	9
BCS3509.5	Evaluate the concepts of Learning, Expert system and applications.	5	9

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Program: B.Tech. Third Year (Semester-V) (CSE)

Course Code: BCS3510 (TCP/IP)

Teaching Scheme

Lecture 3Hrs/week

Tutorial -

Total credit 3

Examination Scheme

CT1 15 Marks

CT2 15 Marks

CA 10 Marks

ESE 60 Marks

Total 100 Marks

Duration of ESE:3 Hrs 00 Mins

Course Contents

UnitI

Introduction to Network Architecture and Technologies

Network architecture, Standards, TCP/IP Model Overview, Internetworking concept, InternetBackbones, NAPs, ISPs, RFCs and Internet Standards, Software-Defined Networking, Network Function Virtualization, Internet of Things (IoT) Networking

UnitII

TCP/IP Protocol Suite and Network Administration

CIDR, Sub-netting and Super-netting, ARP, OSPF, DHCP, IP forwarding and routing algorithms, Computing paths, Mobile IP, ICMP, BGP, MPLS, DNS

UnitIII

TCP/IP Transport Layer Protocols and Services

TCP header, services, Connection establishment and termination, Interactive data flow, Bulk dataflow, TCP timers, Urgent Data processing, Congestion control, Extension headers, TCP/IP Security, Multipath TCP.

UnitIV

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.

UnitV

TCP/IP IPv6 Networking and IP Security

IP security protocol, IPv6 addresses, Packet format, Multicast, Anycast, ICMPv6, Interoperationbetween IPv4 and IPv6, QoS, Auto configuration, Secure Neighbor Discovery, IPSec Tunneling and Virtual Private Networks, Network Address Translation for IPv6

Text Books

T.1 Internetworking With TCP/IP : Principles Protocols And Architecture / D. E. Comer ; 1st Vol. ; Delhi : Pearson Education, 2008

T.2 TCP/IP : Protocol Suite / Behrouz Aforouzan ; New Delhi : Tata McGraw Hill, 2013

T.3 High Performance TCP/IP Networking Concepts, Issues And Solutions / Hassan,Mahbub ; New Delhi : Prentice Hall Of India, 2009

Reference Books

R.1	Network Security and Cryptography, Bernard Menezes, Cengage Learning.
R.2	Information System Security, Nina Godbole, Wiley India, 2008.
Useful Links	
1	https://youtu.be/O--rkQNKqls
2	https://youtu.be/dN-sJpsYBrU
3	https://youtu.be/3DZLIItfbqtQ

	Course Outcomes	CL	Class Sessions
BCS3510.1	Distinguishing functioning of OSI and TCP/IP Model, solve problems on IP Addressing and implement IP forwarding.	4	9
BCS3510.2	Evaluate IP Datagram-IP package –IP forwarding and routing algorithms & solve various problem on routing algorithm.	5	9
BCS3510.3	Implement services on basic application layer server config.	3	9
BCS3510.4	Apply multimedia technique in Computer Security.	3	9
BCS3510.5	Dividing IPv4 and IPv6-QoS protocols.	4	9

Signature

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Tulsiramji Gaikwad-Patil College of Engineering and Technology

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Program: B.Tech. Third Year (Semester-V) (CSE)

Course Code: BCS3511 (Microprocessor and Microcontroller)

Teaching Scheme		Examination Scheme	
Lecture	3Hrs/week	CT1	15 Marks
Tutorial	-	CT2	15 Marks
Total credit	3	CA	10 Marks
		ESE	60 Marks
		Total	100 Marks
		Duration of ESE:3 Hrs 00 Mins	

Course Contents

Unit I	8086 microprocessor, Pin diagram, Architecture, features and operating modes, Flag Register, memory organization & interfacing, Addressing modes, complete instruction set, Interrupt structure.
Unit II	8251, Pins & block diagram, interfacing with 8086 Interfacing of peripherals like 8255 PPI, Pin descriptions, operating modes, BSR and I/O modes, IN and OUT instruction multiplexed 7-seg display & matrix keyboard interface using 8255, Serial communication, Classification & transmission formats, USART.
Unit III	Comparison of microprocessor & micro-controller, Introduction to 8051 micro controller; Pin diagram, architecture, features & operation, Ports, memory organization, PSW Counters/Timers, Serial ports, Instruction set of 8051, data transfer, logical, arithmetic & branching instructions, Addressing modes.
Unit IV	Interfacing of external RAM & ROM with 8051. 8051 ,Interrupt structure, Interfacing of Switches, keyboard, LED & LCD display, ADC & DAC interface, stepper motor interface.
Unit V	PIC Micro-controllers – overview: Features, PIC 16c6x/7x architecture, Introduction to Arduino boards, basic types, history & IDE, Compatible shields with their libraries.

Text Books



T.1	M.A. Mazidi & J.G. Mazidi, the 8051 Micro-controller and Embedded system, 3rd Indian reprint, Pearson Education
T.2	Microprocessor 8086/8088 Family Programme Interfacing: Liu & Gibson.
T.3	Programming PIC Micro-controllers with XC8 by Authors: Subero, Armstrong.

Reference Books	
R.1	Micro-controllers – Peatman, Mc Graw Hill.
R.2	Microprocessors & Microcomputers based system design by Md. Rafiquzzaman.
R.3	Introduction to Microprocessors for Engineers and Scientists, P. K. Ghosh, P. R. Sridhar, PHI Publication.
Useful Links	
1	https://nptel.ac.in/courses/108/105/108105159/
2	https://nptel.ac.in/courses/108/104/108104139/
3	https://nptel.ac.in/courses/117/106/117106108/

	Course Outcomes	CL	Class Sessions
BCS3511.1	Determine the structure and organization of 8086 microprocessor.	3	9
BCS3511.2	Implement the interfacing of I/O peripherals with 8086 using 8255PPI.	3	9
BCS3511.3	Apply the fundamentals and examine the structure of Microcontroller 8051.	3	9
BCS3511.4	Implement the interfacing of 8051 micro-controller with I/O devices.	3	9
BCS3511.5	Analyze the performance and behavior of PIC microcontroller.	4	9

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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			
Program: B.Tech. Third Year (Semester-V) (CSE)				
Course Code: BCS3512 (Advance Java Programming)				
Teaching Scheme			Examination Scheme	
Lecture	3Hrs/week		CT1	15 Marks
Tutorial	-		CT2	15 Marks
Total credit	3		CA	10 Marks
			ESE	60 Marks
		Total	100 Marks	
		Duration of ESE:3 Hrs 00 Mins		
Course Contents				
Unit I	Java Database Connectivity: JDBC Concepts, JDBC API, Driver Manager, Connection, Statement, Prepared Statement, Callable Statement and Result Set classes with relevant methods, Types of Result Sets. Handling queries, inserts, deletes and updates to database. Displaying the query results. Stored Procedures.			
Unit II	Servlets in Java: Servlet structure & lifecycle. Servlet A P I basics, various classes & interfaces. Servlet requirements, writing. Running of Servlets, Concepts of Cookies, Servlets & cookies. Session management with ServletAPI. Server side includes and request forwarding. Servlet chaining. Jdbc Servlets			
Unit III	Introduction to JSP: Simple JSP concepts, Environment set up for JSP, Life cycle of a JSP, Elements involved with development of JSP: Scripting Elements, Directives, Implicit Objects. Java beans: Concept of Beans, Properties, Bean instances & serialization, Bean Scopes, Writing Beans, Deploying a bean, JDBC bean. Jsp Actions, Using a bean in a JSP.			
Unit IV	Introduction to Javascript: What is Javascript?, Values, Types and Operators, Expressions and statements, control flow statements, Functions, Arrow Functions, HTTP and Forms, Event handling, data structures, objects			
Unit V	Introduction to Hibernate: Why Hibernate?, Architecture of Hibernate, Hibernate Query language,Hibernate O/R Mapping, Setting up the Development Environment ,Creating Database Table Writing- Hibernate Configuration File, Java Bean, and Hibernate Mapping File, Developing Controller Component, Developing view Component			
Text Books				
T.1	Java Server Programming Java EE 7 (J2EE 1.7) Black Book(2014),. KogentLearning SolutionsInc.			
T.2	Core Servlets and Java Server Pages: Core Technologies by Marty Hall and Larry Brown,Java 2 Platform Enterprise Edition series, PrenticeHall			
Reference Books				
R.1	Java EE cookbook, Elder Moraes,Packt Publishing Limited (9 April 2018)			
Useful Links				

1	https://www.tutorialspoint.com
2	https://www.javatpoint.com

	Course Outcomes	CL	Class Sessions
BCS3512.1	Analyze robust and efficient Java applications that seamlessly integrate with relational databases.	4	9
BCS3512.2	Implement dynamic and interactive web applications using Java Servlet technology	3	9
BCS3512.3	Apply the concept of Web Server, Web Container and Application Server.	3	9
BCS3512.4	Understand the deployment descriptor and enterprise application deployment.	2	9
BCS3512.5	Implement components like: Session, Java Beans, JSTL, Tag Extensions	3	9

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Program: B.Tech. Third Year (Semester-V) (CSE)

Course Code: BCS3513 (Parallel and Distributed Database)

Teaching Scheme		Examination Scheme	
Lecture	3Hrs/week	CT1	15 Marks
Tutorial	-	CT2	15 Marks
Total credit	3	CA	10 Marks
		ESE	60 Marks
		Total	100 Marks
		Duration of ESE:3 Hrs 00 Mins	

Course Contents

Unit I	Distributed data processing; What is a DDBS; Advantages and disadvantages of DDBS; Problem areas; Overview of database and computer network concepts, Architecture of Distributed Database, Client Server System
Unit II	Storage Management in Distributed Database, Horizontal and vertical fragmentation, Data Partitions and clusters
Unit III	Distributed optimization, computation of join costs and access costs, semi joins, Using Heuristics in Query optimization
Unit IV	Transaction and concurrency control, two phase commit, implementation of ACID properties in parallel and distributed Database, Backup, and Recovery concepts, Transaction recovery, replication concepts, multi master and snapshot, Replication conflict resolution.
Unit V	Database Servers, Architecture of Parallel Databases, Parallel Databases, Parallel DBMS techniques and Parallel Execution Problem, Application of Distributed databases and parallel databases.

Text Books

T.1	S. Ceri and G. Pelagati; "Distributed Database System"; McGraw Hill, 2002 Reprint.
T.2	Tamer Ozstu; "Principles of Distributed Database Systems"; Prentice Hall, 1991
T.3	Principles of Distributed Database Systems, M.T. Ozsu and P. Valduriez, Prentice-Hall, 1991.
T. 4	Distributed Database Systems, D. Bell and J. Grimson, Addison-Wesley, 1992.

Reference Books

R.1	Vijay K Garg, "Elements of Distributed Computing", Wiley-IEEE Press, , May 2002& Embedded Systems, Kenneth J. Ayala, Dhanvijay V. Gadre, CENGAGE Learning.
R. 2	D. Bell and J. Grimson; "Distibuted Database System"; Addison- Wesley 1992.

Useful Links

1	https://nptel.ac.in/courses/106/106/106106168/
2	https://nptel.ac.in/courses/106/106/106106107/

	Course Outcomes	CL	Class Sessions
BCS3513.1	Analyze various distributed databases design principles	3	9
BCS3513.2	Implement distributed transaction processing	3	9
BCS3513.3	Implementation of distributed query processing.	4	9
BCS3513.4	Determine characteristics and goal of transaction management system.	3	9
BCS3513.5	Analyze reliability issues of distributed database system.	4	9

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SCHEME OF INSTRUCTION & SYLLABI

Course Code and Course Numbering Scheme for Open Electives:

Sr. No.	Name of Host Programme	Open Elective Course Code	Title of the Course
1	Computer Science & Engineering	BCSXX01	Fundamentals of Database Management System
2	Computer Science & Engineering	BCSXX02	Python Programming
3	Information Technology	BITXX03	Cyber Security
4	Information Technology	BITXX04	Artificial Intelligence
5	Electronics and Communication Engineering	BECXX05	Internet of Things
6	Electronics and Communication Engineering	BECXX06	Embedded System
7	Civil Engineering	BCEXX07	Introduction to Art and Aesthetics
8	Civil Engineering	BCEXX08	Metro System and Engineering
9	Mechanical Engineering	BMEXX09	Nanotechnology and Surface Engineering
10	Mechanical Engineering	BMEXX10	Automobile Engineering
11	Electrical Engineering	BEEXX11	Power Plant Engineering
12	Electrical Engineering	BEEXX12	Electrical Materials
13	Aeronautical Engineering	BAEXX13	Avionics
14	Aeronautical Engineering	BAEXX14	Unmanned Aerial Vehicles
15	Biotechnology	BBTXX15	Biomaterials
16	Biotechnology	BBTXX16	Food and Nutrition Technology


 HOD
 Deptt. (CSE)
 Tulsiramji Gaikwad-Patil College
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 Monagaon, Wadga Road, Nagpur





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Program: B.Tech. (CSE)

Course Code: BCSXX01 Open Elective: Fundamentals of Database Management System

Teaching Scheme		Examination Scheme	
Lecture	3Hrs/week	CT1	15 Marks
Tutorial	-	CT2	15 Marks
Total credit	3	CA	10 Marks
		ESE	60 Marks
		Total	100 Marks
		Duration of CSE :03Hrs 00Min	

Course Contents

Unit I	Database system :- Purpose of Database systems, Example of Database Applications, Basic Terminologies, Data Models, Entity-Relationship Model, Relational Model.
Unit II	Relational Databases :- Introduction, SQL, DDL, DML, DCL, Database Integrity and Security, Relational-Database Design, Object-Oriented Databases, Object-Relational Databases, database constraints, functional dependencies and normalization
Unit III	Data Storage and Querying :- Storage and File Structure, Indexing and Hashing, Data Retrieval, Query Processing, data-access techniques, query evaluation.
Unit IV	Transaction Management :- Introduction, transaction atomicity, consistency, isolation, and durability, concurrency control, serializability, locking, time stamping. Deadlock issues
Unit V	Database System Architecture :- Centralized systems, client-server systems, parallel and distributed architectures, and network types, LDAP directory system.

Text Books

T.1	Database System Concepts, 7 th Edition, Silberschatz-Korth-Sudarshan, McGraw-Hill, 2019
T.2	The Complete Reference PHP — Steven Holzner, Tata McGraw-Hill

Reference Books

R.1	Fundamentals of Database Systems, 5 th Edition, Elmasri, Navathe & Gupta, Pearson Education.
R.2	Database Systems, 5th Edition, S. K. Singh, Pearson Education
R.3	Internet and World Wide Web — How to program. Dietel and Nieto, Pearson.

	Course Outcomes	CL	Class Sessions
BCSXX01.1	Understand the basics of Database Management System.	2	9
BCSXX01.2	Apply database concepts to design database.	2	9
BCSXX01.3	Apply ER Diagrams & develop SQL queries	2	9
BCSXX01.4	Analyze tables & perform CRUD operations.	3	9
BCSXX01.5	Analyze data dependencies & normalization	3	9






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Program: B.Tech. (CSE)

Course Code: BCSXX02 Open Elective: Python Programming.

Teaching Scheme		Examination Scheme	
Lecture	3Hrs/week	CT1	15 Marks
Tutorial	-	CT2	15 Marks
Total credit	3	CA	10 Marks
		ESE	60 Marks
		Total	100 Marks
		Duration of CSE :03Hrs 00Min.	

Course Contents

Unit I	Introduction: Why Program, Hardware Overview, Python as a Language
Unit II	Installing and Using Python: Installing Python and Writing A Program, Writing Paragraphs of Code, Doing the "Hello World" Assignment
Unit III	Variables and Expressions: Declaring variables, working with data types and variables, working with numeric data, working with string data, Expression
Unit IV	Conditional Code and Decision: Conditional Statements, Defining and writing decision statements, Illustrative programs Loops and Iteration: Loops and iteration, defining loops, working with recursion, Illustrative programs.
Unit V	Functions: Define and use functions and modules, recursive functions, Illustrative programs

Text Books

T.1	Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016
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Reference Books

R.1	Mark Lutz, Programming Python, O'Reilly, 4th Edition, 2010
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Code	Course Outcomes	CL	Class Sessions
BCSXX02.1	Understand the requirement of Python scripting language for developers.	2	9
BCSXX02.2	Apply the knowledge of programming in Python & Installation of python.	2	9
BCSXX02.3	Analyze Variables and Expressions statements in Python.	4	9
BCSXX02.4	Determine Conditional Code, Decision, Loops and Iteration in Python.	3	9
BCSXX02.5	Evaluate functions and pass arguments in Python.	5	9