

K. D. K. College of Engineering, Nagpur

**Scheme and Syllabus for
Bachelor of Technology (Information Technology)**

Submitted by
Board of Studies in Information Technology

TYUG Engineering Curriculum: NEP – Information Technology

Vision of the Institute

Transforming Society through excellence in Education, Innovation and Research.

Mission of the Institute

- M1** To deliver quality, outcome-based education that provides strong technical knowledge and lifelong learning.
- M2** To promote innovation and impactful research addressing real-world and societal challenges.
- M3** To develop competent, ethical and socially responsible professionals through industry interaction and holistic development.

Vision of the Department

To achieve excellence in Information Technology education and research, fostering innovators and ethical professionals who drive digital transformation for societal benefit.

Mission of the Department

- M1** To deliver a rigorous, outcome-based curriculum in Information Technology that equips students with robust core computing skills, adaptability to emerging technologies, and a passion for lifelong learning.
- M2** To foster a culture of research, problem-solving, and innovation in IT, encouraging students and faculty to develop scalable, tech-driven solutions for real-world and societal challenges.
- M3** To nurture competent, ethical, and socially responsible IT professionals by strengthening industry-academia partnerships, promoting entrepreneurship, and cultivating holistic leadership skills.

Program Educational Objectives (PEO)

Graduates of Information Technology will

- PEO1** establish successful careers as software engineers, IT consultants, or system analysts in global enterprises, demonstrating core computing expertise, adaptability to disruptive technologies, and a commitment to continuous professional development.
- PEO2** pursue higher education, engage in impactful research, or establish tech ventures, translating core IT principles into scalable, innovative solutions that solve real-world industry and environmental challenges.
- PEO3** advance into leadership roles within multidisciplinary teams, practicing high standards of professional ethics, social responsibility, and effective communication to drive inclusive digital transformation.

Annexure I: Knowledge and Attitude Profile (WK) as per NBA for UG Tier-I institute

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, reuse of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

WK6: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

WK7: Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

WK8: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

WK9: Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

PROGRAMME OUTCOMES

POs	KEYWORDS	PROGRAM OUTCOMES
PO1	Engineering knowledge	Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
PO2	Problem analysis	Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
PO3	Design/development of solutions	Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
PO4	Conduct investigations of complex problems	Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
PO5	Engineering Tool Usage	Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
PO6	The Engineer and The World	Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
PO7	Ethics	Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
PO8	Individual and Collaborative Team work	Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
PO9	Communication	Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences.
PO10	Project management and finance	Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
PO11	Life-long learning	Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team. Manage projects in multidisciplinary environments.

PROGRAMME SPECIFIC OUTCOMES

PSO 1: Core System Architecture & Emerging Technologies

Ability to analyze, design, and develop scalable IT solutions, software systems, and network architectures by applying core computing principles, data structures, and modern cloud, AI, or cybersecurity methodologies.

PSO 2: Tech-Driven Problem Solving for Societal Benefit

Ability to utilize modern IT tools, agile frameworks, and project management principles to solve complex, real-world problems, creating secure and innovative applications that address ethical, environmental, and societal challenges.

CREDIT FRAMEWORK STRUCTURE

Semester		I	II	III	IV	V	VI	VII	VIII	Total Credits
Basic Science Course	BSC/ESC	3*2=6	4*2=8	....	....	....	....	....	....	14
Engineering Science Course		4*2=8	04	....	....	....	....	....	....	12
Programme Core Course (PCC)	Program Courses	....	02	4*2=8	4*2=8	4+3*2=10	4*2=8	4*2=8	....	44
Programme Elective Course (PEC)		....	....	....	....	04	4+3=7 \$	3*2=6 #	03 #	20
Multidisciplinary Minor (MDM)	Multidisciplinary Courses	....	....	03	02	03	03	03	...	14
Open Elective (OE) Other than a particular program		....	....	03	02	03	...	....	....	8
Vocational and Skill Enhancement Course (VSEC)	Skill Courses	02	02	....	02	....	02	...	....	8
Ability Enhancement Course (AEC -01, AEC-02)	Humanities Social Science and Management (HSSM)	02	....	....	02	....	....	....	....	4
Entrepreneurship/ Economics/ Management Courses		....	....	02	02	....	....	....	....	4
Indian Knowledge System (IKS)		....	02	....	....	....	....	....	....	2
Value Education Course (VEC)		....	....	02	02	....	....	....	....	4
Research Methodology	Experiential Learning Courses	....	....	....	....	....	....	03 #	01	4
Comm. Engg. Project(CEP)/ Field Project (FP)		....	....	02	....	....	....	....	....	2
Project		....	....	....	....	....	....	....	04	4
Internship/ OJT		....	....	....	....	....	....	....	....	12
Co-curricular Courses (CC)	Liberal Learning Courses	02	02	....	....	....	....	....	....	4
Total Credits (Major)		20	20	20	20	20	20	20	24	16

NPTEL/MOOCs Courses

B.Tech Semester-V (Information Technology)

SCHEME OF EXAMINATION

Sr. No.	Course Category	Course Code	Name of Course	BOS	Teaching Scheme (hrs.)			Total Credit	Examination Scheme					
					Th	TU	P		Theory				Practical	
									Exam Hrs.	MSE	CA	ESE	CA	ESE
1	PCC-VII	5BIT01T	Design and Analysis of Algorithm	IT	3	-	-	3	3	30	20	50	-	-
2	PCC-VII	5BIT01P	Design and Analysis of Algorithm Lab	IT	-	-	2	1	-	-	-		25	25
3	PCC-VIII	5BIT02T	Software Engineering and Project Management	IT	2	-	-	2	2	15	10	25	-	-
4	PCC-VIII	5BIT02P	Software Engineering and Project Management Lab	IT	-	-	2	1	-	-	-	-	25	25
5	PCC-IX	5BIT03T	Theory of Computation	IT	3	-	-	3	3	30	20	50	-	-
6	PEC-I	5BIT04T	Refer PEC-I Basket	IT	3	-	-	3	3	30	20	50	-	-
7	PEC-I	5BIT04P	Refer PEC-I Lab	IT	-	-	2	1	-	-	-	-	25	25
8	MDM-III	5BITMD03T	Refer MDM Basket	IT	3	-	-	3	3	30	20	50	-	-
9	OE-III	5BOE03T	Refer Open Elective-III Basket	IT	3	-	-	3	3	30	20	50		
Total					17	-	06	20	-	165	110	275	75	75
Total Marks (Theory & Practical)									550			150		
Total Marks (V Semester)									700					





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KDK COLLEGE OF ENGINEERING
NAGPUR.



B.Tech Semester-VI (Information Technology)

SCHEME OF EXAMINATION

Sr. No.	Course Category	Course Code	Name of Course	BOS	Teaching Scheme (hrs.)			Total Credit	Examination Scheme					
					Th	TU	P		Theory				Practical	
									Exam Hrs.	MSE	CA	ESE	CA	ESE
1	PCC-X	6BIT01T	Computer Networks and Internet	IT	3	-	-	3	3	30	20	50	-	-
2	PCC-X	6BIT01P	Computer Networks and Internet Lab	IT	-	-	2	1	-	-	-	-	25	25
3	PCC-XI	6BIT02T	Database Management System	IT	3	-	-	3	3	30	20	50	-	-
4	PCC-XI	6BIT02P	Database Management System Lab	IT	-	-	2	1	-	-	-	-	25	25
5	PEC-II	6BIT03T	Refer PEC-II Basket	IT	3	-	-	3	3	30	20	50	-	-
6	PEC-II	6BIT03P	Refer PEC-II Lab	IT	-	-	2	1	-	-	-	-	25	25
7	PEC-III	6BIT04T	Refer PEC-III Basket	IT	3	-	-	3	3	30	20	50	-	-
8	MDM-IV	6BITMD04T	Refer MDM Basket	IT	3	-	-	3	3	30	20	50	-	-
9	VSC-IV	6BIT04P	Software Lab	IT	-	-	4	2	-	-	-	-	50	50
Total					17	-	04	20	-	150	100	250	125	125
Total Marks (Theory & Practical)									500			250		
Total Marks (IV Semester)									750					


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KDK College of Engineering, Nagpur
B. Tech. (Computer Science & Engineering)
EXIT SCHEME

After Sixth Semester				BOS	Teaching Scheme (hrs.)			Total Credit	Examination Scheme					
Sr. No.	Course Category	Course Code	Name of Course		Theory	Tutorial	Practical		Theory				Practical	
									Exam Hrs.	CA	MSE	ESE	CA	ESE
1	Exit Course	ITEXT01P	Data Warehousing and Mining	IT	-	-	2	1	-	-	-	-	25	25
2	Exit Course	ITEXT02P	Language Processor	IT	-	-	2	1	-	-	-	-	25	25
3	Exit Course	ITEXT03P	Capstone Project	IT	-	-	12	6	-	-	-	-	-	200
			Total				16	8	-	-	-	-	50	250
							Total Marks		300					

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List of Multi-Disciplinary Minor Courses (MDM) for 2026-27 batch-Basket-1

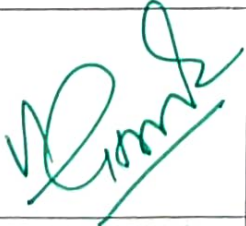
Sr. No.	Course Code	Semester	Subject Name	Credits
1	3BITMD01T	III	Sampling and Statistical Modeling	3
2	4BITMD02T	IV	Discrete Structures and Graph Theory	2
3	5BITMD03T	V	Embedded System Technology	3
4	6BITMD04T	VI	Digital Image Processing	3
5	7BITMD05T	VII	Wireless and Mobile Computing	3

List of Multi-Disciplinary Minor Courses (MDM) for 2026-27 batch-Basket-2

Sr. No.	Course Code	Semester	Subject Name	Credits
1	3BITMD01T	III	Sampling and Statistical Modeling	3
2	4BITMD02T	IV	Discrete Structures and Graph Theory	2
3	5BITMD03T	V	Embedded System Technology	3
4	6BITMD04T	VI	Digital Image Processing	3
5	7BITMD05T	VII	Programming with Arduino and Raspberry-Pi	3

List of Program Electives

Sr. No.	Category	Course Code	Semester	Subject Name
1	PEC-I	5BIT04T-A	V	Machine Learning
2		5BIT04T-B		Data Science & Visualization
3	PEC-II	6BIT04T-A	VI	Artificial Intelligence
4		6BIT04T-B		Cloud Computing
5	PEC-III	6BIT05T-A		Deep Learning
6		6BIT05T-B	VII	Block Chain Technology
7	PEC-IV	7BIT03T-A		Natural Language Processing
8		7BIT03T-B		Fundamentals of Cryptography
11	PEC-V	7BIT04T-A	VIII	Generative AI
12		7BIT04T-B		Computer Vision
13	PEC-VI	8BIT01T-A		Social Networks
14		8BIT01T-B	VIII	Big Data Computing
15		8BIT01T-C		Business Intelligence & Analytics

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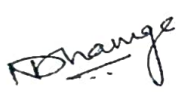
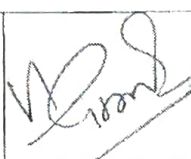
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Courses offered by Applied Science and Humanities Board

Open Elective Courses for V Sem. B. Tech.

Sr. No.	Semester	Course Code	Subjects	Credits
1	V	5BOE03T - A	Principles of Management	3
2	V	5BOE03T - B	Professional Practices & Ethics	3
3	V	5BOE03T - C	Insurance & Banking Management	3
4	V	5BOE03T - D	Total Quality Management	3
5	V	5BOE03T - E	Campus Sustainability	3
6	V	5BOE03T - F	Indian Stock Market	3
7	V	5BOE03T - G	Climate Change	3

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BoS Chairman	Dean (Acad.)	Principal	Date of release	Version	

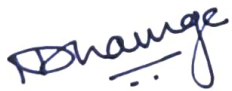
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K. D. K College of Engineering, Nagpur
Department of Information Technology
Track for Minor Courses-Cyber Security
 (Applicable to Students of Other Discipline)

Sr. No.	Course Name	Coordinator	Course Duration
1	Introduction to Operating Systems OR	Prof. Chester Rebeiro	8 weeks
	Operating System Fundamentals	Prof. Santanu Chattopadhyay	12 weeks
2	Computer Networks and Internet Protocol	Prof. Soumya Kanti Ghosh & Prof. Sandip Chakraborty	12 weeks
3	Hardware Security	Prof. Debdeep Mukhopadhyay	12 weeks
4	Ethical Hacking	Prof. Indranil Sengupta	12 weeks
5	Privacy and Security in Online Social Media	Prof. Ponnurangam. K	12 weeks
6	Information Security - 5 - Secure Systems Engineering	Prof. Chester Rebeiro	8 weeks
7	Foundations of Cryptography	Prof. Ashish Choudhury	12 weeks
8	Secure Computation: Part I	Prof. Ashish Choudhury	12 weeks
9	Systems and Usable Security	Prof. Neminath Hubballi	4 weeks
10	Online Privacy	Prof. Ponnurangam Kumaraguru	12 weeks
11	Block chain and its Applications	Prof. Sandip Chakraborty Prof. Shamik Sural	12 weeks
12	Secure Computation: Part II	Prof. Ashish Choudhury	12 weeks
13	Quantum Algorithms and Cryptography	Prof. Shweta Agrawal	12 weeks
14	Cyber Security and Privacy	Prof. Saji K Mathew	12 weeks
15	Practical Cyber Security for Cyber Security Practitioners	Prof. Sandeep K. Shukla	12 weeks

NOTE: 1. Ascertain the credits for each course
 2. Total minimum credits to be acquired is 18

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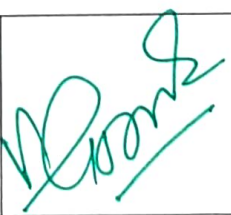
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K. D. K College of Engineering, Nagpur
Department of Information Technology
Track for Major Courses-Cyber Security
 (Applicable to Students of Information Technology)

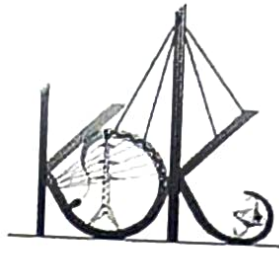
Sr.No	NPTEL Course Name	Coordinator	Course Duration
1	Hardware Security	Prof Debdeep Mukhopadhyay	12 weeks
2	Ethical Hacking	Prof. Indranil Sengupta	12 weeks
3	Privacy and Security in Online Social Media	Prof. Ponnurangam. K	12 weeks
4	Information Security - 5 - Secure Systems Engineering	Prof. Chester Rebeiro	8 weeks
5	Secure Computation: Part I	Prof. Ashish Choudhury	12 weeks
6	Systems and Usable Security	Prof. Neminath Hubballi	4 weeks
7	Online Privacy	Prof. Ponnurangam Kumaraguru	12 weeks
8	Secure Computation: Part II	Prof. Ashish Choudhury	12 weeks
9	Quantum Algorithms and Cryptography	Prof. Shweta Agrawal	12 weeks
10	Cyber Security and Privacy	Prof. Saji K Mathew	12 weeks
11	Practical Cyber Security for Cyber Security Practitioners	Prof. Sandeep K. Shukla	12 weeks

NOTE: 1. Ascertain the credits for each course
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K. D. K. College of Engineering, Nagpur

Syllabus – Fifth Semester

Bachelor of Technology (Information Technology)

KDK College of Engineering, Nagpur
Faculty of Science and Technology
B.Tech. Information Technology

Semester V	Subject Code: 5BIT01T	Name of Subject: Design and Analysis of Algorithm		
Total Hours Distribution per week				
Total Credit: 3	Lecture (L): 3 Hrs/week		Tutorial (T) : -	Practical (P): -
Examination Scheme				
Mid Sem Examination	Continuous Assessment	End Sem Examination	Total Marks	Examination Duration:
30 Marks	20 Marks	50 Marks	100 Marks	3 Hours

Course Objectives	
1	To introduce students the general idea of analysis and design of algorithm.
2	Apply important algorithmic design paradigms and methods of analysis.
3	To enable students to formulate and solve complex optimization problems using dynamic programming techniques.
4	To introduce systematic problem-solving techniques using backtracking and branch and bound approaches.
5	To provide conceptual understanding of computational complexity theory, including problem classification into P, NP, NP-complete, and NP-hard

Course Outcomes	
After completion of syllabus, students would be able to	
CO1	Classify basic concepts of algorithm in analysis and Design of algorithms and Examine Recurrence relations, solutions of recurrence of searching sorting Methods
CO2	Apply Greedy methods used for analysis and Design of Algorithm.
CO3	Analyse Dynamic Programming concepts in designing algorithm.
CO4	Describe Branch & Bound concepts in designing algorithm.
CO5	Evaluate advanced techniques and tools available for algorithm analysis and development

Course Competencies:

1. Analyze algorithm efficiency
2. Design algorithms using Divide and Conquer and Greedy strategies
3. Apply Dynamic Programming techniques to develop optimal solutions
4. Develop solutions using Backtracking and Branch and Bound methods
5. Classify computational problems into P, NP, NP-Hard, and NP-Complete categories

CO-PO Articulation Matrix

Program Outcome & Program Specific Outcome													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	2	2	--	1	1	--	1	2	3	2
CO2	3	3	3	2	3	--	1	1	--	1	2	2	1
CO3	3	3	3	2	3	--	1	1	--	1	2	2	1
CO4	3	3	3	2	3	--	1	1	--	1	2	2	1
CO5	3	3	2	3	3	--	1	1	--	1	2	1	1

SYLLABUS

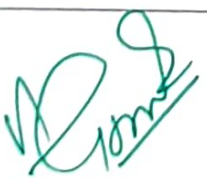
Details of Topic	Allotment of Hours		Mapped with CO
	L	T/A	CO
UNIT 1: Introduction			
Analysis of algorithms, Recurrence relation, Master Theorem, Characteristic Equation, Disjoint set Operation Divide and Conquer : Bitonic Sorting, Min Max Problem, AND OR Graphs	8	-	CO1
UNIT 2: Greedy Strategy			
Introduction, Optimal merge pattern, Huffman coding, Minimum spanning trees, Fractional Knapsack problem, job sequencing with deadlines single source shortest path algorithms: Dijkstra's Algorithm	7	-	CO2
UNIT 3: Dynamic Programming			
Introduction, 0/1 Knapsack, Multistage graph, Floyd-warshall algorithms, optimal binary search trees, Matrix chain Multiplication, Travelling sales man Problem	7	-	CO3
UNIT 4: Backtracking			
Backtracking: General method, Applications- n-queen problem, Sum of subsets problem, Graph coloring and Hamiltonian cycles, Branch and Bound, Connected Components and bi-connected components, Articulation Point	7	-	CO4
UNIT 5: P NP Class			
P, NP-completeness & NP hard problems. Basic Concept of non-deterministic algorithms. NP hard and NP complete classes, Decision and Optimization Problem, Polynomial reduction	7	-	CO5

Text Books:

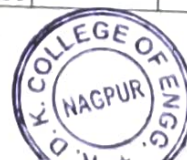
1. Computer Algorithms, Horowitz, Sahani, Rajsekharan, 2nd Edition, Silicon Press
2. Introduction to Algorithm, Thomas H. Cormen, 3rd Edition, 2009, MIT press
3. The Design and Analysis of Computer Algorithms", Pearson education by Alfred V. The Design and Analysis of Computer Algorithms", Pearson education by Alfred V. Aho, John E. Hopcraft, Jeffrey D. Ullman.
4. Fundamentals of Algorithms", Prentice Hall by Brassard, Bratley
5. "Design and Analysis of Algorithms", Pearson Education, II nd Edition, Parag Dave, Himanshu Dave
6. Fundamentals of Algorithm, Dr. S.R.Sathe, Laxmi Publication

Reference Books:

1. Algorithms, S. Dasgupta, C. H. Papadimitriou, and U. V. Vazirani, 1st Edition, 2006
2. Computer Algorithms: Introduction to Design and analysis, 3rd Edition, By Sara Baase and A.V. Gelder Pearson Education.

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**KDK COLLEGE OF ENGINEERING
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KDK College of Engineering, Nagpur
Faculty of Science and Technology
B.Tech. Information Technology

Semester: V	Subject Code: 5BIT01P	Name of Subject: Design and Analysis of Algorithm Lab	
Total Hours Distribution per week			
Total Credit:1	Lecture (L): -	Tutorial (T) : -	Practical (P): 2 Hrs/week
Examination Scheme			
Continuous Assessment		End Sem Examination	Total Marks
25 Marks		25 Marks	50 Marks

Course Objectives	
1. To implement and analyze fundamental algorithms using design techniques such as divide and conquer, greedy methods. 2. To develop practical programming skills for solving computational problems such as dynamic programming. 3. To strengthen understanding of algorithmic concepts by designing solutions for optimization, and backtracking approaches.	
Course Outcomes	
After completion of syllabus, students would be able to	
CO1	Design and develop solutions using Divide and Conquer and Greedy strategies.
CO2	Evaluate and implement problem solutions using Dynamic Programming techniques.
CO3	Design and implement algorithms using Backtracking to solve computational problems.

Course Competencies:	
1. Implement and analyze algorithms using C/C++ programs and evaluate their time and space complexity for different problem sizes.	
2. Develop practical skills in implementing Divide and Conquer, Greedy Method, and Dynamic Programming.	
3. Solve combinatorial and optimization problems efficiently.	

CO-PO Articulation Matrix:

Program Outcome & Program Specific Outcome													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	2	3	1	2	3	2	1	3	3	2
CO2	3	3	3	2	3	1	2	3	2	1	3	3	2
CO3	3	3	2	2	3	1	2	3	2	1	3	3	2

A minimum of Eight to Ten Practicals to be performed based on the theory course Design and Analysis of Algorithm [5BIT01T].

Practical List

1	To implement and analyze time complexity of Searching Algorithm. "Binary Search".
2	To implement and analyze time complexity of Sorting Algorithm "Merge Sort".
3	To Implement and analyze time complexity of algorithm using Divide and Conquer Technique. Strassen's Matrix Multiplication
4	To Implement and analyse time complexity of Greedy Algorithm. Activity Selection
5	To Implement and analyze time complexity of Dynamic Programming Technique 0-1 Knapsack
6	To Implement and analyze time complexity of minimum cost spanning tree algorithm Prim's Algorithm
7	To Implement and analyze time complexity of single source shortest path algorithm. Dijkstra's Algorithm
8	To Implement and analyze time complexity of All pair shortest path algorithm. Floyd – Warshall Algorithm
9	To Implement and analyze time complexity of graph traversing algorithm. Depth First Search
10	To Implement and analyze time complexity of Graph traversing algorithm using Virtual Lab. Breadth First Search.
11	Case Study on different topics
12	To implement Multistage Graph
13	A program to implement N-Queen problem
14	Write a program to implement Sum of Subsets
15	Write a program to implement Graph Coloring Technique

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Faculty of Science and Technology
B.Tech. Information Technology

Semester : V	Subject Code: 5BIT02T	Name of Subject: Software Engineering and Project Management		
Total Hours Distribution per week				
Total Credit: 2	Lecture (L): 2 Hrs/Week		Tutorial (T) : -	Practical (P): -
Examination Scheme				
Mid Sem Examination 15 Marks	Continuous Assessment 10 Marks	End Sem Examination 25 Marks	Total Marks 50 Marks	Examination Duration: 2 Hours

Sr. No.	Course Objectives
1	To understand general idea of software engineering
2	To develop skills to design various software process models for given problem.
3	To develop skills required for software testing
4	To develop skills required for project management, managing software risks

Course Outcomes	Course Outcomes
	After completion of course, the student will be able to
CO1	Acquire & interpret Knowledge of software engineering methods, practices, process models and application.
CO2	Analyze and extract requirements for the product and translate these into a documented design using different modeling techniques.
CO3	Learn & Apply suitable software testing methods and types, and understand debugging concept with various testing methods.
CO4	Outline project management, software risks and principles of quality management, concept of re-engineering and reverse engineering.

Course Competencies:

- Students will acquire proficiency in** software development life cycle methodologies, including Waterfall and Agile.
- Students will acquire Technical Proficiency:** Coding, software design, debugging, testing, and understanding software architecture.
- Students will acquire proficiency in Requirements Engineering:** Eliciting, analyzing, and documenting functional and non-functional requirements.
- Students will learn the project Management skills.**

CO-PO Articulation Matrix:

CO	Program Outcomes & Program Specific Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	1	2	1	2	1	3	2	2	1	2
CO2	3	3	3	2	3	1	2	1	3	2	3	2	2
CO3	3	3	3	2	3	1	2	2	3	3	3	2	2
CO4	3	3	3	1	2	1	2	1	2	2	3	2	2

SYLLABUS

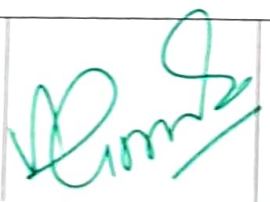
Details of Topic	Hours Allotted	Mapped with CO
	L	CO
UNIT 1: Basics of Software Engineering & Models		
Basics: Introduction to Software Engineering, Software Myths, Software Engineering -A Layered Technology. Software Process Models: The Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized Process Models, Agile Process Models.	7	CO1
UNIT2: Requirement Engineering & Design Engineering		
Requirements Engineering: Requirement Analysis, Analysis Modeling Approaches, Data Modeling, Object -Oriented Analysis, Scenario -Based Modeling, Flow-Oriented Modeling, Class-based Modeling, Design Engineering Concepts, Design Model, Pattern -Based Software Design, Architectural Design, Mapping data flow into software architecture, Cohesion, Coupling, User interface analysis and Design	8	CO2
UNIT 3: Software Testing and Debugging		
Software Testing Fundamentals, Unit Testing, Integration Testing, Validation Testing, System Testing, Alpha & Beta testing, Black-Box Testing, White-Box Testing, Art of Debugging	7	CO3
UNIT 4: Risk Management & Project Management		
Risk Management: Risk strategies, Software risks, Risk identification, Risk refinement, Software Reengineering and Reverse Engineering Software Project Management (SPM) -Definition and importance of project management in software development, Role of a project manager, Project planning activities.	7	CO4

Text Books

1. Software Engineering-A Practitioner's Approach (Sixth Edition) by Roger Pressman (TMH)
2. Software Engineering (Ninth Edition) -Ian Sommerville (Pearson)
3. Software Engineering for students (4th Edition) - Douglas Bell(Pearson)

References Books

1. Schaum's Outline of Theory and Problems of Software Engineering by David Gustafson (TMH)
2. Software Engineering (Third Edition) by K. K. Aggarwal and Yogesh Singh (New age International Publishers)
3. Software Engineering, Theory and Practice(4th Edition) - Pfleeger, Atlee(Pearson)

			June 2026	1.00	Applicable for AY 2026-27 onwards
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PRINCIPAL
KDK COLLEGE OF ENGINEERING
NAGPUR.



KDK College of Engineering, Nagpur
Faculty of Science and Technology
B.Tech. Information Technology

Semester: V	Subject Code: 5BIT02P	Name of Subject: Software Engineering and Project Management Lab	
Total Hours Distribution per week			
Total Credit: 1	Lecture (L): -	Tutorial (T): -	Practical (P): 2Hrs
Examination Scheme			
Continuous Assessment 25 Marks	End Sem Examination 25 Marks		Total Marks 50 Marks

Course Objective	
1	To understand general idea of software engineering & Virtual Lab experiments
2	To develop skills to understand creation of object and interaction between them
3	To develop skills required for creation of various UML models

Course Outcomes	
CO	After completion of syllabus, the student will be able to
CO1	Apply the concept of requirement gathering & develop use case model for given problem
CO2	Take part in object creation and interaction between various objects, their collaboration & Plan various states of objects , different component views for given problem statement.
CO3	Develop various UML models for given problem statement & apply testing tools.

Course Competencies:

1. Student will gain proficiency in Applying the concept of requirement gathering & develop use case model for given problem
2. Students will gain proficiency in object creation and interaction between various objects, their collaboration & Plan various states of objects, different component views for given problem statement.
3. Students will gain knowledge to develop various UML models for given problem statement & apply testing tools.

CO-PO Articulation Matrix:

CO	Program Outcomes & Program Specific Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	1	2	1	2	1	3	2	2	3	3
CO2	3	3	3	2	3	1	2	1	3	2	3	3	3
CO3	3	3	3	2	3	1	2	2	3	3	3	3	3

Instructions:

- Any **Eight** Practicals based on the above syllabus including **Virtual Lab** experiments.
- Practical based on JIRA tool & Selenium Tool for testing.
- Course coordinator should make sure that all units will be covered in their list

List of Practicals:-

1. Identifying the Requirements from Problem Statements
2. Modeling UML Use Case Diagrams and Capturing Use Case Scenarios
3. E-R Modeling from the Problem Statements.
4. Identifying Domain Classes from the Problem Statements.
5. State chart and Activity Modeling for given problem
6. Modeling UML Class Diagrams and Sequence diagrams
7. Modeling Data Flow Diagrams
8. Estimation of Test Coverage Metrics and Structural Complexity.
9. Designing Test Suites
10. Case Study on different topics on different problem statements.

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B.Tech. Information Technology

Semester V	Subject Code: 5BIT03T	Name of Subject: Theory of Computation		
Total Hours Distribution per week				
Total Credit: 3	Lecture (L): 3 Hrs		Tutorial (T) : -	Practical (P): -
Examination Scheme				
Mid Sem Examination	Continuous Assessment	End Sem Examination	Total Marks	Examination Duration:
30 Marks	20 Marks	50 Marks	100 Marks	3 Hours

Course Objectives

1	To understand the fundamental concepts of Finite Automata, and to learn how to design, analyze, and minimize automata models.
2	To understand the concepts of Regular Expressions and their relationship with Finite Automata
3	To understand the relationship between formal languages, grammars, and automata.
4	To understand the concepts and working of Pushdown Automata and Turing Machines
5	To understand computational capabilities and limitations of Turing Machines

Course Outcomes

After completion of syllabus, students will be able to

CO1	Design and implement DFA and NFA for given problems, convert between different automata forms, minimize DFA, and apply Moore and Mealy machines for real-world applications.
CO2	Construct and simplify regular expressions
CO3	Design context-free grammars and pushdown automata and understand their equivalence in recognizing context-free languages.
CO4	Apply the concepts of Turing Machines and their role in defining computability for problem solving.
CO5	Analyze the computational capabilities and limitations of Turing Machines

Course Competencies:

1.	Ability to design, analyze, convert, and minimize finite automata models for language recognition and computational problem solving.
2.	Ability to construct and simplify regular expressions and establish equivalence between regular expressions, finite automata, and regular grammars.
3.	Ability to design context-free grammars and pushdown automata for recognizing and analyzing context-free languages.
4.	Ability to understand and apply the concepts of Turing Machines, computability, recursive functions, and undecidable problems.
5.	Ability to understand model computations using Turing Machines, analyze computability and language classes, and evaluate the decidability and undecidability of computational problems.

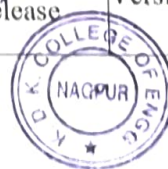
CO-PO Articulation Matrix:

CO	Program Outcomes & Program Specific Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	2	--	--	--	--	--	--	1	1	1
CO2	3	2	2	2	--	--	--	--	--	--	1	1	1
CO3	3	3	2	2	--	--	--	--	--	--	1	1	1
CO4	3	3	2	3	--	--	--	--	--	--	1	1	1
CO5	3	3	2	3	--	--	--	--	--	--	1	1	1

Syllabus

Details of Topic	Allotment of Hours	Mapped CO
UNIT 1: Finite Automata (FA)		
Introduction, Alphabet, set, language, Chomsky Hierarchy, Deterministic Finite Automata (DFA) –Formal definition, simpler notations (state transition diagram, transition table), . Nondeterministic Finite Automata (NFA)- Definition of NFA, language of an NFA, Equivalence of Deterministic and Nondeterministic Finite Automata, Minimization of Deterministic Finite Automata, Finite automata with output (Moore and Mealy machines) and Inter conversion.	8	CO1
UNIT 2: Regular Expressions (Re) And Regular Grammar		
REGULAR EXPRESSIONS (RE): Introduction, Identities of Regular Expressions, Finite Automata and Regular Expressions- Converting from DFA's to Regular Expressions, Converting Regular Expressions to Automata. REGULAR GRAMMARS: Definition, regular grammars and FA, FA for regular grammar, Regular grammar for FA. Right linear and left linear grammars Proving languages to be non-regular –Pumping lemma, Closure properties of regular languages.	7	CO2
UNIT 3: Context-Free Grammar (CFG)		
CONTEXT-FREE GRAMMAR (CFG): Derivation Trees, Sentential Forms, Chomsky Normal Form, Greibach Normal Form, Ambiguity in CFGs, Minimization of CFGs, Pumping Lemma for CFLs, Closure properties of Context Free Grammar	7	CO3
UNIT 4: Pushdown Automata		
PUSHDOWN AUTOMATA: Definition, Model, Acceptance of CFL, Acceptance by Final State and Acceptance by Empty stack and its Equivalence, Equivalence of CFG and PDA	7	CO4
UNIT 5: Turing Machine & Decidability		
TURING MACHINE & DECIDABILITY: Definition, Design of Turing Machines, Universal Turing Machine, Computable Functions, Linear Bounded Automata, Recursive and Recursively Enumerable Languages, Halting Problem, Post Correspondence Problem, Ackerman Function	7	CO5
Text Books:		
1. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Introduction to Automata Theory Language and Computation, 3 rd edition, Pearson Education.		
2. Michael Sipser, Introduction to the Theory of Computation, 3 rd edition, Cengage Learning.		
3. Vivek Kulkarni, Theory of Computation, Oxford University Press, ISBN-13: 978-0-19-808458-7.		
4. Theory of Computation – O.G. Kakde ,University Science Press		
Reference Books:		
1. An Introduction to Formal Languages and Automata – by Peter Linz, Jones & Bartlett Learning.		
2. Automata Theory and Formal Languages, PHI Learning- Debidas Ghosh		

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KDK College of Engineering, Nagpur
Faculty of Science and Technology
B.Tech. Information Technology

Semester V	Subject Code: 5BIT04T-A	Name of Subject: Machine Learning		
Total Hours Distribution per week				
Total Credit: 3	Lecture (L): 3 Hrs/week		Tutorial (T) : -	Practical (P): -
Examination Scheme				
Mid Sem Examination	Continuous Assessment	End Sem Examination	Total Marks	Examination Duration:
30 Marks	20 Marks	50 Marks	100 Marks	3 Hours

Course Objectives	
1	To introduce the fundamental concepts of Machine Learning, its types, workflow, data preprocessing techniques, and real-world applications.
2	To develop an understanding of supervised learning techniques for regression problems and their performance evaluation using appropriate metrics.
3	To enable students to apply supervised learning classification algorithms and evaluate classification models using standard performance metrics.
4	To familiarize students with unsupervised learning methods, clustering algorithms, clustering evaluation techniques, and the basics of reinforcement learning.
5	To provide knowledge of advanced machine learning techniques such as ensemble learning and explore their applications in image recognition, speech recognition, recommendation systems, spam filtering, and fraud detection.

Course Outcomes	
After completing the course, students will be able to	
CO1	Apply basics of Machine Learning Techniques for solving real world problems
CO2	Analyze different types of Regression Techniques.
CO3	Implement various classification techniques.
CO4	Illustrate unsupervised and Reinforcement machine learning techniques.
CO5	Examine modern trends, ensemble learning methods, and practical applications of Machine Learning in various domains.

Course Competencies:

1. Demonstrate an understanding of the fundamental concepts, types, workflow, data preprocessing techniques, and applications of Machine Learning.
2. Apply supervised learning regression algorithms and evaluate their performance using appropriate regression metrics such as MSE, MAE, and R^2 score.
3. Develop and evaluate classification models using supervised learning algorithms including Logistic Regression, KNN, Naïve Bayes, Decision Trees, Support Vector Machines, and Random Forests.
4. Implement unsupervised learning techniques such as K-Means, Hierarchical Clustering, DBSCAN, and anomaly detection, and explain the basic concepts of Reinforcement Learning.
5. Analyze and utilize ensemble learning techniques and identify suitable Machine Learning applications in image recognition, speech recognition, recommendation systems, spam filtering, malware detection, virtual assistants, and fraud detection

CO-PO Articulation Matrix:

CO	Program Outcomes & Program Specific Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	--	--	2	--	1	--	--	--	2	2	1
CO2	3	3	2	1	2	--	1	--	--	--	2	3	2
CO3	3	3	3	2	3	--	1	1	1	--	2	3	3
CO4	3	3	3	2	3	1	1	1	1	--	2	3	3
CO5	3	3	3	3	3	2	1	1	1	1	2	3	3

Syllabus

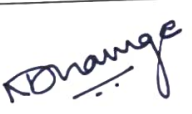
Details of Topic	Hours	Mapped CO
UNIT I: Introduction to Machine Learning: Machine learning and its types (Supervised, unsupervised reinforcement), overview of the machine learning workflow and common data preprocessing techniques, well-posed learning problems, Applications of Machine learning, issues in machine learning. Types of data: Numerical and categorical data, data issues and remediation.	07	CO1
UNIT II: Supervised Learning: Regression: Introduction to regression, Types of regression: Multiple linear regression, Polynomial regression model, Evaluation metrics for regression models: Mean Squared error (MSE), R- squared, Mean Absolute error (MAE). Data pre-processing: Dimensionality reduction, feature subset selection,	07	CO2
UNIT III: Supervised Learning: Classification: Introduction to Classification, Logistic regression, K-nearest neighbor (KNN), Naive Bayes Decision trees, Support vector machine, Random forests, Evaluation metrics for Classification models: Accuracy, Precision, Recall, F1 Score, ROC Curves.	07	CO3
UNIT IV: Unsupervised Learning: Clustering and Reinforcement Learning: Introduction to Clustering & its type, K-means clustering, anomaly detection algorithm, Hierarchical clustering, DBSCAN, Evaluation for Clustering: Silhouette Score, Cohesion and Separation Metrics. Introduction to Reinforcement Learning: Agent, Environment, State, Action and Reward.	08	CO4
UNIT V: Trends and applications in Machine learning: Ensemble learning, Bagging, randomization, Boosting, Applications of Machine learning: Image recognition, speech recognition, Prediction recommendation: email spam and malware filtering, virtual personal assistant, online fraud detection.	07	CO5

Text Books

- Machine Learning by Subramanian Chandramouli, Saikat Dutt, Amit Kumar Das
- Introduction to Machine Learning by Dr. Nilesh Shelke, Dr. Narendra. V Choudhary, Dr. Gopal Sakarkar, Das Ganu Publications, ISBN-978-93-84336-
- Machine Learning by Tom Mitchell, Mc Graw Publications

Reference Books:

- Python Machine Learning by Dr. Randal S. Olson

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KDK College of Engineering, Nagpur
Faculty of Science and Technology
B.Tech. Information Technology

Semester V	Subject Code: 5BIT04P-A	Name of Subject: Machine Learning Lab		
Total Hours Distribution per week				
Total Credit: 1	Lecture (L): -		Tutorial (T) : -	Practical (P): 2 Hrs/week
Examination Scheme				
Continuous Assessment		End Sem Examination	Total Marks	
25 Marks		25 Marks	50 Marks	

Course Objective
1. To develop and implement regression, classification, clustering, and neural network techniques.
2. To analyze and evaluate machine learning models using appropriate performance measures.
3. To apply machine learning techniques for solving real-world data analysis and prediction problems.

Course Outcomes
After successful completion of this course the students will be able to:
CO1 Implement regression techniques for prediction problems and apply classification algorithms for solving supervised learning problems.
CO2 Implement clustering techniques for unsupervised learning and data analysis.
CO3 Apply neural networks and deep learning models for intelligent decision-making applications.

Course Competencies:

- 1. Prepare and preprocess datasets** by handling missing values, encoding categorical variables, normalizing data, and selecting relevant features for machine learning tasks
- 2. Develop and evaluate regression models** using Machine Learning techniques and assess their performance using metrics such as MSE, MAE, and R² score.
- 3. Implement and compare classification algorithms** such as Logistic Regression, K-Nearest Neighbors (KNN), Naïve Bayes, Decision Trees, Support Vector Machines (SVM), and Random Forests using standard evaluation metrics.

CO-PO Articulation Matrix:

CO	Program Outcomes & Program Specific Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	2	3	-	-	1	1	1	1	3	2
CO2	2	3	2	3	3	-	-	1	1	-	2	3	2
CO3	3	3	3	2	3	1	1	1	2	1	2	3	2

Minimum Eight Practical's to be performed from the list as below

SN	Experiments based on
1	a) Linear Univariate regression with Ordinary least squares method (implementing from scratch) b) Using Linear Multivariate regression with Ordinary least squares method (using library function)
2	Implementing linear classifier using Linear Machine concept.
3	Program for Classification using KNN algorithm.
4	KNN algorithm for regression implemented from scratch (without using a library).
5	Implementing Naïve Bayes Classification.
6	Implementing multi-class classifier using Decision Trees
7	Implementing K-means clustering or Hierarchical clustering.
8	Implementing SVM Classification with k-fold cross validation.
9	Implementing a multi-layer feed forward Neural Network based estimation.
10	Experiment on classification using deep network.

Suggested References:

1. Introduction to Machine Learning, Second Edition, Ethem Alpaydm, The MIT Press
2. Applied Machine Learning, M. Gopal, Mc Graw Hill
3. Andreas C. Müller and Sarah Guido Introduction to Machine Learning with Python, A Guide for Data Scientists O'Reilly

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NAGPUR.



KDK College of Engineering, Nagpur
Faculty of Science and Technology
B.Tech. Information Technology

Semester V	Subject Code: 5BIT04T-B	Name of Subject: Data Science and Visualization		
Total Hours Distribution per week				
Total Credit: 3	Lecture (L): 3 Hrs/week		Tutorial (T) : -	Practical (P): -
Examination Scheme				
Mid Sem Examination	Continuous Assessment	End Sem Examination	Total Marks	Examination Duration:
30 Marks	20 Marks	50 Marks	100 Marks	3 Hours

Course Objectives	
1	Understand the fundamentals of data science.
2	Acquire skills in data preparatory and pre-processing steps
3	Learn the tools and packages in Python for data science
4	Acquire knowledge in data interpretation and visualization techniques
5	Develop the ability to analyze, select, and implement appropriate algorithms for solving intelligent decision-making problems.

Course Outcomes	
After completion of syllabus, students will be able to	
CO1	Apply quantitative modelling and data analysis techniques to the solution of real world business problems, communicate findings, and effectively present results using data science tools.
CO2	Apply principles of Data Science to the analysis of business problems.
CO3	Apply ethical practices in everyday business activities and make well-reasoned ethical business and data management decisions.
CO4	Demonstrate knowledge of statistical data analysis techniques utilized in business decision making.
CO5	Apply algorithms to build machine intelligence.

Course Competencies:

1. Understand and apply fundamental concepts of Data Science
2. Demonstrate skills in data collection, pre-processing, and transformation.
3. Apply statistical, probabilistic, and mathematical foundations in solving data science problems.
4. Develop and interpret data visualizations using libraries such as Matplotlib, Seaborn, Plotly, and Bokeh for effective communication of insights.
5. Implement basic machine learning and advanced data analysis techniques.

CO-PO Articulation Matrix:

CO	Program Outcomes & Program Specific Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	3	3	--	1	--	1	--	3	3	3
CO2	3	3	3	3	3	--	1	1	1	--	3	3	3
CO3	3	3	3	3	3	--	1	1	1	--	3	3	3
CO4	3	3	3	3	3	--	1	1	1	--	3	3	3
CO5	3	3	3	3	3	--	1	1	1	--	3	3	3

Syllabus

Details of Topic	Hours Allotted	Mapped with CO
UNIT 1: Introduction to Data Science		
Introduction to Data Science: Need for data science, benefits and uses, facets of data, data science process, setting the research goal, retrieving data, cleansing, integrating and transforming data, exploratory data analysis, build the models, presenting and building applications.	7	CO1
UNIT 2: Mathematical Foundations for Data Science		
Basics of Data Science: Introduction; Typology of problems; Importance of linear algebra, statistics and optimization from a data science perspective; structured thinking for solving data science problems. Optimization: Unconstrained optimization; Necessary and sufficient conditions for optima; Gradient descent methods; Constrained optimization, KKT conditions; Introduction to non-gradient techniques; Introduction to least squares optimization; Optimization view of machine learning. Introduction to Data Science Methods: Linear regression as an exemplar function approximation problem; Linear classification problems.	8	CO2
UNIT 3: Data Handling		
Basics of Numpy arrays, aggregations, computations on arrays, comparisons, masks, boolean logic, fancy indexing, structured arrays. Data manipulation with Pandas: data indexing and selection, operating on data, missing data, hierarchical indexing, combining datasets, aggregation and grouping, pivot tables.	7	CO3
UNIT 4: Visualization Classification and Representations		
Classification of visualization systems, Interaction and visualization techniques misleading, Visualization of one, two and multi-dimensional data, text and text documents. Creating visual representations, visualization reference model, visual mapping, visual analytics, Design of visualization applications.	8	CO4
UNIT 5: Visualization Techniques for Trees, Graphs, and Networks		
Visualization of groups, trees, graphs, clusters, networks, software, Metaphorical visualization. Various visualization techniques, data structures used in data visualization.	7	CO5

Text Books

1. Introduction to Data Science a Python approach to concepts, Techniques and Applications, Igual, L; Seghi, S. Springer, ISBN:978-3-319-50016-4
2. Data Analysis with Python A Modern Approach, David Taieb, Packt Publishing, ISBN-9781789950069
3. Ward, Grinstein, Keim, Interactive Data Visualization: Foundations, Techniques, and Applications. Natick, 2nd edition, A K Peters, Ltd 2015.
4. McKinney W. Python for Data Analysis: Data Wrangling with Pandas, NumPy and IPython, 2nd edition, O'Reilly Media, 2018.
5. Molin S. Hands-On Data Analysis with Pandas, Packt Publishing, 2019.

References Books

- a) Python Data Analysis, Second Ed., Armando Fandango, Packt Publishing, ISBN: 9781787127487
- b) Tamara Munzner, Visualization Analysis & Design, 1st edition, AK Peters Visualization Series 2014
- c) Scott Murray, Interactive Data Visualization for the Web, 2nd Edition, 2017

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KDK College of Engineering, Nagpur
Faculty of Science and Technology
B.Tech. Information Technology

Semester V	Subject Code: 5BIT04P-B	Name of Subject: Data Science and Visualization Lab	
Total Hours Distribution per week			
Total Credit: 1	Lecture (L):	Tutorial (T) : -	Practical (P): -2hr/week
Examination Scheme			
Continuous Assessment		End Sem Examination	Total Marks
25 Marks		25 Marks	50 Marks

Course Objectives	
1	To understand the python libraries for data science
2	To understand the basic Statistical and Probability measures for data science.
3	To apply correlation, regression analytics on standard data sets and present and interpret data using visualization packages in Python.
Course Outcomes	
After completion of syllabus, the student will be able to	
CO1	Download, install and explore the features of NumPy, SciPy, Jupyter, and Pandas packages.
CO2	Apply basic statistics and probability in data analysis.
CO3	Perform data exploration using Matplotlib & Perform correlation and regression analysis on datasets to Visualize and interpret data using Python packages.

Course Competencies:

Students will gain competencies to

1. Use NumPy, SciPy, Jupyter, and Pandas for data science tasks.
2. Apply statistics and probability in data analysis and Perform data exploration using Matplotlib
3. Apply correlation and regression on datasets and Visualize and interpret data using Python tools.

CO-PO Articulation Matrix:

CO	Program Outcomes & Program Specific Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	1	2	1	3	--	1	1	1	1	2	3	2
CO2	3	3	2	2	2	1	1	1	1	--	2	2	3
CO3	2	3	2	3	3	1	1	1	1	3	2	2	3

List of Practicals: Ten Practicals based on above syllabus to be performed

PR. No.	List of Practicals
1	Download, install and explore the features of NumPy, SciPy, Jupyter, Statsmodels and Pandas packages.
2	Create a numpy nd array object by using array() function.
3	Write a program to demonstrate array indexing such as slicing, integer array indexing.
4	To Implement working with Pandas data frame using python code.
5	Write a program to compute summary statistics such as mean, median, mode, standard deviation and variance of the given different types of data.
6	To write a program to find the indexes where the value is even.
7	To Implement Plotting the points for line graph using Matplotlib using python code.
8	To Implement Correlation and Scatter Plots using python code.
9	To visualizing geographic data with basemap
10	To write a python program to compute correlation coefficient.
11	To implement a program of building and validating linear model using a python program.
12	To Implement Regression using Python code.

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KDK College of Engineering, Nagpur
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Semester V	Subject Code: 5BIT04P-C	Name of Subject: Professional Skill-I Lab		
Total Hours Distribution per week				
Total Credit: 1	Lecture (L):	Tutorial (T) : -	Practical (P): -2hr/week	
Examination Scheme				
Continuous Assessment		End Sem Examination	Total Marks	
25 Marks		25 Marks	50 Marks	

Course Objectives	
1	To understand the Advance concepts of Python Programming.
2	To understand the Advance concepts of Data Structure and algorithms.
3	To understand the Advance concepts of Full stack development.
Course Outcomes	
After completion of syllabus, students would be able to	
CO1	Develop proficiency in advance python programming and effective data manipulation strategies.
CO2	Exhibit expertise in advance data structures and algorithms and optimization of complex problems.
CO3	Design and maintain modern, scalable, secure and production ready full-stack web applications.

Course Competencies	
1	To Develop skills using advance python programming to solve complex problems.
2	To develop ability to design optimize solutions for solving computational Problems and improving the efficiency of software applications.
3	Ability in Developing and testing user friendly full stack solutions using modern development tools.

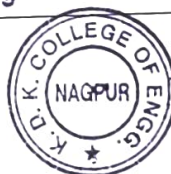
Program Outcome & Program Specific Outcome													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	3	3	3	2	3	1	1	3	3	3
CO2	3	3	3	3	3	3	2	3	1	1	3	3	3
CO3	3	3	3	3	3	3	2	3	1	1	3	3	3

A minimum of 10 practical to be performed based on following topics-

Name of Topic	
1	Advance Data Structures.
2	Object-Oriented Programming Concepts in Python
3	File Handling, OS Module & Automation Scripting
4	Exception Handling , JSON APIs
5	Libraries in Python & Web Scrapping basics.
6	Arrays , Strings , Linked Lists, Stacks , Q
7	Trees, Graphs & Traversal techniques
8	Sorting Searching algorithms
9	Time & Space Complexity analysis
10	Recursion and Backtracking
11	Frontend: HTML , CSS, JavaScript
12	React basics & Component Architecture
13	Backend: Django/Flask
14	Database Integration
15	CRUD Operations

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NAGPUR



KDK College of Engineering, Nagpur
Faculty of Science and Technology
B.Tech. Information Technology

Semester V	Subject Code: 5BITMD03T	Name of Subject: Embedded System Technology		
Total Hours Distribution per week				
Total Credit: 3	Lecture (L): 3 Hrs/week		Tutorial (T) : -	Practical (P): -
Examination Scheme				
Mid Sem Examination	Continuous Assessment	End Sem Examination	Total Marks	Examination Duration:
30 Marks	20 Marks	50 Marks	100 Marks	3 Hours

Course Objectives

1	To understand the fundamentals of embedded systems, microcontrollers, and interfacing techniques.
2	To gain knowledge of sensors, actuators, and communication protocols used in IoT applications.
3	To gain understanding of embedded core concepts.
4	To gain knowledge of IoT-based communication systems wireless protocol
5	To gain knowledge of secure, efficient, and scalable embedded and IoT projects for industrial and societal application.

Course Outcomes

After completion of syllabus, the student will be able to

CO1	Interpret the architecture and operation of embedded systems, microcontrollers, and IoT devices.
CO2	Design and develop embedded applications using sensors, actuators, and interfacing techniques.
CO3	Demonstrate a strong understanding of embedded core concepts and develop problem-solving skills in related areas.
CO4	Implement IoT-based communication systems using wireless protocols
CO5	Develop secure, efficient, and scalable embedded and IoT projects for industrial and societal application.

Course Competencies:

Students will gain following competencies

1. Ability to understand and analyze embedded system architecture and IoT frameworks.
2. Ability to interface sensors, actuators, and peripheral devices with microcontrollers.
3. Ability to develop embedded programs using C/Python for real-time applications.
4. Ability to implement IoT communication protocols and cloud connectivity solutions.
5. Ability to design smart automation systems for industrial, healthcare, agricultural, and home applications & troubleshoot, test, and optimize embedded and IoT systems.

CO-PO Articulation Matrix:

CO	Program Outcomes & Program Specific Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	--	2	2	1	1	--	--	1	1	1
CO2	3	3	3	2	3	2	1	1	1	--	1	1	1
CO3	3	3	3	2	3	2	1	1	1	--	1	1	1
CO4	3	3	3	3	2	2	2	1	1	--	1	2	2
CO5	3	3	3	2	3	2	2	1	2	--	1	2	2

SYLLABUS

Details of Topic	Hours	Mapped with CO
Unit 1: Introduction to Embedded System:		
What is an Embedded Systems? Embedded systems Vs General computing systems, History of Embedded Systems, Classification of Embedded systems, Major Application Areas of Embedded Systems. Purpose of Embedded Systems, The Typical Embedded System, Microprocessor Vs Microcontroller, Differences between RISC and CISC, Harvard V/s VonNeumann Processor/Controller Architecture, Big-endian V/s Little-endian processors, Memory (ROM and RAM types).	8	CO1
Unit 2: Embedded System Design Concepts:		
Characteristics and Quality Attributes of Embedded Systems, Operational and non-operational quality attributes, Embedded Systems-Application and Domain specific, Hardware Software Co-Design	7	CO2
Unit 3: 8-Bit Embedded Processor		
8-Bit Microcontroller – Architecture – Instruction Set and Programming – Programming Parallel Ports – Timers and Serial Port – Interrupt Handling.	7	CO3
Unit 4: IoT And Arduino Programming		
Introduction to the Concept of IoT Devices , IoT Devices Versus Computers , IoT Configurations, Basic Components ,Introduction to Arduino ,Types of Arduino– Arduino Toolchain, Arduino Programming Structure, The Ethical Implications of the Internet of Things	7	CO4
Unit 5: IoT Communication And Applications		
IoT Communication Models and APIs ,IoT Communication Protocols ,Bluetooth, WiFi , ZigBee, GPS , GSM modules, IoT Applications in Real world Scenario(Case study)	7	CO5

Text Books

1. Raj Kamal, Embedded Systems: SoC, IoT, AI and Real-Time Systems, 4th Edition, McGraw Hill Education, 2020..
2. Shriram K. Vasudevan, RMD Sundaram, Abhishek S. Nagarajan, Internet of Things, 3rd Edition, Wiley India, 2024..
3. A.P. Godse and D.A. Godse, Embedded Systems and IoT Design, 1st Edition, Technical Publications, 2023
4. Dr. G. Vimala Kumari et al., Embedded Systems and IoT: A Theoretical Approach, 1st Edition, GCS Publishers, 2022.

References Books

1. Edward Ashford Lee and Sanjit Arunkumar Seshia, Introduction to Embedded Systems: A Cyber- Physical System Approach, 2nd Edition, MIT Press, 2016
2. Peter Marwedel, Embedded System Design, 3rd Edition, Springer, 2021, Springer

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NAGPUR

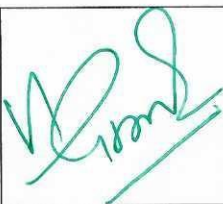


K.D.K. College of Engineering, Nagpur
Faculty of Engineering and Technology

Courses offered by Applied Science and Humanities Board

Open Elective Courses for V Sem. B. Tech.

Sr. No.	Semester	Course Code	Subjects	Credits
1	V	5BOE03T - A	Principles of Management	3
2	V	5BOE03T - B	Professional Practices & Ethics	3
3	V	5BOE03T - C	Insurance & Banking Management	3
4	V	5BOE03T - D	Total Quality Management	3
5	V	5BOE03T - E	Campus Sustainability	3
6	V	5BOE03T - F	Indian Stock Market	3
7	V	5BOE03T - G	Climate Change	3

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KDK College of Engineering, Nagpur

B. Tech.

CE/ ME/ EE/ CSE/ IT/ AI&DS/ ETC Engineering

Semester V	Subject Code: 5BOE03T - A	Name of Subject: Principles of Management		
Total Distribution per week				
Total Credit: 3	Lecture (L): 3	Tutorial (T): 0	Practical (P): 0	
Examination Scheme				
Continuous Assessment	Mid Semester Examination	End Semester Examination	Total Marks	Examination Duration:
20 Marks	30 Marks	50 Marks	100 Marks	3 Hrs

Course Objectives	
1	To enable students, understand the fundamental concepts of management, including the evolution and managerial roles and functions.
2	To enable students to learn the principles, processes, and types of planning and decision-making in managerial contexts.
3	To analyze different organizational structures and processes including staffing, delegation, and departmentalization.
4	To understand behavioral aspects of directing, including motivation, leadership, and communication.
5	To make them learn various control mechanisms, including budgeting and performance monitoring, to improve organizational productivity and effectiveness.

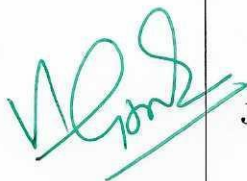
Course Outcomes	
After completion of syllabus, the student will be able to	
1	Define and explain the core concepts of management and distinguish between managers and administrators.
2	Demonstrate knowledge of planning, including setting objectives, formulating policies, and applying planning tools and techniques.
3	Analyse different organizational structures and processes including staffing, delegation, and departmentalization.
4	Understand behavioural aspects of directing, including motivation, leadership, and communication.
5	Utilize various control mechanisms, including budgeting and performance monitoring, to improve organizational productivity and effectiveness.

Course Competencies	
1	Apply foundational knowledge of management principles and develop the ability to plan, organize, lead, and control organizational activities effectively.
2	Implement communication skills, leadership skills, decision-making skills and performance monitoring skills to improve productivity and efficiency

CO_PO Mapping											
	Programme Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	-	-	-	-	2	2	-	-	3	3
CO2	2	2	-	-	3	-	-	-	--	3	3
CO3	-	3	-	-	-	-	-	3	-	3	3
CO4	-	-	-	-	-	-	3	3	3	-	3
CO5	-	2	-	-	-	-	-	-	-	3	3

Course Contents		Mapped with CO
Unit I : Introduction to Management:	8	CO1
Definition, Nature, Importance, Scope of Management – managerial roles and skills- Science or Art – Manager Vs Administrator – Evolution of Management – Scientific, human relations, system and contingency approaches (contributions of F.W Taylor, Henry Fayol, Elton Mayo, Gilberth and McGregor) - Levels and Functions of Management.		
Unit II : Planning:	8	CO2
Nature and purpose of planning – planning process – types of planning – objectives – setting objectives – policies – Planning premises – Planning Tools and Techniques – Decision making steps and process.		
Unit III : Organizing:	8	CO3
Nature and purpose – Formal and informal organization – organization chart – organization structure – types – Line and staff authority – departmentalization – delegation of authority – centralization and decentralization —Span of Management - Job design- Recruitment, selection, Training and Compensation.		
Unit IV : Directing:	8	CO4
Foundations of individual and group behavior – motivation – motivational techniques – job enlargement – job enrichment – leadership – types and theories of leadership – communication – process of communication – barrier in communication – effective communication.		
Unit V : Controlling:	8	CO5
System and process of controlling – budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting.		

Text Books	
1	Principles and Practice of Management: L M Prasad, Sultan Chand & Sons educational. New Delhi
2	Principles of Management, Ramaswamy T., Himalaya Publication
3	Essentials of Management, Harold Koontz, O'Donnell and Heinz Weihrich, 2012, New Delhi, 9th edition, Tata McGraw Hill
4	Fundamentals of Management, Stephen P. Robbins, David A. Decenzo, 2016, Pearson Education, 9th Edition
5	Management Today- Principles and Practice / Edition-13th reprint
Reference Books	
1	Management - Text & Cases, Satya Raju, PHI, New Delhi
2	Management Fundamentals: Concepts, Applications, & Skill Development, 6th edition, Sage. 2014
3	Principles Of Management, Richard L. Daft, Cengage Learning, 2009

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KDK College of Engineering, Nagpur

B. Tech.

CE/ ME/ EE/ CSE/ IT/ AI&DS/ ETC Engineering

Semester V	Subject Code: 5BOE03T - B	Name of Subject: Professional Practices & Ethics		
Total Distribution per week				
Total Credit: 3	Lecture (L): 3	Tutorial (T): 0	Practical (P): 0	
Examination Scheme				
Continuous Assessment	Mid Semester Examination	End Semester Examination	Total Marks	Examination Duration:
20 Marks	30 Marks	50 Marks	100 Marks	3 Hrs

Course Objectives	
1	To understand the basic purpose of profession, professional ethics and various moral and social issues.
2	To analyze various moral issues and theories of moral development
3	To realize their roles of applying ethical principles at various professional levels
4	To identify their responsibilities for safety and risk benefit analysis.
5	To understand their constructive roles in dealing various global issues.

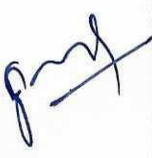
Course Outcomes	
After completion of syllabus, the student will be able to	
1	Understand basic purpose of profession, professional ethics and various moral and social issues.
2	Analyze various moral issues and theories of moral development.
3	Realize their roles of applying ethical principles at various professional levels.
4	Identify their responsibilities for safety and risk benefit analysis.
5	Understand their constructive roles in dealing various global issues.

Course Competencies	
1	Apply professional ethics, moral values, and social responsibilities while dealing with real-world scenarios in their respective professions.
2	Analyze ethical issues critically and perform risk-benefit analysis to make informed and responsible decisions in professional settings.
3	Demonstrate responsible behaviour and actively contribute to addressing global and societal challenges through ethical and socially conscious practices.

CO_PO Mapping											
	Programme Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	-	-	-	-	2	3	1	1	-	3
CO2	-	2	-	-	-	-	3	-	1	-	2
CO3	-	-	-	-	-	-	3	1	2	-	1
CO4	-	-	2	-	2	-	2	-	-	-	3
CO5	-	-	-	-	-	3	3	1	1	-	3

Course Contents		Mapped with CO
Unit I : Human Values and Ethics:	8	CO1
Human Values, Morals, values and Ethics, Integrity, Work ethics, Service learning, Civic virtue, Respect for others, living peacefully, Caring, Sharing, Honesty, Courage		
Unit II : Engineering Ethics:	8	CO2
Engineering Ethics, Senses of 'Engineering Ethics', Variety of moral issues, Moral dilemmas, Moral Autonomy, Kohlberg's theory, Gilligan's theory		
Unit III : Engineering as Social Experimentation:	8	CO3
Engineering as Social Experimentation, Engineering as Experimentation, Engineers as responsible Experimenters, Codes of Ethics, A Balanced Outlook on Law (Industrial Disputes Act, 1947; 07 3 Industrial Employment (Standing Orders) Act, 1946; Workmen's Compensation Act, 1923		
Unit IV : Safeties, Responsibilities and Rights:	8	CO4
Safety, Responsibilities and rights, Safety and Risk, Assessment of Safety and Risk, Risk Benefit Analysis and Reducing Risk, Collective Bargaining, Professional Rights, Employee Rights		
Unit V : Global Issues and Professional Responsibilities:	8	CO5
Global issues, Multinational Corporations, Computer Ethics, Weapons Development, Engineers as Managers, Consulting Engineers, Engineers as Expert Witnesses and Advisors		

Text Book/ Reference Books	
1	Professional Ethics, R. Subramaniam, Oxford Publications, New Delhi.
2	Human Values and Professional Ethics by Jayshree Suresh and B. S. Raghavan, S. Chand Publications
3	Human Values & Professional Ethics by S. B. Gogate, Vikas Publishing House Pvt. Ltd., Noida.

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KDK College of Engineering, Nagpur

B. Tech.

CE/ ME/ EE/ CSE/ IT/ AI&DS/ ETC Engineering

Semester V	Subject Code:	Name of Subject:		
	5BOE03T - C	Insurance and Banking Management		
Total Distribution per week				
Total Credit: 3	Lecture (L): 3	Tutorial (T): 0	Practical (P): 0	
Examination Scheme				
Continuous Assessment	Mid Semester Examination	End Semester Examination	Total Marks	Examination Duration:
20 Marks	30 Marks	50 Marks	100 Marks	3 Hrs

Course Objectives	
1	To introduce the structure and functioning of the banking industry, with a focus on commercial and corporate banking in India.
2	To understand key commercial banking operations and regulatory frameworks like KYC, AML, FEMA, and payment systems (NEFT, RTGS, SWIFT).
3	To explore banking risk management practices, including ALM, NPA management, credit risk, and other financial risks.
4	To provide insights into insurance fundamentals, types of insurance policies, and risk measurement techniques
5	To examine the operational aspects of insurance companies including underwriting and claims management.

Course Outcomes	
After completion of syllabus, the student will be able to	
1	Explain the structure and types of banking institutions in India and the concept of core and universal banking.
2	Describe key operations in commercial banking and apply regulatory norms such as KYC, AML, RTGS, NEFT, and FEMA.
3	Evaluate asset-liability management processes and prudential norms related to NPAs and credit risk management.
4	Illustrate the concepts and types of life and general insurance, and understand premium calculation and risk measurement.
5	Analyze the operational aspects of insurance companies including underwriting principles and claims settlement processes.

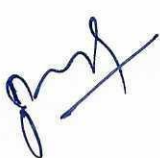
Course Competencies	
1	Understand the structure and regulations of banking and insurance in India.
2	Apply risk management practices and compliance frameworks like KYC, AML, FEMA, NEFT, and RTGS.
3	Analyze insurance policies and claims processes to evaluate financial and operational risks.

CO_PO Mapping											
	Programme Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	-	-	-	-	2	-	-	-	2	3
CO2	-	-	-	-	2	2	2	-	-	3	3
CO3	-	-	-	-	2	2	-	-	-	3	3
CO4	-	-	-	-	3	2	2	-	-	3	2
CO5	-	-	-	-	3	2	2	-	-	3	2

Course Contents		Mapped with CO
Unit I : Introduction to Banking: Banking Industry: Structure of Banking Industry - Public and Private Sectors Banks in India - Corporate Banking and Universal Banking - Core Banking Innovation in Banking: E-Banking - Delivery Channels - ATM - EFTPOS - Phone Banking - Internet Banking - SMS Banking - Mobile Banking - Credit/Debit Cards - Smart Cards - UPI - Bancassurance.	8	CO1
Unit II : Commercial Banking Operations: Banking Operations: Payment and Settlement System - New Age Clearing - New Age Payment - RTGS - NEFT - SWIFT - NTGS - KYC Norms and Anti - Money Laundering - FEMA. Asset Liability Management (ALM): Concept - Organization and Techniques - Provision for NPA's - NPA's in Commercial Banks - Causes and Suggestions - Prudential Norms.	8	CO2
Unit III : Management of Banking Organization: Credit Risk Management: Introduction - Capital Adequacy Norms - Standardized and Advanced Approaches for Credit Risk - Credit Rating/Credit Scoring - Rating System Design. Loan Management: Contents of Loan Policy - Evaluating Credit Applicant Market Risk - Liquidity Risk - Interest Rate Risk - FOREX Risk.	8	CO3
Unit IV Introduction to Insurance: Introduction, Concept - Nature - Scope and Significance - Investment Patterns - Types of Policies. Life insurance: Premium Calculations - Annuities - Measurement of Risk and Morality Table. General Insurance: Fire Insurance - Conditions of Fire Insurance - Subrogation and Reinsurance - Accident and	8	CO4

Motor Insurance - Types of Motor Insurance - Factors to be considered for Premium Fixing - Concept of Health Insurance - Group Insurance - Home Insurance - Catastrophe Insurance		
Unit V : Management of Insurance Companies:	8	CO5
Underwriting: Functions - Principles - Underwriting in Life Insurance - Underwriting in Non-Life Insurance. Claims Management: Claim Settlement in General Insurance - Accident Benefit - Disability Benefit - Permanent Disability Benefit - Claim Settlement in Life Insurance - Maturity Claims and Death Claims.		

Text/ Reference Books	
1	N.R. Mohan Prakash, Banking, Risk and Insurance Management, Vikas Publishing
2	M.N. Mishra & S.B. Mishra, Insurance: Principles and Practice, S. Chand & Co
3	Sunil Kumar, Essentials of Banking and Insurance, JSR Publishing House
4	Bank Management and Financial Services (Indian Edition), Peter Rose & Sylvia Hudgins, 8th Edition, McGraw Hill Education
5	Principles And Practice of Bank Management, 2nd Revised Edition, Dr. P. Subba Rao & Dr. Promod Kumar Khanna, Himalaya Publishing House

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KDK College of Engineering, Nagpur

B. Tech.

CE/ ME/ EE/ CSE/ IT/ AI&DS/ ETC Engineering

Semester V	Subject Code: 5BOE03T - D	Name of Subject: Total Quality Management		
Total Distribution per week				
Total Credit: 3	Lecture (L): 3	Tutorial (T): 0	Practical (P): 0	
Examination Scheme				
Continuous Assessment	Mid Semester Examination	End Semester Examination	Total Marks	Examination Duration:
20 Marks	30 Marks	50 Marks	100 Marks	3 Hrs

Course Objectives	
1	Understand the principles, history, and key contributors of Total Quality Management (TQM)
2	Learn and apply essential quality tools like Kaizen, Six Sigma, and cost analysis.
3	Manage customer satisfaction, employee involvement, and supplier relationships.
4	Use quality improvement techniques such as control charts and the DMAIC process.
5	Apply advanced TQM tools like Benchmarking, QFD, TPM, and FMEA to enhance quality and reliability

Course Outcomes	
After completion of syllabus, the student will be able to	
1	Develop an understanding about Quality management in corporate world.
2	Employ various techniques being used in Total Quality Management.
3	Engage into control of processes in manufacturing and operations
4	Audit control systems and Quality management
5	Apply TQM tools like Benchmarking, QFD, Taguchi Loss Function, TPM, and FMEA to improve quality and reliability in industrial and service processes.

Course Competencies	
1	Apply Total Quality Management (TQM) principles in real-world corporate settings.
2	Operate quality tools and techniques to improve processes and ensure product reliability.
3	Evaluate and audit quality systems to support continuous improvement.

CO_PO Mapping											
	Programme Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	-	2	-	2	1	-	-	-	1	1
CO2	-	2	2	-	3	1	-	-	-	2	2
CO3	-	2	3	-	2	1	1	2	-	2	2
CO4	-	2	2	2	2	1	1	-	-	2	2
CO5	-	2	3	-	3	1	1	-	2	2	2

Course Contents		Mapped with CO
Unit I: Introduction to Total Quality Management Introduction to Total Quality Management, A brief history, the concept of quality, evolution of total quality, principles of total quality, Gurus of total quality management, their philosophies and contributions, characteristics of quality leader, customer satisfaction, customer perception of quality, feedback, customer complaints.	8	CO1
Unit II: Tools of Quality Management Process, Problem solving method, Kaizen, Six Sigma, performance measures, Cost of Quality, Tools for Quality Assurance,	8	CO2
Unit III: Customers and Suppliers Management TQM Principles - Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement –Juran Trilogy, PDSA Cycle, 5S, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy	8	CO3
Unit IV: Quality Improvement Techniques Quality Improvement Techniques - Control Charts for Variables – Definitions, Variation: Common vs. Special Causes, Process capability, Concept of six sigma - Introduction, advantages of six sigma, six sigma DMAIC process	8	CO4
Unit V: Total Productive Maintenance TQM Tools - Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA	8	CO5

Text Books	
1	Dale H.Besterfield, et al., Total Quality Management Pearson Education Asia, 1999. (Indian Areprint 2002)
2	Total Quality Management by Dale H. Besterfield,2019, Perason
Reference Books	
1	James R.Evans & William M.Lidsay, The Management and Control of Quality, (5th Edition), South-Western (Thomson Learning), 2002 (ISBN 0-324-06680-5)
2	Feigenbaum.A.V. "Total Quality Management", McGraw-Hill, 1991
3	Oakland.J.S. "Total Quality Management" Butterworth – Heinemann Ltd., Oxford. 1989

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KDK College of Engineering, Nagpur

B. Tech.

CE/ ME/ EE/ CSE/ IT/ AI&DS/ ETC Engineering

Semester V	Subject Code: 5BOE03T - E	Name of Subject: Campus Sustainability		
Total Distribution per week				
Total Credit: 3	Lecture (L): 3	Tutorial (T): 0	Practical (P): 0	
Examination Scheme				
Continuous Assessment	Mid Semester Examination	End Semester Examination	Total Marks	Examination Duration:
20 Marks	30 Marks	50 Marks	100 Marks	3 Hrs

Course Objectives	
1	Develop an understanding of the principles and practices of sustainability in the context of educational institutions.
2	Build awareness of ecological, economic, and social sustainability challenges on campuses.
3	Enable students to assess and reduce the environmental footprint of academic activities.
4	Introduce tools and strategies for energy, water, and waste efficiency within campuses.
5	Promote student engagement and leadership in sustainability initiatives.

Course Outcomes	
After completion of syllabus, the student will be able to	
1	Explain the concept of sustainability and its relevance to campus ecosystems.
2	Evaluate current campus practices in energy, water, and waste management.
3	Analyze the application of green infrastructure and sustainable mobility in institutions.
4	Propose practical and technical strategies for improving campus sustainability.
5	Demonstrate environmental responsibility through individual and group actions.

Course Competencies	
1	Understand the concept of sustainability and its application to campus ecosystems.
2	Evaluate and improve energy, water, and waste practices within institutions.
3	Apply green infrastructure strategies and promote sustainable mobility on campuses.

CO_PO Mapping											
	Programme Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	-	-	-	-	3	3	-	2	-	2
CO2	-	-	-		-	2	3	-	-	2	2
CO3	-	-	-	2	-	2	2	-	2	2	2
CO4	-	-	-	2	-	2	2	-	2	3	2
CO5	-	-	-	-	-	2	3	3	3	2	-

Course Contents		Mapped with CO
Unit I: Foundations of Sustainability	8	CO1
Introduction to sustainability: environmental, economic, social dimensions, The role of academic institutions in promoting sustainability, UN Sustainable Development Goals (SDGs) and Education for Sustainable Development (ESD), Examples of sustainable campuses worldwide		
Unit II: Energy Management in Campus Infrastructure	8	CO2
Campus energy audits: methods and case studies, Renewable energy integration: solar, wind, biomass, Energy conservation in labs, hostels, and classrooms, Smart grids, sensors, and building automation systems		
Unit III: Water Conservation and Solid Waste Management	8	CO3
Water audits and sustainable usage, Rainwater harvesting systems and greywater reuse, Solid waste segregation, composting, and recycling models, E-waste handling and hazardous waste precautions		
Unit IV: Green Buildings and Sustainable Transportation	8	CO4
Concepts of green building: LEED, GRIHA, EDGE certifications, Use of sustainable construction materials, Campus biodiversity and green landscaping Bicycle-friendly campuses, EV charging, carpool systems		
Unit V: Community Engagement and Behavior Change	8	CO5
Building a green culture through clubs and campaigns, Institutional policies and green charters, Sustainability reporting and auditing tools, Design and presentation of a campus sustainability project		

Text book/Reference Books	
1	Geng, Yong, and Brent, Daniel. Sustainable Campus: Theory and Practice. Springer, 2021.
2	Agyeman, Julian et al. Local Environment: The International Journal of Justice and Sustainability (Selected papers)
3	United Nations. UN Sustainable Development Goals Reports – https://sdgs.un.org/
4	National Institute of Urban Affairs. Campus Sustainability Guidelines for Indian Institutions
5	AICTE & TERI Green Campus Manual (India-specific guidelines)

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KDK College of Engineering, Nagpur

B. Tech.

CE/ ME/ EE/ CSE/ IT/ AI&DS/ ETC Engineering

Semester V	Subject Code: 5BOE03T - F	Name of Subject: Indian Stock Market		
Total Distribution per week				
Total Credit: 3	Lecture (L): 3	Tutorial (T): 0	Practical (P): 0	
Examination Scheme				
Continuous Assessment	Mid Semester Examination	End Semester Examination	Total Marks	Examination Duration:
20 Marks	30 Marks	50 Marks	100 Marks	3 Hrs

Course Objectives	
1	Provide an in-depth understanding of the Indian capital and stock market structure.
2	Equip students with knowledge of equity, derivatives, mutual funds, and trading platforms.
3	Build analytical skills through fundamental and technical evaluation of securities.
4	Develop understanding of portfolio construction and investment strategies
5	Familiarize students with the regulatory framework, investor protection, and ethical investing

Course Outcomes	
After completion of syllabus, the student will be able to	
1	Explain the structure and functions of Indian stock markets and financial instruments.
2	Demonstrate knowledge of trading mechanisms and regulatory compliance.
3	Apply technical and fundamental analysis to evaluate investment opportunities.
4	Analyze and compare financial products like mutual funds, ETFs, and derivatives
5	Construct and manage a diversified portfolio applying key risk-return concepts.

Course Competencies	
1	Understand the structure and functions of the Indian stock market and its financial instruments.
2	Apply analytical tools and trading knowledge to evaluate investments and build portfolios.
3	Demonstrate understanding of regulatory compliance and ethical investing practices.

CO_PO Mapping											
	Programme Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	1	2	-	-	2	-	-	-	1	2
CO2	2	1	2	-	-	3	-	-	2	2	3
CO3	1	2	3	-	-	2	-	-	-	3	3
CO4	1	1	2	-	-	2	-	-	-	2	3
CO5	2	1	3	-	-	2	-	-	-	3	3

Course Contents		Mapped with CO
Unit I: Overview of Financial Markets & Stock Exchanges	8	CO1
Introduction to financial markets: Money vs. Capital market, Primary & Secondary markets, Stock exchanges in India: NSE, BSE, MCX, Role of SEBI and regulatory framework, Market participants: FIIs, DIIs, retail, HNIs Demat & Trading accounts, clearing & settlement (T+1 cycle)		
Unit II: Equity Market Instruments & Trading Mechanism	8	CO2
Types of securities: Equity, preference shares, debentures, IPO Process and Book Building, Market indices: Nifty, Sensex (construction & relevance), Order types: market, limit, stop-loss, Trading mechanisms: intraday vs. delivery, Circuit breakers, price bands, margin systems		
Unit III: Technical & Fundamental Analysis	8	CO3
Charts: Line, bar, candlestick, Patterns: head & shoulders, double top/bottom, triangles, Indicators: Moving Average, RSI, MACD, Bollinger Bands Fundamental analysis: P&L statement, Balance Sheet, Cash Flow Key ratios: EPS, P/E, ROE, Debt-equity ratio, DCF Model basics		
Unit IV: Derivatives and Mutual Funds	8	CO4
Introduction to Derivatives: Futures and Options, Hedging, speculation, arbitrage, Option chain, Greeks (basic understanding), Mutual funds: Types, NAV, SIP, SWP, AUM, ETFs and Index Funds, Fund selection and performance metrics		
Unit V: Portfolio Management & Regulatory Environment	8	CO5
Risk-return analysis and investor profiling, Asset allocation & diversification strategies, Basics of portfolio construction, Regulatory bodies: SEBI, AMFI, NISM, Insider trading, corporate governance, taxation (STCG, LTCG), Investor protection and grievance redressal		

Text Books	
1	Indian Financial System” By M. Y. Khan
2	McGraw Hill Education (Covers capital markets, SEBI, trading mechanisms, mutual funds)
Reference Books	
1	“Security Analysis and Portfolio Management” – S. Kevin, PHI Learning
2	“Fundamentals of Financial Markets” – V. A. Avadhani, Himalaya Publishing
3	“Fundamental Analysis for Investors” – Raghunathan V., McGraw Hill
4	NSE Academy Certified Capital Market Professional (E-NCCMP) modules
5	NISM Series: Equity Derivatives & Mutual Funds Distributor Study Material

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KDK College of Engineering, Nagpur

B. Tech.

CE/ ME/ EE/ CSE/ IT/ AI&DS/ ETC Engineering

Semester V	Subject Code:	Name of Subject:		
	5BOE03T - G	Climate Change		
Total Distribution per week				
Total Credit: 3	Lecture (L): 3	Tutorial (T): 0	Practical (P): 0	
Examination Scheme				
Continuous Assessment	Mid Semester Examination	End Semester Examination	Total Marks	Examination Duration:
20 Marks	30 Marks	50 Marks	100 Marks	3 Hrs

Course Objectives	
1	Understand the scientific principles underlying climate change.
2	Explore the causes and evidence of global warming and climate change.
3	Analyze the impacts of climate change on ecosystems, societies, and economies
4	Examine national and international climate policies, treaties, and frameworks.
5	Identify engineering and technological strategies for climate mitigation and adaptation.

Course Outcomes	
After completion of syllabus, the student will be able to	
1	Explain the basic science of climate systems and greenhouse effect.
2	Interpret evidence and data supporting global climate change.
3	Assess environmental, social, and economic impacts of climate change.
4	Describe national and international responses and frameworks like UNFCCC, Kyoto Protocol, Paris Agreement.
5	Propose technological and policy-based solutions to mitigate and adapt to climate change.

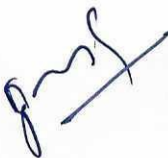
Course Competencies	
1	Inculcate the scientific basis of climate systems and global warming.
2	Analyze climate change impacts and interpret related environmental data.
3	Evaluate global climate policies and propose strategies for mitigation and adaptation.

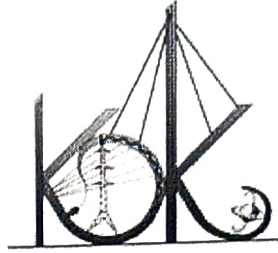
CO_PO Mapping											
	Programme Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	2	-	-	-	-	-	-	-	-	2
CO2	-	3	-	2	2	-	-	-	-	-	3
CO3	-	2	-	-	3	2	-	-	2	2	-
CO4	-	-	-	-	3	3	-	-	-	2	2
CO5	-	2	3	2	2	3	3	1	1	2	-

Course Contents		Mapped with CO
Unit I: Climate Science Fundamentals	8	CO1
Earth's energy balance and the greenhouse effect, Natural vs anthropogenic causes of climate change, Role of carbon cycle and feedback mechanisms, Climate models and prediction tools		
Unit II: Evidence of Climate Change	8	CO2
Observed temperature and precipitation trends, Melting glaciers, sea-level rise, ocean acidification, IPCC reports and global climate data sources, Regional climate change patterns in India		
Unit III: Impacts of Climate Change	8	CO3
Environmental: biodiversity, forests, oceans, Social: health, migration, and agriculture, Economic: infrastructure, energy, and livelihoods, Case studies: floods, droughts, cyclones		
Unit IV: Climate Change Governance	8	CO4
Global treaties: UNFCCC, Kyoto Protocol, Paris Agreement, National policies: NAPCC, SAPCCs (India's response), Role of international bodies: IPCC, UNEP, COP summits, Climate finance and carbon trading		
Unit V: Mitigation and Adaptation Strategies	8	CO5
Renewable energy technologies and carbon capture, Sustainable urban and industrial design, Disaster-resilient infrastructure, Behavioral and lifestyle changes, Role of engineers in climate innovation		

Text Books	
1	1. Climate Change: From Science to Sustainability" by A. Barrie Pittock – Earthscan
2	"Global Warming: Understanding the Forecast" by David Archer – Wiley
3	"Introduction to Climate Change" by D. G. Martin – Oxford University Press

Reference Books	
1	IPCC Sixth Assessment Report (AR6) – https://www.ipcc.ch
2	India's National Action Plan on Climate Change (NAPCC) – https://moef.gov.in
3	"The Climate Solution" by Mridula Ramesh – Hachette India
4	UN SDG Goal 13 Reports – https://sdgs.un.org/goals/goal13

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K. D. K. College of Engineering, Nagpur

Syllabus – Sixth Semester

Bachelor of Technology (Information Technology)

KDK College of Engineering, Nagpur
Faculty of Science and Technology
B.Tech. Information Technology

Semester : VI	Subject Code: 6BIT01T	Name of Subject: Computer Network and Internet		
Total Hours Distribution per week				
Total Credit: 3	Lecture (L): 3 Hrs		Tutorial (T) : -	Practical (P): -
Examination Scheme				
Mid Sem Examination	Continuous Assessment	End Sem Examination	Total Marks	Examination Duration:
30 Marks	20 Marks	50 Marks	100 Marks	3 Hours

Course Objectives	
1	To understand the fundamental of Computer Network.
2	Comparison of the OSI & the TCP/IP Reference Models.
3	Distinguish between the different types of bit errors and can explain the concept of bit redundancy and how it is generally achieved in the facilitation of error detection and the main methods of error correction.
4	To Gain core knowledge of Network layer routing protocols and IP addressing.
5	To understand the overall concept of Network security

Course Outcomes	
After completing the course, students will be able to	
CO1	Interpret the fundamental concepts of Computer Network.
CO2	Compare of the OSI & the TCP/IP Reference Models.
CO3	Distinguish between the different types of bit errors and can explain the concept of bit redundancy and how it is generally achieved in the facilitation of error detection and the main methods of error correction.
CO4	Acquire & Apply core knowledge of Network layer routing protocols and IP addressing.
CO5	Infer the overall concept of Network security.

Course Competencies:

1. Understand and apply the protocols and functions of the OSI and TCP/IP models to optimize network communications.
2. Effectively apply IP addressing and subnetting techniques to design, manage, and Troubleshoot networks problems.
3. Apply and analyze Transport Layer protocols, in various network applications.
4. Configure and implement routing protocols to enhance network performance.
5. Gain competency in overall concept of Network security.

CO-PO Articulation Matrix

CO	Program Outcomes & Program Specific Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	1	1	1	2	--	1	2	1	--	3	3	2
CO2	3	1	1	2	2	--	1	2	2	--	3	3	2
CO3	3	1	1	2	1	--	1	2	2	--	3	3	2
CO4	3	1	1	2	3	--	1	2	1	--	3	2	2
CO5	3	1	1	2	3	--	1	2	1	--	3	2	2

Syllabus

Details of Topic	Hours	Mapped with CO
Unit I: Introduction to Data Communication & Network		
Introduction to computer network, Components of computer network, Use of computer networks, Classification of Networks: - Local Area Networks, Metropolitan Area Networks, Wide Area Networks, Wireless Networks, IEEE 802.11, Bluetooth and WiMAX, wireless transmission, Networking Devices (HUB, SWITCH, ROUTER etc.) Security :- Cryptography, Data Encryption.	08	CO1
Unit II: Physical Layer and Communication Media		
Analog and digital Data, Analog and digital signals, Manchester encoding, Communication Media: copper wire, and Fibre optic cable structure, Email Phishing, Authentication and Authorization User Authentication, Security Protocols in Internet, Firewalls, Design issues for layered architecture, Network Software and Architecture Reference Model:- OSI Reference Model, TCP/IP Reference Model, Comparison of OSI Reference Model and TCP/IP Reference Model, Network Standard.	08	CO2
Unit III: Data Link Layer:		
Types of errors:- Hamming Code, CRC Code, framing (character and bit stuffing), Protocols: for noiseless channels (Simplex, Stop and wait), for noisy channels (Stop and wait ARQ, Piggybacking, Go back-N ARQ, Selective repeat ARQ), Sliding Window Protocol, Multiple Access Protocol: Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, CSMA/CA., P-persistent CSMA, Non-persistent CSMA, 1-persistent CSMA	08	CO3
Unit IV: Network Layer		
Network Layer:- Circuit switching and Packet switching network, Typical Circuit Route for Long Distance, IPv4 Addresses, IP addressing Methods with sub-netting and super-netting, Routing Protocols: Shortest Path Routing, Distance Vector Routing, Link State Routing, Hierarchical Routing.	08	CO4
Unit V: Transport Layer and Application Layer		
Duties of Transport Layer, Process-to-process delivery, Congestion control Open loop, closed loop. Quality of Service, Application Layer Protocols, ARP, RARP, ICMP, IGMP, IPV6, DNS, SMTP, SNMP, FTP, HTTP & WWW, The World Wide Web Architectural Overview, Static and Dynamic web pages and web applications, CSS, Socket Programming	08	CO5

Text Books

- | | |
|---|--|
| 1 | B. A. Forouzan – “Data Communications and Networking (3rd Ed.)” – TMH |
| 2 | A. S. Tanenbaum – “Computer Networks (4th Ed.)” – Pearson Education/PHI |
| 3 | W. Stallings – “Data and Computer Communications (8th Ed.)” – PHI/ Pearson Education |

Reference Books:

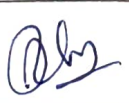
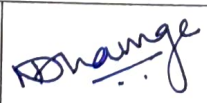
- | | |
|---|--|
| 1 | Comer – “Internetworking with TCP/IP, vol. 1, 2, Ed.)” Pearson |
|---|--|

TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:

- | | |
|---|---|
| 1 | Trace TCP & UDP Stream using Wireshark, A Small PC Network |
| 2 | Networked Applications, Larger Site Networks, Network Security, Work in a Unix network environment. |

WEB SOURCE REFERENCES:

- | | |
|---|--|
| 1 | Packet switching and circuit switching - https://www.youtube.com/watch?v=SaQ3RhRVT6c |
| 2 | IP Multicasting - https://www.youtube.com/watch?v=TAplo_BiX6U |
| 3 | Congestion control- https://www.youtube.com/watch?v=ZYIdYIt7W_g |
| 4 | Client Server Concepts DNS, Telnet, Ftp- https://www.youtube.com/watch?v=eA9mnY1Z2so |

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KDK College of Engineering, Nagpur
Faculty of Science and Technology
B.Tech. Information Technology

Semester: VI	Subject Code: 6BIT01P	Name of Subject: Computer Network and Internet Lab	
Total Hours Distribution per week			
Total Credit: 1	Lecture (L): -	Tutorial (T): -	Practical (P): 2Hrs
Examination Scheme			
Continuous Assessment	End Sem Examination		Total Marks
25 Marks	25 Marks		50 Marks

Sr No	Course Objective
1	The course develop an understanding of various protocols used at different layers of OSI and TCP/IP reference model and explains the implementation of protocols using network simulators.
2	Explains the students the implementation of protocols using network simulators.
3	To explain students IP addressing, subnetting,static & dynamic routing
Course Outcomes	
After successful completion of this course the students will be able to:	
CO1	Interpret the perform protocols of OSI and TCP/IP reference model.
CO2	Apply Networking layer concepts of IP addressing and Subnetting.
CO3	Analyze Transport Layer Protocols and its application & Implement the different static and dynamic routing protocols. .

Course Competencies:

1. Gain proficiency to apply the protocols and functions of the OSI and TCP/IP models to Optimize network communications.
2. Develop ability to effectively apply IP addressing and subnetting techniques to design, manage, and Troubleshoot networks problems.
3. Proficiency to analyze Transport Layer protocols, in various network applications & to configure and implement routing protocols to enhance network performance

CO-PO Articulation Matrix:

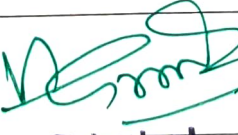
CO	Program Outcomes & Program Specific Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	1	1	1	2	--	1	2	1	--	3	3	2
CO2	3	1	1	2	2	--	1	2	2	--	3	3	2
CO3	3	1	1	2	1	--	1	2	2	--	3	3	2

Minimum Ten Practicals to be performed from the list covering all COs.

List of Experiments

Exp No.	Title of Experiment	CO
1	Demonstrate the formation of local area network	CO1
2	Step by step installation of Ubuntu operating system, configuration of display card and Ethernet Card, Creating partitions of an HDD, Creating bootable media with a bootable image.	CO1
3	Installation of ns2 by using ubuntu os and to study network simulator NS2	CO1
4	TO demonstrate data transmission using ping protocol tracert and IP	CO1

	Configuration.	
5	Carrier Sense Multiple Access with Collision Detection (CSMA/CD)	CO1
6	To study simulation of 2 nodes in NS2	CO1
7	Implementing TLS, SSL Security over HTTP and IP Protocol to form IPSec and https	CO2
8	To Create simple network topology in NS2	CO2
9	To implement TCP (Transmission control Protocol) using NS2	CO2
10	Implementation of DNS Server, Configuring IIS(Web Server) , Creating andConfiguring Web Sites in Windows Server	CO2
11	Write and simulate the ns2 program to implement user datagram protocol UDP Using NS2 Simulator.	CO2
12	To perform PC to PC Communication using RS-232	CO2
13	Setting up an email server in Windows, configuring mail server software, setting up DNS records, creating user mailboxes, and enabling protocols like SMTP,IMAP, and POP3 to send and receive emails within a network or over the internet.	CO3
14	To configure Router through web access interface	CO3
15	Configuration of Access-lists - Extended ACLs	CO3
16	Carrier Sense Multiple Access with Collision Detection (CSMA/CD)	CO4
17	Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA)	CO4
18	Subnetting	CO4
19	Distance Vector Routing Algorithm	CO4
20	Link State Routing Algorithm	CO4
21	Implementation of Stop & Wait ARQ Flow control Protocols	CO4
22	Implementation of Go-Back-N ARQ Flow Control Protocols	CO4
23	Implementation of Selective Repeat ARQ Flow Control Protocols	CO4
24	Implementation of Static Routing protocols	CO4
25	Implementation of Dynamic Routing protocols	CO4
26	Demonstration of the functioning of Network Devices used for establishing communication among the computer/networks	CO4
27	Demonstration and Implementation of cryptographic algorithms	CO4
28	Demonstration and Implementation of two-tier and three-tier client-server architecture	CO4
30	Implementation of Packet Switching: Setup, Transmission, and Teardown	CO4
31	Implementation of Uni-Polar, Polar and Bipolar Line Encoding Schemes	CO4

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KDK College of Engineering, Nagpur
Faculty of Science and Technology
B.Tech. Information Technology

Semester VI	Subject Code: 6BIT02T	Name of Subject: Database Management System		
Total Hours Distribution per week				
Total Credit: 3	Lecture (L): 3 Hrs		Tutorial (T) : -	Practical (P): -
Examination Scheme				
Mid Sem Examination	Continuous Assessment	End Sem Examination	Total Marks	Examination Duration:
30 Marks	20 Marks	50 Marks	100 Marks	3 Hours

Course Objectives	
1	Learn the fundamental concepts of Database Management Systems
2	Acquire the knowledge of database query languages and transaction processing
3	Understand systematic database design approaches
4	Understand concept of indexing in database Management
5	Acquire the knowledge of transaction processing, recovery from failure
Course Outcomes	
After completion of syllabus, the student will be able to	
CO1	Analyze and design Database Management System using ER model
CO2	Implement database queries using database languages.
CO3	Create normalized database design using normal forms
CO4	Illustrate Indexing concepts in database languages
CO5	Apply Transaction Management concepts in real -time situations

Course Competencies:

1. Fundamental Knowledge: Understand the purpose , advantages, and architecture of DBMS over traditional file systems
2. Database Design and Modelling: Ability to construct E-R diagrams, map them to relational schema and apply normalization to reduce data redundancy
3. SQL Proficiency: Master Structured Query Language(SQL) for Data Definition Language and Data Manipulation Language tasks, including complex joins, subqueries and views.
- 4.Transaction Management: Understand ACID(Atomicity, Consistency, Isolation, Durability) properties, concurrency control and recovery techniques.
5. Gain proficiency to optimize performance through indexing & Implement security constraints to protect data and ensure integrity.

CO-PO Articulation Matrix

CO	Program Outcomes & Program Specific Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	2	3	2	1	1	1	--	3	2	3
CO2	3	3	2	2	2	2	1	1	1	--	3	2	2
CO3	3	3	2	2	3	2	1	1	1	--	3	3	3
CO4	2	2	2	2	3	2	1	1	1	--	3	2	3
CO5	2	2	2	2	3	2	1	1	1	--	3	2	3

SYLLABUS

Details of Topic	Hours	Mapped with CO
Unit 1: Introduction		
Introduction: Purpose of Database Systems, Database-System Applications, View of Data, Database Languages, Database System Structure, Data Models. Database Design and ER Model: Entity, Attributes, Relationships, Constraints, Keys, Design Process, Entity Relationship Model, ER Diagram, Design Issues, Extended E -R Features, converting ER and EER diagrams into tables.	8	CO1
Unit 2: Relational Algebra and SQL		
Relational Algebra: Unary Binary operators in relational Algebra , Set Operations, Database modifications, Relational Calculus Introduction to SQL : SQL Data Definition, Basic Structure of SQL Queries, DDL, DML, DCL, TCL, Set Operations, Null values, Aggregate functions, Nested Sub-queries, Modifications of the Databases Intermediate SQL: Join Expressions, Views, Integrity Constraints, SQL Data types and Schemas, Authorization,	8	CO2
Unit 3: Relational Model & Database Design:		
Basic concepts, Attributes and Domains, CODD's Rules. Relational Integrity: Domain, Referential Integrities, Enterprise Constraints. Database Design: Features of Good Relational Designs, Normalization, Atomic Domains and First Normal Form, Decomposition using Functional Dependencies, Decomposition, 2NF, 3NF, BCNF.	7	CO3
Unit 4: File organization		
Organization of records in files, Data dictionary storage, Basic concepts of indexing, ordered indices, B+ Tree index files, B+ Tree indexing, B+ Tree Extensions, Multiple Key Access, Static Hashing, Dynamic Hashing, Comparison of Ordered Indexing and Hashing, Bitmap Indices, Index Definition in SQL.	7	CO2
Unit 5: Databases, Database Transaction, Recovery and Concurrency Control		
No SQL Databases, Cloud Databases, Introduction to Database Transaction, Transaction states, ACID properties, Concept of Schedule, Serial Schedule. Serializability: Conflict and View, Cascaded Aborts, Recoverable and Non-recoverable Schedules. Concurrency Control: Lock-based, Timestamp based Deadlock handling. Recovery methods: Shadow-Paging and Log-Based Recovery, Checkpoints. Log-Based Recovery: Deferred Database Modifications and Immediate Database Modifications.	8	CO5

Text /Reference Books

1. Silberschatz A., Korth H., Sudarshan S., "Database System Concepts", McGraw Hill Publishers, ISBN 0-07-120413-X, 6th edition
2. Connally T, Begg C., "Database Systems" , Pearson Education, ISBN 81-7808-861-4
3. C J Date, "An Introduction to Database Systems", Addison-Wesley, ISBN: 0201144719
4. S.K.Singh, "Database Systems: Concepts, Design and Application", Pearson Education, ISBN 978-81-317-6092-5
5. Ramez Elmasri and Shamkant Navathe, Database Systems -Models, Languages, Design and Application Programming

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KDK College of Engineering, Nagpur
Faculty of Science and Technology
B.Tech. Information Technology

Semester VI	Subject Code: 6BIT02P	Name of Subject: Database Management System Lab		
Total Hours Distribution per week				
Total Credit: 1	Lecture (L): -	Tutorial (T) : -	Practical (P): 2 Hrs/week	
Examination Scheme				
Continuous Assessment		End Sem Examination	Total Marks	
25 Marks		25 Marks	50 Marks	

Course Objectives	
1	To understand the fundamental concepts of Database Management Systems
2	To acquire the knowledge of database query languages and transaction processing
3	To understand systematic database design approaches

Course Outcomes	
At the end of this course students are able to:	
CO1	Analyze and design Database Management System using ER model
CO2	Implement database queries using database languages –DDL,DML,DCL
CO3	Apply Indexing concepts in database languages, Database Security, Data Integrity

Course Competencies:

1. Database Design and Modelling: Ability to construct E-R diagrams, map them to relational schema and Apply normalization to reduce data redundancy
2. SQL Proficiency: Master Structured Query Language(SQL) for Data Definition Language and Data Manipulation Language tasks, including complex joins, subqueries and views.
3. Transaction Management: Understand ACID(Atomicity, Consistency, Isolation, Durability) properties, concurrency control and recovery techniques & Implement security constraints to protect data and ensure integrity.

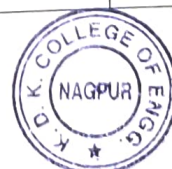
CO-PO Articulation Matrix:

CO	Program Outcomes & Program Specific Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	2	3	2	2	2	2	2	3	2	3
CO2	3	3	2	2	2	2	2	2	2	1	3	2	2
CO3	3	3	2	2	3	2	2	3	3	1	3	3	3

List of Practicals:-**Minimum 8 Practicals to be conducted based on above Syllabus (maximum upto 10).**

SN	Details
1	ER Modeling using E-R Diagram tool and Normalization
2	SQL Queries: DDL
3	SQL Queries: DML
4	SQL Queries: TCL, B+ Tree simulator
5	SQL Queries – all types of Join, Sub-Query
6	PL/SQL Stored Procedure and Stored Function, NoSQL
7	Database Trigger
8	Database Connectivity
9	Mini Project
10	CASE Studies on real-world scenarios
12	Design & Develop database Management System for Order Management
13	An Exercise using Open-Source Software like My SQL

			June 2026	1.00	Applicable for AY 2026-27 onwards
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KDK College of Engineering, Nagpur
Faculty of Science and Technology
B.Tech. Information Technology

Semester VI	Subject Code: 6BIT03T-A	Name of Subject: Artificial Intelligence		
Total Hours Distribution per week				
Total Credit: 3	Lecture (L): 3 Hrs/week		Tutorial (T) : -	Practical (P): -
Examination Scheme				
Mid Sem Examination	Continuous Assessment	End Sem Examination	Total Marks	Examination Duration:
30 Marks	20 Marks	50 Marks	100 Marks	3 Hours

Course Objectives	
1	To understand the fundamentals of Artificial Intelligence.
2	To learn intelligent problem-solving techniques.
3	To understand knowledge representation and reasoning methods.
4	To study machine learning basics and expert systems.
5	To explore real-world AI applications

Course Outcomes	
After completion of syllabus, students will be able to	
CO1	Define Artificial Intelligence and explain its historical development and current applications. Formulate problems using state space representation
CO2	Apply appropriate search techniques to solve search problem. Implement and compare uninformed and informed search algorithms for problem-solving
CO3	Utilize various knowledge representation techniques such as predicate logic, semantic nets, and frames.
CO4	Apply probabilistic reasoning and Bayesian networks to handle uncertainty in AI systems.
CO5	Illustrate various learning Techniques and architecture of expert system.

Course Competencies:

1. Understand the fundamentals, history, and applications of Artificial Intelligence.
2. Analyze and apply search algorithms and problem-solving techniques in AI.
3. Utilize knowledge representation and reasoning methods for intelligent systems.
4. Apply probabilistic reasoning techniques to handle uncertainty in AI applications.
5. Understand intelligent agents, machine learning concepts, and expert systems.

CO-PO Articulation Matrix:

CO	Program Outcomes & Program Specific Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	2	2	--	--	1	1	--	2	3	2
CO2	3	3	3	2	3	--	--	1	1	--	2	3	2
CO3	3	3	3	3	3	--	--	1	1	--	2	3	3
CO4	3	3	3	3	3	1	1	1	1	--	2	3	3
CO5	3	3	3	2	3	1	1	1	1	--	3	3	3

Syllabus

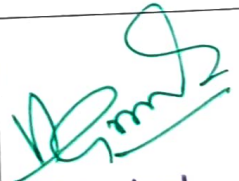
Details of Topic	Allotment of Hours (L)	Mapped CO
UNIT 1: Introduction to AI		
Introduction: What is AI? History & Applications, Artificial intelligence as representation & Search, Production system, Control strategy, Basics of problem solving: problem representation paradigms, defining problem as a state space representation, Characteristics.	8	CO1
UNIT 2: Search Techniques		
Search Techniques: Uninformed Search techniques, Informed Heuristic Based Search, Generate and test, Hill-climbing. Best-First Search, Problem Reduction, and Constraint Satisfaction.	7	CO2
UNIT 3: Knowledge representation		
Knowledge representation: Knowledge representation Issues, First order logic, Inference in first order logic Predicate Logic, Structured Knowledge Representation: Unification, Backward Chaining. Forward Chaining. Resolution, Semantic Nets, Frames, and Scripts.	7	CO3
UNIT 4: Uncertain knowledge & Intelligent Agents		
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. Intelligent Agents: Introduction to Intelligent Agents, Rational Agents, their structure, reflex, model-based, goal-based, and utility-based agents.	7	CO4
UNIT 5: Knowledge and learning		
Learning: What is learning? Knowledge and learning. Learning in Problem Solving. Learning from example, Statistical Learning methods, Reinforcement Learning. Learning probabilistic models Expert Systems: Fundamental blocks, Knowledge Engineering. Knowledge Acquisition. Knowledge-Based Systems, Basic understanding of Natural language.	7	CO5

Text Books:

1. E. Rich and K. Knight, Artificial Intelligence, Tata McGraw Hill, 2008.
2. S. Russell and P. Norvig, Artificial Intelligence: A Modern Approach, 3rd edition

Reference Books:

- 1 Introduction to Artificial Intelligence – Charniak (Pearson Education)
2. Artificial intelligence and soft computing for beginners by Anandita Das Bhattachargee, Shroff Publishers

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Semester: VI	Subject Code: 6BIT03P-A	Name of Subject: Artificial Intelligence Lab	
Total Hours Distribution per week			
Total Credit: 1	Lecture (L): -	Tutorial (T): -	Practical (P): 2Hrs
Examination Scheme			
Continuous Assessment	End Sem Examination		Total Marks
25 Marks	25 Marks		50 Marks

Course Objective
1. Explore various problem-solving techniques and search algorithms used in AI.
2. Familiarize students with knowledge representation methods and reasoning techniques
3. Develop an understanding of handling uncertainty and probability in AI systems and Introduce the concept of intelligent agents and their applications.

Course Outcomes
After successful completion of this course the students will be able to:
CO1 Apply problems using state space representation and implement appropriate search techniques to solve them.
CO2 Analyze various knowledge representation techniques such as predicate logic, semantic nets, and frames.
CO3 Implement and compare uninformed and informed search algorithms for problem-solving.

CO-PO Articulation Matrix:

CO	Program Outcomes & Program Specific Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	2	2	--	1	1	1	--	2	3	2
CO2	3	3	3	2	3	--	1		1	--	2	3	2
CO3	3	3	3	3	3	--	1	1	1	--	2	3	3

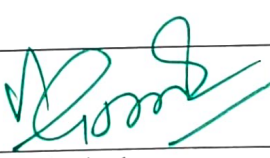
A minimum of Ten practical to be performed based on the theory course 6BIT03T-A.

List of Practicals

SN	Experiments based on
1	Installation of Python and AI Libraries.
2	Developing agent programs for real world problems
3	Implementation of constraint satisfaction problems
4	Implementation and Analysis of DFS and BFS for an application
5	Developing Best first search and A* Algorithm for real world problems
6	Implementation of minimax algorithm for an application
7	Implementation of unification and resolution for real world problems.
8	Implementation of knowledge representation schemes -use cases
9	Implementation of uncertain methods for an application
10	Implementation of block world problem
11	Implementation of learning algorithms for an application
12	Development of ensemble model for an application
13	Classification using Decision Tree, Naïve Bayes Algorithm on a sample dataset
14	Implementation of NLP programs
15	Applying deep learning methods to solve an application

Suggested References:

- 1.Introduction to Artificial Intelligence – Charniak (Pearson Education)
- 2.Artificial intelligence and soft computing for beginners by Anandita Das Bhattachargee, Shroff Publishers

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Semester VI	Subject Code: 6BIT03T-B	Name of Subject: Cloud Computing		
Total Hours Distribution per week				
Total Credit: 3	Lecture (L): 3 Hrs/week		Tutorial (T) : -	Practical (P): -
Examination Scheme				
Mid Sem Examination	Continuous Assessment	End Sem Examination	Total Marks	Examination Duration:
30 Marks	20 Marks	50 Marks	100 Marks	3 Hours

Course Objectives	
1	To study fundamental concepts of cloud computing
2	To understand the implementation of Virtualization in Cloud Computing
3	To learn the application and security on cloud computing
Course Outcomes	
After completion of syllabus, students will be able to	
CO1	Understand the different Cloud Computing environment
CO2	Analyze virtualization technology and install virtualization software
CO3	Use appropriate data storage technique on Cloud, based on Cloud application
CO4	Apply security in cloud applications
CO5	Use advance techniques in Cloud Computing

Course Competencies:

1. Identify key characteristics like scalability, fault tolerance, and transparency
2. Analyze deployment models: public, private, hybrid, community cloud
3. Understand virtualization concepts and hypervisors
4. Analyze data replication, consistency, and availability
5. Design, analyze, and manage scalable, secure, and efficient cluster and cloud computing systems for real-world applications

CO-PO Articulation Matrix:

CO	Program Outcomes & Program Specific Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	2	3	--	--	1	1	--	2	3	2
CO2	3	3	3	2	3	--	--	1	1	--	2	3	2
CO3	3	3	3	3	3	1	1	1	1	--	2	3	3
CO4	3	3	3	2	3	1	1	1	1	--	3	3	3
CO5	3	3	3	2	3	1	1	1	1	--	3	3	3

Syllabus

Details of Topic	Allotted Hours(L)	Mapped with CO
Unit I: Introduction		
Introduction: Importance of Cloud Computing, Characteristics, Pros and Cons of Cloud Computing, Migrating into the Cloud, Seven-step model of migration into a Cloud, Trends in Computing. Cloud Service Models: SaaS, PaaS, IaaS, Storage, Cloud Architecture: Cloud Computing Logical Architecture, Developing Holistic Cloud Computing Reference Model, Cloud System Architecture, Cloud Deployment Models	8	CO1

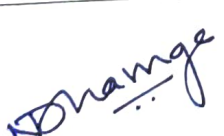
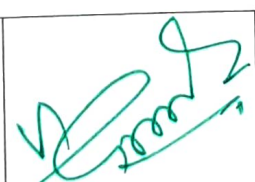
Unit II: Introduction to Virtualizations		
Introduction to Virtualizations: Definition of Virtualization, Types of Virtualizations, Virtualization Architecture and Software, Pitfalls of Virtualization, Virtualization and Cloud Security	7	CO2
Unit III: Cloud Storage and Management		
Cloud Storage: Data Management, Provisioning Cloud storage, Data Intensive Technologies for Cloud Computing, Cloud Characteristics. Distributed Data Storage	8	CO3
Unit IV: Risk Management and Cloud Security		
Risks in Cloud Computing: Risk Management, Types of Risks in Cloud Computing. Data Security in Cloud: Security Issues, Challenges, advantages, Disadvantages, Cloud Digital persona and Data security, Cloud Security Services: Confidentiality, Integrity and Availability, Security Authorization Challenges in the Cloud	7	CO4
Unit V: Future Trends in Cloud Computing		
Future Trends in Cloud Computing, Mobile Cloud, Automatic Cloud Computing: Cloud Computing, Distributed Cloud Computing Vs Edge Computing, Containers, Docker, and Kubernetes, Introduction to DevOps, IOT	8	CO5

Text Books:

1. A.Srinivasan, J. Suresh, "Cloud Computing: A Practical Approach for Learning and Implementation", Pearson, ISBN: 978-81-317-7651-3
2. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, "Mastering Cloud Computing", McGraw Hill Education, ISBN-13:978-1-25-902995-0
3. Thomas Erl, Ricardo Puttini, Zaigham Mahmood, "Cloud Computing: Concepts, Technology & Architecture", Pearson Education

Reference Books:

1. Anthony T. Velte Toby J. Velte, Robert Elsenpeter, "Cloud Computing: A Practical Approach" McGraw Hill Tim Mather, Subra K, Shahid L., "Cloud Security and Privacy", Oreilly, ISBN-13 978-81-8404-815-5
2. Dr. Kris Jamsa, "Cloud Computing: SaaS, Paas, IaaS Virtualization and more", Wiley Publications, ISBN: 978-0-470-97389-9
3. Arshdeep Bahga, Vijay Madisetti, "Cloud Computing: A Hands-On Approach", University Press

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Semester VI	Subject Code: 6BIT03P-B	Name of Subject: Cloud Computing Lab	
Total Hours Distribution per week			
Total Credit: 1	Lecture (L): -	Tutorial (T) : -	Practical (P): 2 Hrs/week
Examination Scheme			
Continuous Assessment		End Sem Examination	Total Marks
25 Marks		25 Marks	50 Marks

Course Objective	
1.	To understand fundamental concepts of cloud computing and virtualization.
2.	To develop practical skills in implementing cloud-based services and applications.
3.	To analyze cloud storage, security, and deployment techniques & apply modern cloud tools and technologies for real-world computing solutions

Course Outcomes	
After successful completion of this course the students will be able to:	
CO1	Understand and implement different cloud computing environments and service models.
CO2	Apply virtualization technologies and cloud deployment techniques.
CO3	Implement cloud storage and security mechanisms for cloud applications & Apply advanced cloud technologies such as containers, Docker, Kubernetes, and DevOps tools. Use Azure, AWS platforms

Course Competencies

1.Ability Identify key characteristics like scalability, fault tolerance, and transparency, virtualization concepts and hypervisors & to Analyze data replication, consistency, and availability
2. Ability to Analyze deployment models: public, private, hybrid, community cloud
3.Proficiency in Design, analyze, and manage scalable, secure, and efficient cluster and cloud computing systems for real-world applications

CO-PO Articulation Matrix:

CO	Program Outcomes & Program Specific Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	2	3	--	--	1	1	--	2	3	2
CO2	3	3	3	2	3	--	--	1	1	--	2	3	2
CO3	3	3	3	3	3	1	1	1	1	--	2	3	3

Minimum Eight Practical's to be performed Based on the Theory Course.

List of Practicals
1. Develop a hello world program web application and deploy it on the Google app engine.
2. Develop a web application which displays the current date and time in a formatted way.
3. Develop a web application which is customized version of the practical no 2, which relates the clock with Google accounts. Each user will get different view based on the preferences and the user's time zone.
4. Develop a web application for task management. Create a form to enter summary, URL and description of task and a button to insert a task in the task list. Use JPA (Java Persistence API) for the persistence and Sends the selected to do to yourself via email as a reminder
5. Develop a simple Java web application for Google App Engine--a guestbook that lets users post messages to a public message board.
6. Create a book class as entity and make the object persistence using JPA. Demonstrate the saving, fetching and deleting objects operations.
7. Create an employee class as entity and makes the objects persistence using JPA. Demonstrate transaction processing in the data store using JPA.
8. JPA includes a SQL-like query language called JPQL, perform the practical no 6 with JPQL also.
9. Perform the practical no 7 with JPQL[list the employees having salary between a particular range

Text Books:
1. John W.Rittinghous, James F.Ransome, —Cloud Computing: Implementation, Management and Securityl, CRC Press 2010.
2. Cloud Computing-A Practical Approach, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter. McGrawHill. 3. Michael Miller, —Cloud computing – Web based applications that change the way you work and collaborate onlinel, Pearson Education Inc., 2008
3. John W.Rittinghous, James F.Ransome, —Cloud Computing: Implementation, Management and Securityl, CRC Press 2010.

Reference Books:
1. Rishabh Sharma: Cloud Computing Fundamentals, Industry Approach and Trends: Wiley Publication.(ISBN: 978-81-265-5306-8)
2. Kailash Jayaswal, Jagannath Kallakurchi, Donald J Houde, Dr. Deven Shah : Cloud Computing :Black Book Dreamtech Publications(ISBN 978-93-5119-418-7)
3. Dan Sanderson: Programming Google App Engine: O'Reilly| Google Press: (ISBN-978-0-596-52272-8)
4. Cloud Computing: A practical approach by Anthony T. Vetle – Tata McGraw Hill Education Private Limited (2009)
5. Rajkumar Buyya, Christian Vechhiola, S.Thamarai Selvi, “Mastering Cloud Computing “, McGraw Hill Education (India) Private Limited.

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Semester VI	Subject Code: 6BIT04T-A	Name of Subject: Deep Learning		
Total Hours Distribution per week				
Total Credit: 3	Lecture (L): 3 Hrs/week		Tutorial (T) : -	Practical (P): -
Examination Scheme				
Mid Sem Examination	Continuous Assessment	End Sem Examination	Total Marks	Examination Duration:
30 Marks	20 Marks	50 Marks	100 Marks	3 Hours

Course Objectives	
1	Explain the basic concepts and techniques of Deep Learning and the need of Deep Learning techniques in real-world problems.
2	Demonstrate CNN algorithms and the way to evaluate performance of the CNN architectures.
3	Compare RNN and LSTM to learn, predict and classify the real-world problems in the paradigms of DeepLearning.
4	To analyze, learn, and design GANs for selected problems.
5	To analyze the concept of Auto-encoders and enhance GANs using Auto-encoders.
Course Outcomes	
After completion of syllabus, the student will be able to	
CO1	Apply fundamental concepts, architectures, and techniques of Deep Learning to address real-world problems.
CO2	Implement CNN algorithms and assess the performance of CNN architectures using suitable evaluation methods.
CO3	Differentiate RNN and LSTM architectures for modeling, prediction, and classification of sequential real-world data.
CO4	Develop and optimize GAN models for selected application areas.
CO5	Utilize Auto-encoders to improve GAN architectures for advanced problem-solving in Deep Learning.

Course Competencies:

1. **Apply foundational Deep Learning principles** to identify and solve real-world problems using appropriate architectures and techniques. charts, etc. to summarize, interpret, and effectively communicate data insights for data-driven decisions.
2. **Design, implement, and evaluate Convolutional Neural Network (CNN) models** for image-related tasks using suitable performance metrics.
3. **Analyze and differentiate sequential learning models** such as RNN and LSTM for prediction and classification of temporal or sequential data.
4. **Develop, train, and optimize Generative Adversarial Networks (GANs)** for selected domain-specific applications.
5. **Integrate Auto-encoders with GAN architectures** to enhance model performance for advanced Deep Learning solutions.

CO-PO Articulation Matrix

CO	Program Outcomes & Program Specific Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2		3	1	1	1	1	--	2	2	3
CO2	2	2	3	1	3	1	1	2	2	--	1	3	2
CO3	2	3	2	2	3	1	1	2	2	--	1	3	2
CO4	2	2	3	1	3	1	1	2	1	--	2	3	3
CO5	2	3	3	1	3	1	1	1	1		2	3	3

Syllabus

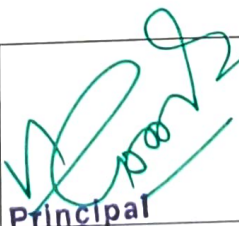
Details of Topic	Allotted Hours	Mapped with CO
Unit 1 : Introduction To Deep Learning Introduction to Deep Learning: Historical Trends in Deep Learning, Why DL is Growing, Artificial Neural Network, Non-linear classification example using Neural Networks: XOR/XNOR, Single/Multiple Layer Perceptron, Feed Forward Network, Deep Feed- forward networks, Stochastic Gradient –Based learning, Hidden Units, Architecture Design, Back- Propagation.	8	CO1
Unit 2: Convolution Neural Network (CNN): Introduction to CNNs and their applications in computer vision, CNN basic architecture, Activation functions-sigmoid, tanh, ReLU, Softmax layer, Types of pooling layers, Training of CNN in TensorFlow, various popular CNN architectures: VGG, Google Net, ResNet etc, Dropout, Normalization, Data augmentation	7	CO2
Unit 3: Recurrent Neural Network (RNN) Introduction to RNNs and their applications in sequential data analysis, Back propagation through time (BPTT), Vanishing Gradient Problem, gradient clipping Long Short Term Memory (LSTM) Networks, Gated Recurrent Units, Bidirectional LSTMs, Bidirectional RNNs.	7	CO3
Unit 4: Generative Adversarial Networks (GANs) Generative models, Concept and principles of GANs, Architecture of GANs (generator and discriminator networks), Comparison between discriminative and generative models, Generative Adversarial Networks (GANs), Applications of GANs.	7	CO4
Unit 5: Auto-Encoders Auto-encoders, Architecture and components of auto-encoders (encoder and decoder), Training an auto-encoder for data compression and reconstruction, Relationship between Auto encoders and GANs, Hybrid Models: Encoder-Decoder GANs.	7	CO5

Text Books

1. Deep Learning for Engineers, Tariq M. Arif , Md Adilur Rahim, Chapman and Hall/CRC, ISBN-10 - 1032504730
2. Deep Learning Core concepts, Methods, and Applications Gopal, ISBN-10- 356061971, edition 1st

References Books

1. Deep Learning with Python, Francois Chollet, Manning publications, 2018
2. Advanced Deep Learning with Keras, Rowel Atienza, PACKT Publications, 2018

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KDK College of Engineering, Nagpur
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Semester VI	Subject Code: 6BIT04T-B	Name of Subject: Block Chain Technology		
Total Hours Distribution per week				
Total Credit: 3	Lecture (L): 3 Hrs/week		Tutorial (T) : -	Practical (P): -
Examination Scheme				
Mid Sem Examination	Continuous Assessment	End Sem Examination	Total Marks	Examination Duration:
30 Marks	20 Marks	50 Marks	100 Marks	3 Hours

Course Objectives	
1	To understand the fundamental concepts and architecture of Blockchain .
2	To study the working principles of Bitcoin and other blockchain-based systems.
3	To explore consensus mechanisms, smart contracts, and decentralized applications.
4	To analyze real-world applications, challenges, and security issues in blockchain technology.
5	Introduce students with security, privacy, and scalability issues in blockchain systems

Course Outcomes	
After completion of syllabus, students would be able to	
CO1	Interpret the architecture and working principles of Blockchain systems.
CO2	Analyze cryptographic techniques used in blockchain networks.
CO3	Develop and analyze Smart Contract based applications.
CO4	Evaluate security, privacy, and scalability issues in blockchain systems.
CO5	Identify practical applications of blockchain in finance, supply chain, and other industries.

Course Competencies:

After successful completion of this course, students will gain competencies in:

1. fundamental concepts of cryptography, blockchain architecture, and distributed ledger technologies.
2. Analyze blockchain mechanisms including transactions, blocks, hashing, digital signatures, and consensus models.
3. Demonstrate knowledge of cryptocurrencies such as Bitcoin and Ethereum, including mining, wallets, and decentralized systems & Design and implement smart contracts using Solidity programming language and deploy decentralized applications (DApps).
4. Examine the architecture and working of Hyperledger Fabric and enterprise blockchain platforms.
& Apply blockchain technology concepts in real-world applications such as IoT, healthcare, digital currency, and secure data management systems.
5. Utilize modern blockchain tools and platforms like MetaMask, Ethereum Wallet, and Hyperledger Composer for blockchain development & Develop problem-solving and analytical skills for building secure, scalable, and decentralized blockchain-based solutions & Explore emerging trends, challenges, and future scope of blockchain technology across various domains.

CO-PO Articulation Matrix:

CO	Program Outcomes & Program Specific Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	1	2	-	-	-	1	-	2	2	3
CO2	3	3	2	2	3	-	-	-	1	-	2	3	3
CO3	3	3	3	2	3	-	1	-	1	-	2	3	3
CO4	3	3	2	2	3	1	1	-	1	-	2	3	3
CO5	3	3	3	2	3	1	1	1	2	1	3	3	3

SYLLABUS

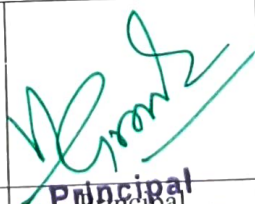
Details of Topic	Allotment of Hours	Mapped CO
UNIT 1: Introduction to Blockchain Introduction to distributed systems, Basics of Blockchain , History and evolution of blockchain, Structure of blocks and blockchain architecture, Public vs private blockchain networks.	6	CO1
UNIT 2: Cryptography and Blockchain Fundamentals Basics of cryptography, Hash functions and digital signatures, Public key cryptography, Merkle trees, Role of cryptography in blockchain security.	8	CO2
UNIT 3: Blockchain Platforms and Cryptocurrencies Working of Bitcoin, Blockchain transactions and wallets, Mining and incentives, Introduction to Ethereum, Comparison of blockchain platforms.	7	CO3
UNIT 4: Smart Contracts and Decentralized Applications Concept of Smart Contract , Smart contract lifecycle, Introduction to Solidity , Decentralized Applications (DApps), Use cases of smart contracts.	7	CO4
UNIT 5: Blockchain Applications and Challenges Blockchain in finance and banking, Supply chain management applications, Healthcare and identity management, Security and privacy issues, Scalability challenges and future trends.	8	CO5

Text Books:

1. Blockchain Basics: A Non-Technical Introduction in 25 Steps, Daniel Drescher, Apress, 1st Edition, 2017.
2. Mastering Blockchain, Imran Bashir, Packt Publishing, 3rd Edition, 2020.

Reference Books:

1. Blockchain Revolution, Don Tapscott and Alex Tapscott, Portfolio, 1st Edition, 2016
2. Bitcoin and Cryptocurrency Technologies, Arvind Narayanan, Princeton University Press, 1st Edition, 2016.
3. Hands-On Blockchain with Hyperledger, Nitin Gaur, Packt Publishing, 1st Edition, 2018.

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KDK College of Engineering, Nagpur
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Semester VI	Subject Code: 6BITMD04T	Name of Subject: Digital Image Processing		
Total Hours Distribution per week				
Total Credit: 3	Lecture (L): 3 Hrs/week		Tutorial (T) : -	Practical (P): -
Examination Scheme				
Mid Sem Examination	Continuous Assessment	End Sem Examination	Total Marks	Examination Duration:
30 Marks	20 Marks	50 Marks	100 Marks	3 Hours

Course Objectives	
1	To study the image fundamentals and mathematical transforms necessary for image processing
2	To study the image enhancement techniques
3	To study image restoration procedures
4	To study the image compression procedures
Course Outcomes	
After completion of syllabus, students will be able to	
CO1	Review the fundamental concepts of a digital image processing & Mathematical transforms.
CO2	Analyze images in the spatial & frequency domain for image enhancement using various transforms.
CO3	Evaluate the techniques for image restoration
CO4	Interpret image segmentation and representation techniques
CO5	Categorize various compression techniques.

Course Competencies:

1. Develop Fundamentals Understanding of Image Processing
2. Learn and Apply Image Enhancement techniques in Spatial & Frequency Domain
3. Able to use Image Restoration & Analysis
4. Categorize Image Compression models
5. Apply Segmentation techniques

CO-PO Articulation Matrix:

CO	Program Outcomes & Program Specific Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	1	2	1	1		1	--	2	2	2
CO2	3	2	1	1	2	2	1	1	1	--	2	2	2
CO3	3	2	1	1	2	2	1	1	1	--	2	2	2
CO4	3	2	1	1	2	2	1	1	1	--	2	2	2
CO5	3	2	1	1	2	2	1	1	1	--	2	2	2

Syllabus

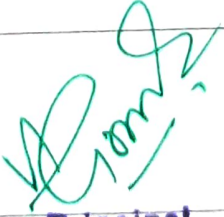
Details of Topic	Allotted Hours(L)	Mapped CO
UNIT 1: Digital image fundamentals & Image Transforms		
Digital Image fundamentals, Sampling and quantization, Relationship between pixels. Image Transforms: 2-D FFT, Properties. Walsh transforms, Hadamard Transform, Discrete cosine Transform, Discrete Wavelet Transform.	8	CO1
UNIT 2: Image enhancement		
Image enhancement (spatial domain) :Introduction, Image Enhancement in Spatial Domain, Enhancement Through Point Operation, Types of Point Operation, Histogram Manipulation, gray level Transformation, local or neighborhood operation, median filter, spatial domain high- pass filtering. Image enhancement (Frequency domain): Filtering in Frequency Domain, Obtaining Frequency Domain Filters from Spatial Filters, Generating Filters Directly in the Frequency Domain, Low Pass (smoothing) and High Pass (sharpening) filters in Frequency Domain	8	CO2
UNIT 3: Image Restoration:		
Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration.	7	CO3
UNIT 4: Image segmentation and Morphological Image Processing		
Image segmentation: Detection of discontinuities. Edge linking and boundary detection, Thresholding, Region oriented segmentation. Morphological Image Processing: Dilation and Erosion, Dilation, Structuring Element Decomposition, Erosion, Combining Dilation and Erosion, Opening and Closing, the Hit or Miss Transformation.	8	CO4
UNIT 5: Image Compression		
Image Compression: Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Huffman and Arithmetic Coding, Error Free Compression, Lossy Compression, Lossy and Lossless Predictive Coding, Transform Based Compression, JPEG 2000 Standards.	7	CO5

Text Books:

1. Digital Image Processing- Rafeal C. Gonzalez, Richard E. Woods, 3rd Edition, Pearson, 2008
2. Digital Image Processing- S Jayaraman, S. Essakkirajan, T. Veerakumar-TMH,2010

Reference Books:

1. Fundamentals of Digital Image Processing-A.K. Jain, PHI, 1989 Digital Image Processing and computer Vision-Somka, Halavac, Boyle - Cengage learning (Indian edition) 2008,
2. Digital Image Processing using Matlab, Rafeal C. Gonzalez, Richard E. Woods, Steven L. Eddins, Pearson Education.
3. Introduction to Image Processing & Analysis-John C. Russ, J. Christian Russ, CRC Press, 2010
4. Digital Image Processing with MATLAB & Labview - Vipula Singh Elsevier

			June 2026	1.00	Applicable for AY 2026-27 onwards
Chairman, BoS	Dean (Acad.)	Principal K. D. K. College of Engg NAGPUR	Date of release	Version	



KDK College of Engineering, Nagpur
Faculty of Science and Technology
B.Tech. Information Technology

Semester: VI	Subject Code: 6BIT04P	Name of Subject: Professional Skill-II Lab	
Total Hours Distribution per week			
Total Credit: 2	Lecture (L): -	Tutorial (T): -	Practical (P): 4 Hrs/Week
Examination Scheme			
Continuous Assessment	End Sem Examination		Total Marks
50 Marks	50 Marks		100 Marks

Course Objectives	
1	To understand the practical skills required to design, build, and deploy full-stack web applications using the MERN stack.
2	To understand the practical skills required to deploy, manage, and scale cloud-native applications using Kubernetes and modern container orchestration technologies.
3	To understand and gain knowledge, practical skills required to automate network operations and build network applications using Python.
Course Outcomes	
After completion of syllabus, students would be able to	
CO1	Develop and integrate RESTful APIs with front-end applications and perform database operations in a MERN-based application.
CO2	Apply Kubernetes concepts to configure, deploy, and monitor scalable cloud-native applications.
CO3	Develop Mini Project based on Python programs for network automation, socket programming, and network application development.

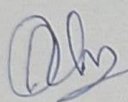
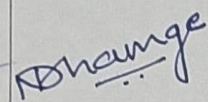
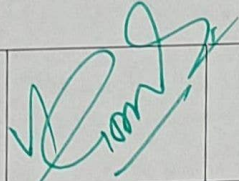
Course Competencies	
1	Develop and integrate full-stack web applications using the MERN stack with efficient database management.
2	Develop, deploy, manage, and monitor cloud-native applications using Kubernetes and container orchestration tools.
3	Develop mini project Python-based solutions for network programming, automation, and network application management.

Program Outcome & Program Specific Outcome													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	3	3	3	2	3	1	1	3	3	3
CO2	3	3	3	3	3	3	2	3	1	1	3	3	3
CO3	3	3	3	3	3	3	2	3	1	1	3	3	3

A minimum of 10 practical should be performed from following list

List of experiments - Name of Topic	
1	MongoDB fundamentals & Schema Design.
2	Express.js for backend development
3	Node.js runtime & server-side logic

4	RESTful API development using Node & Express
5	CRUD operations with MongoDB
6	Kubernetes architecture , pods, deployment & services
7	ConfigMaps & secrets
8	Scaling & auto-healing, Rollbacks & Versioning
9	Network & Decurity(RBAC)
10	Cloud Integration
11	TCP/IP & OSI basics
12	Socket Programming, TCP vs. UDP implementation
13	HTTP/HTTPS & API handling(requests)
14	Network automation(SSH-Paramiko)
15	Basic cyber security concepts
16	Develop a Mini Project based on recent technologies.

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