JAIDEV EDUCATION SOCIETY'S
J D COLLEGE OF ENGINEERING AND MANAGEMENT
KATOL ROAD, NAGPUR
Website: **www.jdcoem.ac.in**   E-mail: **info@jdcoem.ac.in**
(An Autonomous Institute, with NAAC "A" Grade)
Affiliated to DBATU, RTMNU & MSBTE Mumbai
Department of Computer Science & Engineering
"A Place to Learn, A Chance to Grow"
Session: 2024-25

B. Tech.

In

Computer Science and Engineering

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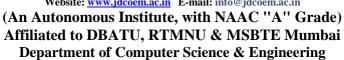**KATOL ROAD, NAGPUR**
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3rd Semester Computer Science & Engineering

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				
				L	T/A	P	CA	MSE	ESE	Total	Credit
1	PCC	CS3T001	Computer Networks	3	0	0	20	20	60	100	3
2	PCC	CS3T002	Operating Systems	3	0	0	20	20	60	100	3
3	PCC	CS3T003	Computer Architecture & Organization	3	0	0	20	20	60	100	3
4	Audit Subject	CS3T004	Organizational Behaviour	2	0	0	10	15	25	50	Audit
5	MDM	CS3M001	Linear Algebra & Transform	2	0	0	20	20	60	100	2
6	OEC	CS3O001	Open Elective -I	3	0	0	20	20	60	100	3
7	EEMC	CS3H001	Entrepreneurship Development	2	0	0	20	20	60	100	2
8	VEC	CS3V001	UHV-II	2	0	0	20	20	60	100	2
9	PCC	CS3L005	Object Techniques & UML Lab	0	0	2	60	-	40	100	1
10	PCC	CS3L006	Python Programming Lab	0	0	2	60	-	40	100	1
11	PCC	CS3L007	Web Technology Lab	0	0	2	60	-	40	100	1
12	CEP/FP	CS3F001	Community Engagement Project	0	0	4	30	-	20	50	2
				20	0	10	360	155	585	1100	23

4th Semester Computer Science & Engineering

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				
				L	T	P	CA	MSE	ESE	Total	Credit
1	PCC	CS4T001	JAVA Programming	2	0	0	20	20	60	100	2
2	PCC	CS4T002	Formal Languages &Automata	3	0	0	20	20	60	100	3
3	PCC	CS4T003	Design & Analysis of Algorithms	3	0	0	20	20	60	100	3
4	MDM	CS4M002	Discrete Mathematics & Statistical Analysis	2	0	0	20	20	60	100	2
5	OEC	CS4O002	Open Elective-II	3	0	0	20	20	60	100	3
6	AEC	CS4A002	Principles of Corporate Success	2	0	0	20	20	60	100	2
7	EEMC	CS4H002	Engineering Economics	2	0	0	20	20	60	100	2
8	VEC	CS4V002	Intellectual Property Rights	2	0	0	20	20	60	100	2
9	PCC	CS4L004	JAVA Programming Lab	0	0	2	60	-	40	100	1
10	PCC	CS4L005	Design & Analysis of Algorithms Lab	0	0	2	60	-	40	100	1
11	PCC	CS4L006	R Programming Lab	0	0	2	60	-	40	100	1
12	VSEC	CS4L007	Graphics Programming & Animations	0	0	4	60	-	40	100	2
				19	0	10	400	160	640	1200	24

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3rd Semester Computer Science & Engineering

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T/A	P	CA	MSE	ESE	Total	
1	PCC	CS3T001	Computer Networks	3	0	0	20	20	60	100	3
2	PCC	CS3T002	Operating Systems	3	0	0	20	20	60	100	3
3	PCC	CS3T003	Computer Architecture & Organization	3	0	0	20	20	60	100	3
4	Audit Subject	CS3T004	Organizational Behaviour	2	0	0	10	15	25	50	Audit
5	MDM	CS3M001	Linear Algebra & Transform	2	0	0	20	20	60	100	2
6	OEC	CS3O001	Open Elective -I	3	0	0	20	20	60	100	3
7	EEMC	CS3H001	Entrepreneurship Development	2	0	0	20	20	60	100	2
8	VEC	CS3V001	UHV-II	2	0	0	20	20	60	100	2
9	PCC	CS3L005	Object Techniques & UML Lab	0	0	2	60	-	40	100	1
10	PCC	CS3L006	Python Programming Lab	0	0	2	60	-	40	100	1
11	PCC	CS3L007	Web Technology Lab	0	0	2	60	-	40	100	1
12	CEP/FP	CS3F001	Community Engagement Project	0	0	4	30	-	20	50	2
				20	0	10	360	155	585	1100	23

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
III	**CS3T001**	**Computer Network**	3	0	0	3

Prerequisites for the course	
1.	Basics of Computer Devices & Connecting Devices.
2.	Fundamentals of Protocols, Data & Signals.

Prior Reading Material/useful links	
1.	https://onlinecourses.nptel.ac.in/noc23_cs35/preview
2.	https://www.capectc.org/o/ctc/page/computer-networking-security

Course Outcomes:

Sr. No	Course Outcome Number	CO statement
1	CO1	Student will be able to describe the basics of network and its hardware components
2	CO2	Students will be able to explain the different network models.
3	CO3	Students will be able to interpret the various functions and protocols of network models.
4	CO4	Students will be able to assess different transmission media with its connectors.
5	CO5	Students will be able to summarize the concepts of network security and privacy.

Syllabus:

Course Contents		Hours
Unit I	**Introduction to Data Communication and Computer Networks:** Definition, Characteristics, Components, Data Representation, Need of Computer Networks, Advantages and Disadvantages, Goals and Application of Computer Network, Network Hardware Components, Physical Topology, Types of Network, LAN, MAN, WAN.IP Address	06
Unit II	**Physical Layer:** Types of signals, Transmission Mode, Transmission Impairment, Data Rate Limits, Nyquist Bit Rate, Transmission Media, Switching Techniques. **Data Link Layer:** Framing Methods, Error Detection and Correction Methods, MAC layer multiple access protocols	09

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	(CSMA,CSMA/CD,CSMA/CA), Channelization(FDMA, TDMA, CDMA), Introduction to Virtual LAN.	
Unit III	**Network Layer:** Design Issues, Store and Forward Packet, Switching Connection Less and Connection Oriented Services, Routing Algorithms, Shortest Path, Flooding, Distance Vector Routing, Hierarchical Routing, Congestion Control Algorithms. OSI Reference Model & Architecture, TCP/IP Reference Model.	08
Unit IV	**Transport Layer:** Elements of Transport Protocols, Connection Establishment and Termination, TCP Header Format, UDP Header Format, Sliding Window, Timers, Retransmission. **Session and Presentation Layer:** Session Layer Design Issues, Responsibilities of Presentation Layer.	07
Unit V	**Application Layer and Network Security:** Responsibilities of Application Layer, Application Layer Services (DNS, E-mail, MIME, SMTP, FTP, TFTP),Architecture of WWW and HTTP, Introduction to Cryptography, Security Services, Introduction to Symmetric and Asymmetric Key Cryptography, Digital Signature.	06

Text Books	
1.	Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013.
2.	Computer Networks - Andrew S Tanenbaum, 4th Edition, Pearson Education.
3.	Kurose and Ross, "Computer Networking - A top-down approach", Seventh Edition, Pearson, 2017.
4.	Peterson and Davie, "Computer Networks, A Systems Approach", 5th ed., Elsevier,

Reference Books	
1.	An Engineering Approach to Computer Networks - S. Keshav, 2nd Edition, Pearson Education.
2.	Understanding communications and Networks, 3rd Edition, W. A. Shay, Cengage Learning**.**

Useful Links	
1.	https://onlinecourses.nptel.ac.in/noc21_cs18/preview
2.	https://onlinecourses.nptel.ac.in/noc19_cs75/preview

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
III	CS3T002	Operating System	3	0	0	3

Prerequisites for the course	
1.	Basics Knowledge of Operating System.
2.	Fundamental services provided by and the design of an operating system.
3.	Introduction of different approaches to memory management

Prior Reading Material/useful links	
1.	https://www.tutorialspoint.com/operating_system/os_overview.htm
2.	https://www.tutorialspoint.com/computer_fundamentals/computer_operating_system.htm
3.	https://www.mygreatlearning.com/blog/what-is-operating-system/

Course Outcomes:

Sr. No	Course Outcome Number	CO statement
1	CO1	Students will be able to Understand the basics of how operating systems work.
2	CO2	Students will be able to Explain how processes and CPU scheduling function in an operating system.
3	CO3	Students will be able to Solve common process synchronization problems.
4	CO4	Students will be able to Describe memory management concepts, including virtual memory.
5	CO5	Students will be able to Comprehend disk management and the role of file systems in an operating system.

Syllabus:

Course Contents	Hours
Unit I **Introduction:** Concept of Operating System, User View, System View, Computer System Organization, Bootstrap Program, Storage Structure, Types of Operating Systems. **Operating System Structure:** Monolithic, Layered, Micro Kernel, Operating System Services, User and Operating System Interfaces: Command Interpreters, Graphical User Interface. System Calls, Types of	7

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	System Call, System Programs.	
Unit II	**Process Concept:** Process Definition, Process in Memory, Process State, Process Control Block(PCB), Operation on Process, Context Switching. **Threads:** Definition, Benefits of Threads, Types of Threads, Different State of Thread. **Process Scheduling:** Scheduling Objective, CPU – I/O Burst Cycle, CPU Scheduler: Types of Scheduler, Scheduling Criteria. **Scheduling Algorithms:** Pre-Emptive and Non Pre-emptive, FCFS, SRTF, Priority, RR.	8
Unit III	**Synchronization:** Critical Section Problem, Race Condition, Peterson Solution, Semaphores. Classic Problem IPC problem: Producer Consumer Problem, Reader Writer Problem. The Dinning-Philosophers Problem. **Deadlocks:** System Model, Deadlock Characterization, Methods of Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock Detection and Recovery	7
Unit IV	**Memory Management:** Basic Concepts, Logical and Physical Address Mapping, Swapping **Memory Allocation**: Contiguous Memory Allocation, Fixed Partition and Variable Partition, **Fragmentation:** Internal and External Fragmentation **Paging:** Basic method , Paging Model for Logical and Physical Memory , Paging Hardware with TLB, Advantage and Disadvantage of Paging.	7
Unit V	**Virtual Memory Management:** Basic of Virtual Memory, Demand Paging, Page Replacement Algorithm: FIFO, LRU, Optimal **Disk Management:** Disk Structure, Disk Scheduling– FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK **File System:** File concepts, File Attributes, File Operations, File Types. File Access Method : Sequential Access ,Direct Access	7

Text Books	
1.	Abraham Silberschatz, Peter B. Galvin and Greg Gagne, Operating System Concepts, Wiley Publication, 8th Edition, 2008.
2.	Andrew S. Tanenbaum, Modern Operating System, PHI Publication, 4thEdition, 2015
3.	Richard Stevens, Stephen Rago, Advanced Programming in the UNIX Environment, Pearson Education,
4.	D. M. Dhamdhere, Systems Programming and Operating Systems, McGraw-Hill, 2ndEdition, 1996.

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	Reference Books
1.	Garry Nutt, Operating Systems Concepts, Pearson Publication, 3rd Edition, 2003.
2.	Harvey M. Deitel, An Introduction to Operating Systems, Addison-Wesley Publication, 2nd Edition, 1990.
3.	Thomas W. Doeppner, Operating System in Depth: Design and Programming, Wiley
4.	M. J. Bach. Design of the Unix Operating System, Prentice Hall of India, 1986.Publication, 2011.

	Useful Links
1.	https://www.google.co.in/books/edition/Introduction_to_Operating_System_Design/KisFwig6YnAC?hl=en&gbpv=1&dq=Operating+System&printsec=frontcover
2.	https://www.google.co.in/books/edition/Operating_System_Concepts/hIdQAAAAMAAJ?hl=en&gbpv=1&bsq=Operating+System&dq=Operating+System&printsec=frontcover
3.	https://www.google.co.in/books/edition/Operating_System/Ad9qKEaVzQIC?hl=en&gbpv=1&dq=Operating+System&printsec=frontcover
4.	https://www.google.co.in/books/edition/Operating_Systems/gSy8qdmf3qEC?hl=en&gbpv=1&dq=Operating+System&printsec=frontcover

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
III	**CS3T003**	**Computer Architecture & Organization**	3	0	0	**3**

Prerequisites for the course	
1.	Basics of Digital Electronics and Microprocessor.
2.	Fundamentals of Number Systems.

Prior Reading Material/useful links	
1.	https://www.youtube.com/watch?v=Ol8D69VKX2k
2.	https://www.youtube.com/watch?v=4TzMyXmzL8M
3.	https://www.youtube.com/watch?v=leWKvuZVUE8

Course Outcomes:

Sr. No	Course Outcome Number	CO statement
1	CO1	Students will be able to Summarize the organization and operation of digital computers.
2	CO2	Students will be able to Study and apply knowledge of processor instruction sets and its execution.
3	CO3	Students will be able to Demonstrate computer arithmetic operations on integer and floating-point numbers..
4	CO4	Students will be able to Describe the organization of memory system.
5	CO5	Students will be able to Explain concepts of I/O organization and pipelining of a processor.

Syllabus:

Course Contents		Hours
Unit I	**Basic Structure of Computer:** Functional Units, Architecture of a small accumulator based CPU, A typical CPU with general register organization, Instruction execution cycle, Addressing modes, Instruction Format. **Processing Unit:** Execution of a complete instruction, Sequencing of	08

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	control Signals, types of Buses, Single, Two, multiple bus structure.	
Unit II	**Computer Arithmetic:** Binary Addition, Addition and subtraction, Multiplication of unsigned binary integers, Booth's algorithm for Two's complement multiplication unsigned, Unsigned binary division, IEEE Floating-Point representation, Floating Point arithmetic.	07
Unit III	**Control Unit:** Control Unit operation: Introduction, Micro-operations, Control of the Processor, Hardwired implementation. **Micro Programmed Control:** Microinstruction formats, Micro programmed control unit, Functioning of micro programmed control unit, Microinstruction sequencing techniques.	07
Unit IV	**The Memory System:** Internal organization of memory chip, Static memories, Dynamic RAMs, Read-Only Memories, Memory interleaving, Cache Memory, Mapping techniques, Virtual memory, Memory Management requirements, I/O modules, Programmed I/O, Interrupt Driven I/O, DMA.	07
Unit V	**Pipelining and parallel Processing:** Pipelining: Introduction, Pipeline organization, Pipelining issues, Memory delays, Branch delays, Parallel Processing, Types of parallel processor systems, Vector processing **Processors:** RISC & CISC Processors, Pentium processor, superscalar processor.	07

Text Books	
1.	V. Carl Hamacher& S. Zaky: Computer Organization, Fourth Edition, McGraw-Hill (ISE).
2.	Computer Organization and Design David A.Patterson & John L. Hennessy Morg, Fourth Edition, McGraw-Hill (ISE).

Reference Books	
1.	Stallings. W: Computer Organization &Arcitecture, Fifth Edition, Pearson Education.
2.	Tananbaum A. S: Structured Computer Organization, Fifth Edition, Pearson Education

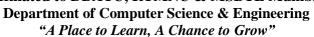| Useful Links	
1.	https://onlinecourses.nptel.ac.in/noc22_cs88/preview
2.	https://nptel.ac.in/courses/106106166

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Semester	Course Code	Name of the course	L	T	P	Credits
III	CS3T004	Organizational Behaviour	2	0	0	Audit

Prerequisites for the course	
1.	Basic of Universal Human Rights in Organization
2.	Communication Skill in Organization

Prior Reading Material/useful links	
1.	https://www.iedunote.com/organizational-behavior
2.	https://thebusinessprofessor.com/en_US/management-leadership-organizational-behavior/organizational-behavior-definition
3.	https://www.javatpoint.com/organizational-behaviour

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Students will be able to remember various methods and terms used in different organizational behaviour models.
2	CO2	Students will be able to understand Individual as well as Group Behaviour like attitude, perception, motivation, personality, misbehaviour and emotions.
3	CO3	Students will be able to apply the Principles of Organization Behaviour through leadership, Power & Politics.
4	CO4	Students will be able to analyse the dynamics of organizational behaviour and managing change.
5	CO5	Students will be able to evaluate the importance of Advanced Communication tools and Techniques for the decision making Process.

Syllabus:

Course Contents		Hours
Unit I	**Introduction to organization Behaviour:** Meaning, Fundamental concepts, Definition, Approaches to OB, Characteristics and limitations of OB, Models of OB, Impact of technology on organizational behaviour. **Organization Culture:** Meaning and dimensions, Types of organizational cultures.	4
Unit II	**Organizational Design, Change and Innovation:** Designing an	5

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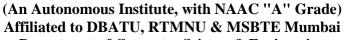|		
	organizational structure, Division of labour, Delegation of authority, Span of control, Dimensions of structure, Organizational design models, Virtual Organizations. **Communication**: The importance of communication, Communication process, Interpersonal communication, Multicultural communication, Barriers to effective communication, **Technical Report Writing :** Characteristics of Technical Communication, Types of Technical Documents, Technical Writing Process.	
Unit III	**Personality:** Meaning of personality, Nature and Determinants of Personality, Personality Traits - Big Five, Locus of Control, Self-esteem, Type A/ Type B Personality, Risk Taking, Machiavellianism. **Attitude:** Attributes of personality, Transactional Analysis, Nature and dimensions of attitude, Developing the right attitude, ABC model of Attitude.	5
Unit IV	**Groups and Organizations:** Groups and Teams, Group Dynamics - Groups versus teams, Nature and types of groups, five stages of group/team development **Leadership:** Leadership as a concept and its essence, Leaders versus managers, Blake and Mouton's managerial grid, Hersey and Blanchard's situational leadership, Transactional versus Transformational leadership,	5
Unit V	**Motivation:** Purpose of motivation, Theories of motivation, Locke's goal setting theory, Vroom's expectancy theory, Porter and Lawler's model, Motivational Techniques **Power and Politics**: The concept of power, Sources of power, Interdepartmental power, Political strategies and tactics, Ethics, power and politics, **Empowerment and Participation**: The nature of empowerment and participation, How participation works, Programs for participation, Important considerations in participation.	5

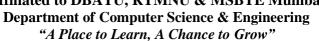| Text Books	
1.	Franklin Kuo, "Network Analysis & Synthesis", Wiley International.
2.	Govind Daryanani, "Analysis and Synthesis of Filters".
3.	Stephen P. Robbins, Timothy A. Judge, "Organisational Behaviour" Pearson Australia, 2019
4.	S. S. Khanka, "Organisational Behaviour" S. Chand Limited

Reference Books	
1.	Kendall Su, "Analog Filters", Kluwer Academic Publisher, 2nd Edition, 2002.

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Session: 2024-25

VISION	MISSION
To be recognized for excellent engineering, developing global leaders both in educational and research in the domain of computer science and wireless engineering.	1. To create self-learning environment by facilitating leadership qualities, team spirit and ethical responsibilities. 2. To improve department-industry collaboration, interaction with professional society through technical knowledge and internship program. 3. To promote research and development with current techniques through well qualified resources in the area of computer science and wireless engineering.

2.	John O' Malley, "Basic Circuit Analysis", Schaum's series.
3.	Van Valkenberg, "Network Analysis", Pearson Education
4.	Organisation Behaviour by Dr. F. C. Sharma, SBPD Publications

	Useful Links
1.	https://www.google.co.in/books/edition/Organizational_Behaviour/6Rj9DwAAQBAJ?hl=en&gbpv=1&dq=organizational+behaviour+book&printsec=frontcover
2.	https://www.youtube.com/watch?v=SheMhZeajyk
3.	https://www.youtube.com/watch?v=aA_ygVI0gB8

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
III	CS3M001	Linear Algebra & Transform	2	0	0	2

Prerequisites for the course	
1.	Basics concept of Laplace Transform such as Inverse Transform, Fourier transform etc
2.	Fundamental Knowledge about complex variables Numerical Linear algebra .

Prior Reading Material/useful links	
1.	https://www.geeksforgeeks.org/matrices/
2.	https://people.umass.edu/~prokofev/P605/complex_functions.pdf

Course Outcomes:

Sr. No	Course Outcome Number	CO statement
1	CO1	Students will be able Describe the concept of Laplace Transform, Inverse Laplace Transform, Fourier transform, complex variables, Numerical Linear Algebra.
2	CO2	Students will be able to Apply the concept of Laplace Transform, Inverse Laplace Transform, Fourier transform, complex variables, Numerical Linear Algebra.
3	CO3	Students will be able to Analyse the problem by using the concept of Laplace Transform, Inverse Laplace Transform, Fourier transform, complex variables, Numerical Linear Algebra.
4	CO4	Students will be able to Evaluate the problem base on the concept of Laplace Transform, Inverse Laplace Transform, Fourier transform, complex variables, Numerical Linear Algebra.
5	CO5	Students will be able to Create the new concept by using the theory of Laplace Transform, Inverse Laplace Transform, Fourier transform, complex variables, Numerical Linear Algebra.

Syllabus:

Course Contents		Hours
Unit I	**Matrix:** Characteristics equation, Eigen values and Eigen vectors, Statement and Verification of Cayley Hamilton Theorem [without proof], Reduction to Diagonal form, Sylvester's theorem [without proof].	04

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Unit II	**Functions of complex variables:** Analytic functions; Harmonic functions in Cartesian form; fundamental theorem of algebra; Cauchy's integral theorem; Cauchy's integral formula; Residues; Cauchy's residue theorem.	05
Unit III	**Fourier transform:** Definitions, Fourier transforms; Properties of Fourier transforms; Fourier sine and cosine transforms; Properties of Fourier transforms; Parseval's identity for Fourier Transforms; Finite Fourier transform.	05
Unit IV	**Laplace Transform:** Definition, conditions for existence; Properties of Laplace transforms; Transforms of some special functions- periodic function, Heaviside-unit step function.	04
Unit V	**Inverse Laplace Transform:** Introductory remarks, Inverse transforms of some elementary functions; Partial fraction method and Convolution Theorem for finding inverse Laplace transforms ; Applications to find the solutions of differential equations	06

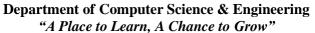| Text Books	
1.	Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, New Delhi.
2.	Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, New York.
3.	A Course in Engineering Mathematics (Vol III) by Dr. B. B. Singh, Synergy Knowledgeware, Mumbai.
4.	A Text Book of Applied Mathematics (Vol I & II) by P. N. Wartikar and J. N. Wartikar, Pune Vidyarthi Griha Prakashan, Pune.
Reference Books	
1.	Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publications, NewDelhi.
2.	A Text Book of Engineering Mathematics by Peter O' Neil, Thomson Asia Pte Ltd.,Singapore.
3.	Advanced Engineering Mathematics by C. R. Wylie & L. C. Barrett, Tata Mcgraw-Hill Publishing Company Ltd., New Delhi.

Useful Links	
1.	https://byjus.com/jee/matrices/
2.	https://betterexplained.com/articles/an-interactive-guide-to-the-fourier-transform/

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
III	CS3O001	Open Elective-I (Ethical Hacking)	3	0	0	3

Prerequisites for the course	
1.	Basics of Universal Human Value and entrepreneurial behaviour.
2.	Knowledge of the social, ethical and culture and Consumer Affairs

	Prior Reading Material/useful links
1	https://www.google.co.in/books/edition/Entrepreneurship_and_Economic_Developmen/deeFDAAAQBAJ?hl=en&gbpv=1&dq=Innovation+and+Entrepreneurship+Development&printsec=frontcover
2	https://www.google.co.in/books/edition/The_Role_of_Innovation_and_Entrepreneurs/klZYEAAAQBAJ?hl=en&gbpv=1&dq=Innovation+and+Entrepreneurship+Development&printsec=frontcover
3	https://www.google.co.in/books/edition/Innovation_and_Entrepreneurship/OiuDBAAAQBAJ?hl=en&gbpv=1&dq=Innovation+and+Entrepreneurship+Development&printsec=frontcover

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Students will be able to Identify the changing roles, traits of entrepreneurs for the growth of entrepreneurship.
2	CO2	Students will be able to Assess internal and external factors affecting entrepreneurship and apply theories to overcome them.
3	CO3	Students will be able to Analysis of market and Developing business plan process.
4	CO4	Students will be able to develop reports and analyse various funding offered by different financial institutes.
5	CO5	Students will be able to Develop the role and schemes of government to support entrepreneurship

Syllabus:

	Course Contents	Hours
Unit I	**Ethical Hacking Overview & Vulnerabilities:** Understanding the importance of security, Concept of ethical hacking and essential Terminologies Threat, Attack, Vulnerabilities, Target of Evaluation,	08

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	Exploit. Phases involved in hacking.	
Unit II	**Footprinting & Port Scanning:** Foot printing - Introduction to foot printing, Understanding the information gathering methodology of the hackers, Tools used for the reconnaissance phase. Port Scanning - Introduction, using port scanning tools, ping sweeps, Scripting Enumeration-Introduction, Enumerating windows OS & Linux OS	07
Unit III	**System Hacking**: Aspect of remote password guessing, Role of eavesdropping ,Various methods of password cracking, Keystroke Loggers, Understanding Sniffers ,Comprehending Active and Passive Sniffing, ARP Spoofing and Redirection, DNS and IP Sniffing, HTTPS Sniffing.	07
Unit IV	**Hacking Web Services & Session Hijacking:** Web application vulnerabilities, application coding errors, SQL injection into Back-end Databases, cross-site scripting, cross-site request forging, authentication bypass, web services and related flaws, protective http headers Understanding Session Hijacking, Phases involved in Session Hijacking, Types of Session Hijacking, Session Hijacking Tools	07
Unit V	**Hacking Wireless Networks:** Introduction to 802.11,Role of WEP, Cracking WEP Keys, Sniffing Traffic, Wireless DOS attacks, WLAN Scanners, WLAN Sniffers, Hacking Tools, Securing Wireless Networks.	07

Text Books	
1.	Kimberly Graves, "Certified Ethical Hacker", Wiley India Pvt Ltd, 2010
2.	Michael T. Simpson, "Hands-on Ethical Hacking & Network Defense", Course Technology, 2010
3.	Rajat Khare, "Network Seuciryt and Ethical Hacking", Luniver Press, 2006
Reference Books	
1.	Ramachandran V, BackTrack 5 Wireless Penetration Testing Beginner's Guide (3rd ed.). Packt Publishing, 2011
2.	Thomas Mathew, "Ethical Hacking", OSB publishers, 2003
3.	Zimmerer W. Thomas, Norman M. Scarborough, Essentials of Entrepreneurship and Small Business Management, PHI,4 ed.

Useful Links	
1	https://www.google.co.in/books/edition/Creativity_and_Innovation_in_Entrepreneu/f1c7EAAAQBAJ?hl=en&gbpv=1&dq=Innovation+and+Entrepreneurship+Development&printsec=frontcover
2	https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwj14Jaw9L_AhWgU2wGHaLcCNUQFnoECCYQAQ&url=https%3A%2F%2Fwww.dpgpolytechnic.com%2Fdownloads%2Ffiles%2Fn5c419bcb66c09.pdf&usg=AOvVaw3cbsLd-So8C6Pgj0LW3S35

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
III	CS3H001	Entrepreneurship Development	2	0	0	2

Prerequisites for the course	
1.	Basics of Universal Human Value and entrepreneurial behaviour.
2.	Knowledge of the social, ethical and culture and Consumer Affairs

Prior Reading Material/useful links	
1	https://www.google.co.in/books/edition/Entrepreneurship_and_Economic_Developmen/deeFDAAAQBAJ?hl=en&gbpv=1&dq=Innovation+and+Entrepreneurship+Development&printsec=frontcover
2	https://www.google.co.in/books/edition/Innovation_and_Entrepreneurship/OiuDBAAAQBAJ?hl=en&gbpv=1&dq=Innovation+and+Entrepreneurship+Development&printsec=frontcover

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Students will be able to Identify the changing roles, traits of entrepreneurs for the growth of entrepreneurship.
2	CO2	Students will be able to Assess internal and external factors affecting entrepreneurship and apply theories to overcome them.
3	CO3	Students will be able to Analysis of market and Developing business plan process.
4	CO4	Students will be able to develop reports and analyse various funding offered by different financial institutes.
5	CO5	Students will be able to Develop the role and schemes of government to support entrepreneurship

Syllabus:

Course Contents		Hours
Unit I	**Foundation of Entrepreneurship Development:** Concept and need of entrepreneurship; Characteristics and Types of Entrepreneurship; Entrepreneurship as a career; Entrepreneurship as a style of Management; The changing role of the entrepreneur; Entrepreneurial traits, factors affecting entrepreneurs.	05
Unit II	**Theories of Entrepreneurship:** Influences on entrepreneurship	04

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	development; External influences on entrepreneurship development; Socio-cultural, Political, economical, personal entrepreneurial success and failure: reasons and remedies; Women entrepreneurs: Challenges and achievements of women entrepreneurs.	
Unit III	**Business Planning Process:** The business plan as an entrepreneurial tool; Elements of business planning; Objectives; Market analysis; development of Product/idea; Marketing, Finance, Organization and management; Ownership; Critical risk contingencies of The proposal; Scheduling and milestones.	05
Unit IV	**Project Planning for Entrepreneurs:** Technical, Financial, Marketing, Personnel, and management feasibility reports; Financial schemes offered by various financial institutions, Like Commercial Banks, IDBI, ICICI, SIDBI, SFCs, Foreign currency Financing; Estimation of Financial requirements.	05
Unit V	**Entrepreneurship Development and Government:** Role of Central Government and State Government in promoting entrepreneurship with various incentives, subsidies, grants, programs, schemes and challenges. Government initiatives and inclusive entrepreneurial Growth.	05

Text Books	
1.	Entrepreneurship Development, S. S. Khanka, S. Chand Publishers
2.	Creativity Innovation & Entrepreneurship, Zechariah James Blanchard, Needle Rat Business, Publishers.

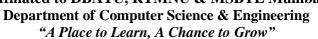| Reference Books	
1.	Khanna, S. S., Entrepreneurial Development, S. Chand, New Delhi.
2.	Hisrich D. Robert, Michael P. Peters, Dean A. Sheperd, Entrepreneurship, McGraw-Hill,6 ed.

Useful Links	
1	https://www.google.co.in/books/edition/Creativity_and_Innovation_in_Entrepreneu/f1c7EAAAQBAJ?hl=en&gbpv=1&dq=Innovation+and+Entrepreneurship+Development&printsec=frontcover
2	https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwj14Jaw9L_AhWgU2wGHaLcCNUQFnoECCYQAQ&url=https%3A%2F%2Fwww.dpgpolytechnic.com%2Fdownloads%2Ffiles%2Fn5c419bcb66c09.pdf&usg=AOvVaw3cbsLd-So8C6Pgj0LW3S35

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
III	CS3V001	Universal Human Value-II	2	0	0	2

Prerequisites for the course	
1.	Basics of Communication Skill.
2.	Fundamental concept of Organization Behaviour

Prior Reading Material/useful links	
1.	https://vvce.ac.in/wp-content/uploads/2021/04/Realising-Aspirations-of-NEP2020-UHV.pdf
2.	https://www.geeksforgeeks.org/human-values-concept-and-importance/
3.	https://www.researchgate.net/publication/320613836_The_importance_and_need_of_universal_human_values_in_engineering_students_life

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Students will be able to Sensitization of student towards self, family (relationship), society and nature
2	CO2	Students will be able to understand (or developing clarity) of nature, society and larger systems, on the basis of human relationships and resolved individuals.
3	CO3	Students will be able to Strengthening of self-reflection.
4	CO4	Students will be able to Development of commitment and courage to act.
5	CO5	Students will be able to Justify the need of this education.

Syllabus:

Course Contents		Hours
Unit I	**Introduction to Value Education:** Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfil the Basic Human Aspirations	5
Unit II	**Harmony in the Human Being:** Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding	5

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	Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health.	
Unit III	**Harmony in the Family and Society:** Harmony in the Family – the Basic Unit of Human Interaction, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to-Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order.	4
Unit IV	**Harmony in the Nature/Existence:** Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence	4
Unit V	**Implications of the Holistic Understanding – a Look at Professional Ethics**: Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession.	6

Text Books	
1.	Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010
2.	JeevanVidya: EkParichaya, ANagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
3.	Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

Reference Books	
1.	The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
2.	Rediscovering India - by Dharampal
3.	Economy of Permanence - J C Kumarappa
4.	Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi

Useful Links	
1.	https://www.google.co.in/books/edition/Human_Values/XhuMFyzdMT8C?hl=en&gbpv=1&dq=Universal+Human+Values&printsec=frontcover
2.	https://www.google.co.in/books/edition/Human_Values_and_Professional_Ethics/CSDzDwAAQBAJ?hl=en&gbpv=1&dq=Universal+Human+Values&printsec=frontcover

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
III	**CS3L005**	**Object Techniques & UML Lab**	0	0	2	**1**

Prerequisites for the course	
1.	Basics knowledge of Object Oriented Programming.
2.	Fundamental of UML Models, Tools.

Prior Reading Material/useful links	
1.	https://www.cet.edu.in/noticefiles/285_OOPS%20lecture%20notes%20Complete.pdf
2.	https://www.uml-lab.com/
3.	https://www.clear.rice.edu/comp310/Eclipse/UMLLab/

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Students will be able to Programming Basics of OOPs and UML Concepts.
2	CO2	Students will be able to Implement C++ program by using structure, functions and Draw Class & Activity Diagram.
3	CO3	Students will be able to Develop Socket Programing and draw Deployment Model.
4	CO4	Students will be able to Use object-oriented approaches to software problems in C++.
5	CO5	Students will be able develop applications for a range of problems using object-oriented programming techniques and UML Models.

List of Practical's

	Course Contents	Hours
0	Introduction of Object Oriented Programming & UML Lab	2
1	WAP to Store Information of Students using Structure also Draw Class Diagram of Students with attributes.	2
2	WAP for ATM machine in C++ using Functions and Draw Activity Diagram for it.	2
3	Draw Use Case Diagram of Library Scenario also Write A C++ Program To Read and Write The Library Data	2
4	Implement client server architecture in C++ and Draw Deployment diagram for Client server system	2
5	WAP for Timing constraints in real-time system also draw Sequence	2

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	diagram on it.	
6	WAP Login and Register System using File handling in C++ and Draw Collaboration diagram for it.	2
7	WAP for User-defined Function in C++ and make a component diagram for my web service	2
8	Implementing a Finite State Machine in C++ and Draw State Transition Diagram.	2
9	Draw Diagram for the relation between a Component & Class.	2
10	Draw Deployment diagram for Physical Connection System.	2

Note: 2 Practical based on Content Beyond Syllabus.

Text Books	
1.	Object Oriented Programming with C++ by E. Balagurusamy, McGraw-Hill Education (India)
2.	C++ and Object Oriented Programming – Jana, PHI Learning.
3.	The Elements of UML(TM) 2.0 Style by Scott W. Ambler Cambridge University Press, 09-May-2005 - Computers - 188
4.	Fundamentals of Object-Oriented Design in Uml by Meilir Page-Jones, Larry L. Constantin

Reference Books	
1.	Mastering C++ - Venugopal, McGraw-Hill Education (India)
2.	Object Oriented Programming with C++ - Rajiv Sahay, Oxford
3.	Using UML Activities to model Business Processes, A Handbook for Practitioners Ed Walters.

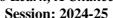| Useful Links	
1.	https://biet.ac.in/pdfs/C++%20LAB%20MANUAL.pdf
2.	http://www.uop.edu.pk/ocontents/good%20startter.pdf
3.	https://www.studocu.com/in/document/adithya-institute-of-technology/computer-science/r19-uml-lab-manual/37364626
4.	https://www.scribd.com/doc/67143168/UML-Lab-Manual

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Session: 2024-25

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To be recognized for excellent engineering, developing global leaders both in educational and research in the domain of computer science and wireless engineering.	1. To create self-learning environment by facilitating leadership qualities, team spirit and ethical responsibilities. 2. To improve department-industry collaboration, interaction with professional society through technical knowledge and internship program. 3. To promote research and development with current techniques through well qualified resources in the area of computer science and wireless engineering.

Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
III	CS3L006	Python Programming (Lab)	0	0	2	1

Prerequisites for the course	
1.	Basics Knowledge of Computer programming.
2.	Introduction to Computer programming Lab.

Prior Reading Material/useful links	
1.	https://www.rgmcet.edu.in/assets/img/departments/CSE/materials/R19/2-1/Python%20Lab.pdf
2.	https://mrcet.com/pdf/Lab%20Manuals/CSE/(R18A0588)%20Python%20Programming%20%20Lab%20Manual.pdf
3.	https://python-iitk.vlabs.ac.in/

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Students will be able to Write, test, and debug simple Python programs
2	CO2	Students will be able to Implement Python programs with conditionals and loops.
3	CO3	Students will be able to Develop Python programs step-wise by defining functions and calling them
4	CO4	Students will be able to Use Python lists, tuples, dictionaries for representing compound data.
5	CO5	Students will be able to Read and write data from/to files in Python

List of Practical's

	Course Contents	Hours
0	Introduction of Python Programming Lab	2
1	WAP to implement stack using arrays.	2
2	WAP to evaluate a given postfix expression using stacks.	2
3	WAP to convert a given infix expression to postfix form using stacks.	2
4	WAP to implement circular queue using arrays.	2
5	WAP to implement double ended queue (de queue) using arrays.	2
6	WAP to implement a stack using two queues such that the push operation	2

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	runs in constant time and the pop operation runs in linear time.	
7	WAP to implement a stack using two queues such that the push operation runs in linear time and the pop operation runs in constant time.	2
8	Write a program to implement a queue using two stacks such that the enqueue operation runs in constant time and dequeue operation runs in linear time.	2
9	Write programs to implement the following data structures: a. Single linked list b. Double linked list	2
10	Implement the following sorting algorithms: a. Insertion sort b. Merge sort c. Quick sort d. Heap sort	2

Note: 2 Practical based on Content Beyond Syllabus.

Text Books	
1.	Python for the Lab By Aquiles Carattino · 2020 Lulu.com
2.	Explorations in Computing An Introduction to Computer Science By John S. Conery · 2011 Taylor & Francis
3.	Introduction to Computer Science Using Python A Computational Problem-Solving Focus By Charles Dierbach · 2013 Wiley

Reference Books	
1.	The Absolute Beginner's Guide to Python Programming A Step-by-Step Guide with Examples and Lab Exercises By Kevin Wilson · 2022Apress
2.	Absolute Beginner's Python Programming Full Color Guide with Lab Exercises The Illustrated Guide to Learning Computer Programming By Kevin Wilson · 2022 Elluminet Press

Useful Links	
1.	https://www.google.co.in/books/edition/Python_for_the_Life_Sciences/y5CyDwAAQBAJ?hl=en&gbpv=1&dq=Python+Programming+(Lab)&printsec=frontcover
2.	https://www.mrecacademics.com/DepartmentStudyMaterials/20201223-python%20programming%20lab%20manual.pdf
3.	https://cdlsiet.ac.in/wp-content/uploads/2022/03/PYTHON-Lab-Manual.pdf
4.	https://www.jnit.org/wp-content/uploads/2020/04/Python-Lab-Manual-converted.pdf

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
III	**CS3L007**	**Web Technology Lab**	0	0	2	**1**

Prerequisites for the course	
1.	Basics of Internet Programming like coding, designing, Testing.
2.	Fundamental Knowledge of Computing and Programming.

Prior Reading Material/useful links	
1.	https://www.bharathuniv.ac.in/downloads/csc/BCS7L2Web%20Technology%20Lab.pdf
2.	https://gnindia.dronacharya.info/CSE/Downloads/Labmanuals/Web-Tech-Lab Manual.pdf

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Students will be able to Design web pages using HTML, DHTML and Cascading Styles sheets.
2	CO2	Students will be able to access and Validate form data using JavaScript and PHP.
3	CO3	Students will be able to connect to database using JSP and JDBC and perform various operations.
4	CO4	Students will be able to connect to MySQL using PHP and perform various operations
5	CO5	Students will be able to Build and consume web services.

List of Practical's
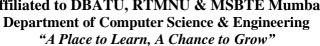
	Course Contents	Hours
0	Introduction of Web Technology Lab	

1	Design the following static web pages required for an online book store web site.
	    i. Home Page
	    ii. Login Page
	    iii. Catalogue Page
		2

2	Design the following static web pages required for an online book store web site. i. Registration Page	2

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	ii. Cart Page	
3	Design a web page using CSS which includes the following: i.Use different font and text styles ii. Set a background image for both the page and single element on the page. iii. Define styles for links iv. Working with layers v. Adding a Customized cursor	2
4	i. Write a JavaScript to validate the fields of the login page. ii. Write a JavaScript to validate the fields of the Registration page	2
5	Write an XML file which will display the Book information which includes the following: Title of the book, Author Name, ISBN number, Publisher name, Edition and Price. Validate the above document using DTD and XML Schema	2
6	i. Write a PHP program to validate the fields of the login page. ii. Write a PHP program to validate the fields of the Registration page	2
7	Write a JSP to connect to the database and extract data from the tables and display them to the user.	2
8	Design a JSP to insert the details of the users who register through the registration page and store the details in to the database.	2
9	Write a PHP program to connect to MySQL database which retrieves the data from the tables and display them to the user.	2
10	Write a PHP program to insert the details entered by the user in the Registration form into MySQL database.	2

Note: 2 Practical based on Content Beyond Syllabus.

Text Books	
1.	Introduction To Web Technology (Paperback) by Pankaj Sharma
2.	Web Technology: A Developer's Perspective (Paperback) by N.P. Gopalan

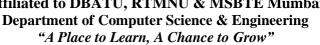| Reference Books	
1.	Web Technology Theory and Practice By Akshi Kumar
2.	Introduction to Web Interaction Design With HTML and CSS By Michael Macaulay

Useful Links	
1.	https://www.atri.edu.in/images/pdf/departments/Web%20Technologies%20Lab%20Manual.pdf
2.	https://www.lendi.org/CSE/labmanuals/Web%20Technologies.pdf

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rogram: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
III	CS3F001	Community Engagement Project	0	0	0	2

Prerequisites for the course	
1.	Understand the visiting companies shall be relevant and suitable ones to the specialization and academic requirements.
2	Learning Important tool for attracting investment and technology.

Prior Reading Material/useful links	
1.	https://www.quora.com/What-are-some-good-places-for-an-industrial-trip-of-CSE-students
2.	https://www.suas.ac.in/industrial-visit-for-computer-science-and-information-technology-5th-sem-students/

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Students will able to functional opportunity in different sectors.
2	CO2	Students will able to helps to combine theoretical knowledge with industrial knowledge.
3	CO3	Students will able to provide an insight into the real working environment,
4	CO4	Students will able to get to learn a lot of things that will help in their development and also for the future.
5	CO5	Students will able to acquire and apply fundamental principles of science and engineering.

Community engagement is based on the democratic idea that everyone who is affected by an issue that impacts their community should have a say in the decision making around it. It, moreover, holds the promise that public participation can influence decisions that affect the provision of services, future visions and sustainability of our communities.

At its most basic level, community engagement is striving towards improving the quality of life in a given community through both political and non-political means. Community engagement is also commonly referred to as civic engagement or public participation, and all terms reference a desire to make a positive difference in one's community that manifests itself through action, combining knowledge, skills, values and motivation.

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Although voting often comes to mind when people discuss the topic of community engagement, it's important to know that it's much more than that. In fact, voting could be considered the bare minimum of community engagement. While voting is certainly a civic duty, or responsibility, engaging in one's community should never stop there.

Examples of Community Engagement
Among the many different forms of community engagement, here are just a few:
➢ Volunteering at a local food bank, animal shelter or homeless shelter
➢ Maintaining a community garden
➢ Participating in a local blood drive
➢ Helping set up a local farmers market
➢ Advocating for others
➢ Creating support groups in your community
➢ Attending and participating in town hall and city council meetings
➢ Attending and participating in school board meetings
➢ Voting in local elections

Models for Community Engagement
Along with the many forms of community engagement, there are also many different models for it. These models can include relationship-building projects that help bring a community together and form stronger bonds; community education projects that provide instructional services or educate the public on certain issues; direct service projects that provide something to a group in need; and more.

These varying forms of community engagement happen in communities all across the globe. While not every community has the same level of engagement, the same percentage of the population that's passionate about it, or the same forms of community engagement, it shouldn't be a surprise to learn that the ones with higher levels of engagement fare better.

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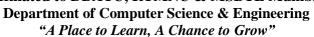## 4th Semester Computer Science & Engineering

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				
				L	T	P	CA	MSE	ESE	Total	Credit
1	PCC	CS4T001	JAVA Programming	2	0	0	20	20	60	100	2
2	PCC	CS4T002	Formal Languages & Automata	3	0	0	20	20	60	100	3
3	PCC	CS4T003	Design & Analysis of Algorithms	3	0	0	20	20	60	100	3
4	MDM	CS4M002	Discrete Mathematics & Statistical Analysis	2	0	0	20	20	60	100	2
5	OEC	CS4O002	Open Elective-II	3	0	0	20	20	60	100	3
6	AEC	CS4A002	Principles of Corporate Success	2	0	0	20	20	60	100	2
7	EEMC	CS4H002	Engineering Economics	2	0	0	20	20	60	100	2
8	VEC	CS4V002	Intellectual Property Rights	2	0	0	20	20	60	100	2
9	PCC	CS4L004	JAVA Programming Lab	0	0	2	60	-	40	100	1
10	PCC	CS4L005	Design & Analysis of Algorithms Lab	0	0	2	60	-	40	100	1
11	PCC	CS4L006	R Programming Lab	0	0	2	60	-	40	100	1
12	VSEC	CS4L007	Graphics Programming & Animations	0	0	4	60	-	40	100	2
				19	0	10	400	160	640	1200	24

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
IV	**CS4T001**	**Java Programming**	2	0	0	2

Prerequisites for the course	
1.	Basic concept Object Oriented Programming
2.	Basic concept of C & C++ .

Prior Reading Material/useful links	
1.	https://www.techtarget.com/searchapparchitecture/definition/object-oriented-programming-OOP
2.	https://www.programiz.com/python-programming/object-oriented-programming
3.	https://www.youtube.com/watch?v=-DP1i2ZU9gk

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Students will be able to Use of programming language constructs in program implementation.
2	CO2	Students will be able to Explain and Create packages and interfaces and used it in programs.
3	CO3	Students will be able to Design and implement multithreaded programs.
4	CO4	Students will be able to Develop and Design applet and graphics programming
5	CO5	Students will be able to Design and implement Database Connectivity.

Syllabus:

Course Contents		Hours
Unit I	**Introduction to JAVA, Class and Object:** Introduction to data types, operators and control statements, Classes: fundamentals of classes, declaring objects, Assigning objects, reference variables, methods, constructor, variable handling. Methods and classes: Overloading methods, understanding static and final.	**05**
Unit II	**Array, Packages, Interface:** Introduction to Array, Vectors, Wrapper class & Inheritance, Packages and interface: Packages, access protection,	**04**

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	importing packages, interfaces.	
Unit III	**Exception Handling & Multithreaded Programming:** Exception handling: Fundamentals exception types, uncaught exception, try-catch, displaying description of an exception, multiple catch clauses, nested try statements, throw, finally, built in exceptions, creating own exception subclasses, JAVA thread model, creating thread, creating multiple thread.	**05**
Unit IV	**Applet, Graphics Programming:** Introduction to applet, The Five Stages of an Applet's Life Cycle, Methods for Adding UI Components, Methods for Drawing and Event Handling.	**05**
Unit V	**Database Connectivity:** JDBC (Java Data Base Connection), Introduction to JDBC, Databases and Drivers, Types of Driver, Loading a driver class file, establishing the Connection to Database with different Driver. Executing SQL queries by result Set using Statement.	**05**

Text Books	
1.	Herbert Schildt, The Complete Reference-Java, Tata Mcgraw-Hill Edition, Eighth Edition, 2014.
2.	Nicholas S. Williams, Professional Java for Web Applications, Wrox Press, 2014.
3.	Complete Reference J2EE by James Keogh mcgraw publication.

Reference Books	
1.	Black Book " Java server programming" J2EE, 1st ed., Dream Tech Publishers, 2008. 3. Kathy walrath .
2.	Core Java, Volume II: Advanced Features by Cay Horstmann and Gary Cornell Pearson Publication.
3.	Spring in Action 3rd edition , Craig walls, Manning Publication.
4.	Hibernate 2nd edition, Jeff Linwood and Dave Minter, Beginning Après publication

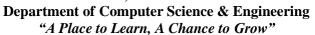| Useful Links	
1.	https://www.youtube.com/watch?v=m3jW02Kp6vg
2.	https://www.youtube.com/watch?v=Hkas0ILReoA
3.	https://www.youtube.com/watch?v=2KRp6YJdUkM
4.	https://onlinecourses.nptel.ac.in/noc22_cs47/preview

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
IV	CS4T003	Formal Languages & Automata	3	0	0	3

Prerequisites for the course	
1.	None

Prior Reading Material/useful links	
1.	https://nptel.ac.in/courses/106104148
2.	https://onlinecourses.nptel.ac.in/noc23_cs31/preview
3.	https://archive.nptel.ac.in/courses/106/106/106106049/

Course Outcomes:

Sr. No	Course Outcome Number	CO statement
1	CO1	Students will be able to Define the mathematical principles behind theoretical computer science.
2	CO2	Students will be able to Differentiate and give examples for the different types of automata like finite automata, push down automata, linear bounded automata and Turing machine.
3	CO3	Students will be able to Correlate the different types of automata to real world applications.
4	CO4	Students will be able to Choose and design appropriate automata for the different requirements outlined by theoretical computer science.
5	CO5	Students will be able to Identify the different computational problems and their associated complexity.

Syllabus:

Course Contents		Hours
Unit I	**Fundamentals:** Alphabet, languages and grammars, productions and derivation, Chomsky hierarchy of languages.	03
Unit II	**Regular languages and finite automata:** Regular expressions and languages, deterministic finite automata (DFA) and equivalence with regular expressions, nondeterministic finite automata (NFA) and equivalence with DFA, regular grammars and equivalence with finite automata, properties of regular languages, Kleene's theorem, pumping	07

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	lemma for regular languages, Myhill-Nerode theorem and its uses, minimization of finite automata.	
Unit III	**Context-free languages and pushdown automata:** Context-free grammars (CFG) and languages (CFL), Chomsky and Greibachnormal forms, nondeterministic pushdown automata (PDA) and equivalence with CFG, parse trees, ambiguity in CFG, pumping lemma for context-free languages, deterministic pushdown automata, closure properties of CFLs.	07
Unit IV	**Context-sensitive languages:** Context-sensitive grammars (CSG) and languages, linear bounded automata and equivalence with CSG. **Turing machines:** The basic model for Turing machines (TM), Turing recognizable(recursively enumerable) and Turing-decidable (recursive) languages and their closure properties, variants of Turing machines, nondeterministic TMs and equivalence with deterministic TMs, unrestricted grammars and equivalence with Turing machines, TMsas enumerators.	09
Unit V	**Undecidability:** Church-Turing thesis, universal Turing machine, the universal and diagonalization languages, reduction between languages and Rice s theorem, undecidable problems about languages. **Basic Introduction to Complexity**: Introductory ideas on Time complexity of deterministic and nondeterministic Turing machines, P and NP, NP- completeness, Cook's Theorem, other NP - Complete problems.	09

Text Books	
1.	Introduction to Automata Theory Languages and Computation". Hopcroft H. E. and Ullman J. D. Pearson Education.
2.	Introduction to Theory of Computation – Sipser 2nd edition Thomson .
3.	Theoretical Foundations of Computer Science", Shrikant Satarkar, Sachin Agrawal

Reference Books	
1.	Introduction to Formal languages Automata Theory and Computation Kamala Krithivasan Rama R.
2.	Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
3.	Theory of Computation: A Problem - Solving Approach, Kavi Mahesh, Wiley India Pvt. Ltd.

Useful Links	
1.	https://www.digimat.in/nptel/courses/video/106104148/L01.html
2.	https://onlinecourses.nptel.ac.in/noc21_cs83/preview

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To be recognized for excellent engineering, developing global leaders both in educational and research in the domain of computer science and wireless engineering.	1. To create self-learning environment by facilitating leadership qualities, team spirit and ethical responsibilities. 2. To improve department-industry collaboration, interaction with professional society through technical knowledge and internship program. 3. To promote research and development with current techniques through well qualified resources in the area of computer science and wireless engineering.

Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
IV	CS4T003	Design & Analysis of Algorithm	3	0	0	03

Prerequisites for the course	
1.	Basic knowledge of Data Structures, their uses & applications.
2.	Study of different algorithms.

Prior Reading Material/useful links	
1.	https://onlinecourses.swayam2.ac.in/cec22_cs13/preview
2.	https://www.youtube.com/watch?v=XqWYatsgwfU
3.	https://www.youtube.com/watch?v=0IAPZzGSbME

Course Outcomes:

Sr. No	Course Outcome Number	CO statement
1	CO1	Students will be able to understand basic knowledge of computational complexity, approximation and randomized algorithms, selection of the best algorithm to solve a problem.
2	CO2	Students will be able to develop efficient algorithms for simple computational tasks.
3	CO3	Students will be able to gain understanding of concepts of time and space complexity, worst case, average case and best case complexities and the big-O notation.
4	CO4	Students will be able to design standard algorithms such as sorting, searching, and problems involving graphs
5	CO5	Students will be able to compute complexity measures of algorithms, including recursive algorithms using recurrence relations

Syllabus:

Course Contents		Hours
Unit I	**Introduction to Algorithm:** Definition of algorithms and brief explanation about the basic properties of algorithms Recurrence relations, solutions of recurrence relations using technique of characteristic equation, master theorem, Asymptotic notations of analysis of algorithms, worst case, average case and best case, amortized analysis,	08

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	application of amortized analysis.	
Unit II	**Greedy and Divide & Conquer Approach:** Divide and conquer strategies: Binary search, Stressen's matrix multiplication algorithm, min-max algorithm. Greedy Approach: Application to job sequencing with deadlines problem, knapsack problem, optimal merge pattern, Huffman code, minimum cost spanning tree using Prim's and Kruskal's algorithm.	07
Unit III	**Dynamic Programming:** Dynamic Programming: Basic Strategy, Multistage graph (forward and backward approach), Longest Common Subsequence, Optimal Binary Search Tree, 0/1 Knapsack problems, Travelling Salesman problem, single source shortest path using Bellman Ford algorithm, all pair shortest path using Floyd- Warshall algorithm	07
Unit IV	**Backtracking Algorithm:** Basic Traversal and Search Techniques: Breadth first search and depth first search, connected components. Backtracking: Basic strategy, N-Queen Problem and their Analysis (4 & 8-Queen), graph coloring, Hamiltonian cycles.	07
Unit V	**Computational Complexity & Parallel Algorithm:** NP-hard and NP-complete problems, basic concepts, non-deterministic algorithms, NP-hard and NP-complete, Cook's theorem, decision and optimization problems, graph based problems on NP Principle. **Parallel Algorithm:** Introduction, analysis,Parallel Algorithm - Models, Parallel Algo structure Introduction to Backtracking, N-Queen Problem, Backtracking Strategies, Search & Traversal Techniques – BFS, DFS, Sum of Subsets, Graph coloring, Hamiltonian Circuit Problem, Efficiency of Algorithms: Polynomial Time & Non-Polynomial Time Algorithms, NP-Complete, NP-Hard.	07

Text Books	
1.	Thomas H. Cormen, Charles E Leiserson, Introduction to Algorithms, PHI Publication, 3rd Edition.
2.	Parag Dave, Himanshu Dave, Design and Analysis of Algorithm, Pearson Education India, 2nd Edition.
3.	S. Sridhar, Design and Analysis of Algorithms, Oxford University Press, India.

Reference Books	
1.	Aho, Ullman, Data Structure and Algorithms, Addison-Wesley Publication, 1st Edition, 1983.
2.	Michel Goodrich, Roberto Tamassia, Algorithm Design - Foundation, Analysis & Internet Examples, Wiley Publication, 2nd Edition, 2006.

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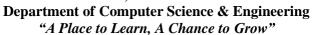|	
3.	George T. Heineman, Gary Pollice, Stanley Selkow, Algorithms in a Nutshell, A Practical Guide, O'Reilly Media, 2nd Edition, 2016.

	Useful Links
1.	https://archive.nptel.ac.in/courses/106/101/106101060/
2.	https://nptel.ac.in/courses/106106131
3.	https://www.digimat.in/nptel/courses/video/106106131/L01.html
4.	https://onlinecourses.nptel.ac.in/noc19_cs47/preview

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
IV	**CS4M002**	**Discrete Mathematics & Statistical Analysis**	2	0	0	**2**

Prerequisites for the course	
1.	Mathematics ,probability
2.	Basic Knowledge of Binary operations.

Prior Reading Material/useful links	
1.	https://www.javatpoint.com/graph-theory-in-discrete-mathematics
2.	https://www.youtube.com/watch?v=HkNdNpKUByM
3.	https://www.youtube.com/watch?v=HipVU5vz3Q8

Course Outcomes:

Sr. No	Course Outcome Number	CO statement
1	CO1	Students will be able to Describe the concept of probability, statistics, logic and concept of set, group theory, graph theory.
2	CO2	Students will be able to Illustrate the concept of probability, statistics, logic and concept of set, group theory, graph theory, combinatorics by using examples.
3	CO3	Students will be able to Apply the concept of probability, statistics, logic and concept of set, group theory, graph theory, combinatorics to solve the problem.
4	CO4	Students will be able to Analyze the problem by using the concept of probability, statistics, logic and concept of set, group theory, graph theory, combinatorics.
5	CO5	Students will be able to Evaluate the problem based on the concept of probability, statistics, graph theory, combinatorics.

Syllabus:

Course Contents		Hours
Unit I	**Mathematical Expectation:** Mathematical Expectation, Variance and standard deviation, Moments and moment generating function, Characteristic function, Expectation and Varaince for joint distribution and covariance, Conditional Expectation, Variance and moments.	04

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Unit II	**Joint Probability and Random Variable:** Joint Distribution of Discrete Random Variable: Joint Probability Function of DRV, Join Distribution Function of DRV ,Marginal Probability Function of DRV, Joint Distribution of Continuous Random Variable: Joint Probability Function of CRV, Join Distribution Function of CRV ,Marginal Probability Function of CRV.	05
Unit III	**Mathematical Logic and set theory:** Propositions and Logical Operation, Quantifiers, Conditional Statements and Tautologies, Method of Proof, Principle of Mathematical Induction. Basic concept of set theory, Operations on sets, The power set.	05
Unit IV	**Group Theory:** Binary Operations , Properties , Semigroups, Monoids, subsemigroup, Submonoid, Isomorphism and Homomorphism, Group (only definition and examples) Subgroups and Homomorphism Cosets and Lagrange's theorem, Normal subgroups.	05
Unit V	**Statistical Analysis:** Introduction to Bayesian Function, Mean, Median &Mode, Linear Regression, Multiple Regression, Logistic Regression, Normal Distribution, Binomial Distribution, Poisson Regression, Analysis of Covariance, Time Series Analysis, Nonlinear Least Square, Decision Tree, Random Forest, Survival Analysis, Chi Square Tests	05

Text Books	
1.	Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, New Delhi.
2.	C.L.Liu, Elements of Discrete Mathematics, second edition 1985, McGraw-Hill Book Company. Reprinted 2000.

Reference Books	
1.	J .L.Mott, A.Kandel, T.P .Baker, Discrete Mathematics for Computer Scientists and Mathematicians, second edition 1986, Prentice Hall of India.
2.	W.K.Grassmann and J.P.Tremblay, Logic and Discrete Mathematics, A Computer Science.

Useful Links	
1.	https://www.youtube.com/watch?v=HipVU5vz3Q8
2.	https://www.youtube.com/watch?v=HkNdNpKUByM
3.	https://www.tutorialspoint.com/discrete_mathematics/graph_and_graph_models.htm

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
IV	CS3O002	Open Elective-II (Cyber Law & Cyber Crime)	3	0	0	3

Prerequisites for the course	
1.	Introduction to cryptography.
2.	Some basic of cyber security.

Prior Reading Material/useful links	
1.	https://www.stu.edu/law/academics/cybersecurity-law/learningoutcomes/
2.	https://www.careers360.com/courses/cyber-law-course

Course Outcomes:

Sr. No	Course Outcome Number	CO statement
1	CO1	Students will be able to Understand the different types of cyber security threats posed to computer systems and networks
2	CO2	Students will be able to Identify national security implications from threats in the cyber domain.
3	CO3	Students will be able to Apply the legal authorities and obligations of government and the private sector to protect computer systems and networks
4	CO4	Students will be able to analyse the national security policy decisions, directives, and actions for developing and implementing cyber security policy in relation to federal laws, executive orders, regulations, and on-going cases.
5	CO5	Students will be able to evaluate and communicate the human role in security systems with an emphasis on ethics.

Syllabus:

Course Contents		Hours
Unit I	**Introduction:** Understanding Cyber Crimes and Cyber Offences, Crime in context of Internet, Types of Crime in Internet, **Crimes targeting Computers:** Definition of Cyber Crime & Computer related Crime. History, Development and Reasons for Growth of Cyber	08

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	Crimes.	
Unit II	**Role in Cyber & Cyber Crimes:** Social Media and its Role in Cyber World, Fake News, Defamation, Online Advertising, Prevention of Cyber Crimes & Frauds, Critical analysis & loop holes of The IT Act, 2000 in terms of cyber-crimes, **Cyber Crimes:** Freedom of speech in cyber space & human right issues, International position on Free Speech in Internet.	07
Unit III	**Indian Penal Law and Cyber Crimes:** Fraud, Hacking, Mischief, Trespass, Defamation, Stalking, Spam, **Issues of Internet Governance:** Freedom of Expression in Internet, Issues of Censorship, Hate Speech, Sedition, Libel, Subversion, Privacy.	07
Unit IV	**Cyber Law:** International Perspective, EDI: Concept and legal Issues, UNCITRAL Model Law, Electronic Signature Laws of Major Countries Cryptography Laws, Cyber Laws of Major Countries, EU Convention on Cyber Crime	07
Unit V	**International Organizations and Their Roles:** ICANN, URDP, WTO and TRIPS, Interpol & Europol, Impact of Cyber warfare on Privacy Identity, Net Neutrality and EU Electronic communication Regulatory framework, WCAG, Social Networking sites Vis – a – Vis Human Right.	07

Text Books	
1.	Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd
2.	Information Warfare and Security by Dorothy F. Denning, Addison Wesley.
3.	Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform
4.	Data Privacy Principles and Practice by Natraj Venkataramanan and Ashwin Shriram, CRC Press.

Reference Books	
1.	Prashant Mali: Cyber Law & Cyber Crimes Sumplified, Cyber Infonedia Publishe
2.	Justice Yatindra Singh: Cyber Laws, Universal Law Publishing Co., Latest Edition

Useful Links	
1.	https://lawbhoomi.com/cyber-law-notes/
2.	https://www.upcounsel.com/cyber-law

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
IV	CS4H002	Engineering Economics	2	0	0	2

Prerequisites for the course	
1.	Fundamental of Engineering and economics.
2.	Basic Knowledge of managerial economics.

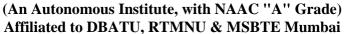| Prior Reading Material/useful links	
1	https://mrcet.com/downloads/digital_notes/ECE/II%20Year/MANAGERIAL%20ECONOMICS%20AND%20FINANCIAL%20ANALYSIS.pdf
2	https://www.iitmanagement.com/images/Gallery/ECONOMICS%20FOR%20ENGINEERS.pdf

Course Outcomes:

Sr. No	Course Outcome Number	CO statement
1	CO1	Students will be able to Understand the Fundamental of Engineering and economics.
2	CO2	Students will be able to Identify best economic model from various available alternatives.
3	CO3	Students will be able to Apply managerial economics concept in business analysis and business decision making
4	CO4	Students will be able to Explain relationships between production and costs and understand different forms of market structures.
5	CO5	Students will be able to Asses impact of macroeconomics and government policies on business and economy

Syllabus:

Course Contents		Hours
Unit I	**Introduction:** Engineering and economics, Problem solving and decision making, Laws of demand and supply, Difference between Microeconomics & Macroeconomics, equilibrium between demand & supply, elasticity of demand, price elasticity, income elasticity.	05
Unit II	**Role of Returns:** Law of Returns, Interest and interest factors, simple and compound interest, Cash flow diagrams, personal loans and EMI payment calculation with flexible interest rates, Discussion and problems	05
Unit III	**Economics:** Introduction of Economics, Classification of economics,	05

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	Industrial economics, Applications of Industrial economics. Types of Business structures, Consumer demand, Law of Demand, Determinants of demand, Demand forecasting, Law of supply, Utility, Law of diminishing marginal Utility, Types of Elasticity of demand	
Unit IV	**Concept of Production**: Factors of Production, Laws of return, Cost concepts and types of cost, cost curves, Market Structures-Perfect competition, Monopoly, Oligopoly, and Monopolistic competition. Business cycles, optimum size of firm.	04
Unit V	**The functions of central bank**: Inflation, Deflation, Recession. Measures to control Inflation, National income, GDP, GNP, Monetary and fiscal policy of government. Liberalization, Privatization and Globalization	05

Text Books	
1.	Managerial Economics, D.N. Dwivedi, 8th Vikas Publishing
2.	Modern Economic Theory, K.K. Dewett, 2005, S. Chand Publisher.
3.	Engineering Economy, Riggs J.L. McGraw Hill, 2002
4.	Engineering Economy, Thuesen H.G. PHI , 2002

Reference Books	
1.	Industrial Organization and Industrial economics, T.R. Banga, S.C. Sharma, 2006, Khanna Publishers
2.	Engineering Economy, Thuesen H.G. PHI , 2002
3.	Modern Economic Theory, By Dr. K. K. Dewett & M. H. Navalur, S. Chand Publications
4.	Economics: Principles of Economics, N Gregory Mankiw, Cengage Learning

Useful Links	
1.	https://www.hzu.edu.in/engineering/engineering%20economy.pdf
2.	https://www.uoanbar.edu.iq/eStoreImages/Bank/6298.pdf
3.	https://kanchiuniv.ac.in/coursematerials/CS8T1%20%20Engineering%20Economics%20and%20Management-Course%20Material%20Feb%202021.pdf.
4.	https://easyengineering.net/mg6863-engineering-economics/

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
IV	**CS4V002**	**Intellectual Property Rights**	2	0	0	2

Prerequisites for the course	
1.	A basic concept of Ethics in IT.
2.	A basic concept of IEED.

Prior Reading Material/useful links	
1.	http://www.bdu.ac.in/cells/ipr/docs/ipr-eng-ebook.pdf
2.	https://www.wipo.int/edocs/pubdocs/en/intproperty/489/wipo_pub_489.pdf

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Students will be able to provide an understanding of the law relating to Intellectual Property and Competition in India.
2	CO2	Students will be able to understand the concept of Intellectual Property with special reference to India.
3	CO3	Students will be able to appreciate the significance of Intellectual Property in modern times, in the light of its international legal regime.
4	CO4	Students will be able to study the important Agreements, Treaties and Conventions relating to Intellectual Property Rights.
5	CO5	Students will be able to understand the intricacies of grant of Patent, Patentability, Licensing and Revocation at National and International levels.

Syllabus:

Course Contents		Hours
Unit I	**Introduction to IPRs:** Basic concepts and need for Intellectual Property Patents, Copyrights, Geographical Indications, IPR in India and Abroad Function of IPR. Public good, Incentive theory, different forms of IPR, Industrial Property, technological Research, Inventions and Innovations Important examples of IPR.	05
Unit II	Practical aspects of registration of Copy Rights, Trademarks, Patents, Geographical Indications, Trade Secrets and Industrial Design registration	05

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	in India and Abroad. Introduction to competition Law, Anti-competitive agreements, Abuse of dominance, Regulation of combinations	
Unit III	International Treaties and Conventions on IPRs, TRIPS Agreement, PCT Agreement, Patent Act of India, Patent Amendment Act, Design Act, Trademark Act, Geographical Indication Act.	05
Unit IV	The relationship and Interaction between IPR and competition law The economics of US Antitrust law, IP and competition issues, Technology transfer agreements. The EU experience with IP and Competition Law	04
Unit V	Market allocation, Horizontal agreements, Vertical agreements, licensing issues. Indian Competition Act and IPR protection. Digital Innovations and Developments as Knowledge Assets, IP Laws, Cyber Law and Digital Content Protection, Unfair Competition, Meaning and Relationship between Unfair Competition and IP Laws, Case Studies.	05

Text Books	
1.	V. Scople Vinod, Managing Intellectual Property, Prentice Hall of India pvt Ltd, 2012
2.	S. V. Satakar, "Intellectual Property Rights and Copy Rights, Ess Publications, New Delhi, 2002

Reference Books	
1.	Deborah E. Bouchoux, "Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets", Cengage Learning, Third Edition, 2012.
2.	Prabuddha Ganguli,"Intellectual Property Rights: Unleashing the Knowledge Economy", McGraw Hill Education, 2011.

Useful Links	
1.	http://www.bdu.ac.in/cells/ipr/docs/ipr-eng-ebook.pdf
2.	https://www.wipo.int/edocs/pubdocs/en/intproperty/489/wipo_pub_489.pdf

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
IV	**CS4L004**	**JAVA Programming (Lab)**	0	0	2	**1**

	Prerequisites for the course
1.	Object Oriented Programming
2.	Programming for problem solving

	Prior Reading Material/useful links
1.	https://www.techtarget.com/searchapparchitecture/definition/object-oriented-programming-OOP
2.	https://www.programiz.com/python-programming/object-oriented-programming
3.	https://www.youtube.com/watch?v=-DP1i2ZU9gk

Course Outcomes:

Sr. No	Course Outcome Number	CO statement
1	CO1	Students will be able to Identify classes, objects, members of a class and relationships among them needed for a specific problem
2	CO2	Students will be able to Write Java application programs using OOP principles and proper program structuring
3	CO3	Students will be able to Demonstrate the concepts of polymorphism and inheritance.
4	CO4	Students will be able to Write Java programs to implement error handling techniques using exception handling
5	CO5	Students will be able to Incorporate cutting-edge frameworks in web application development.

List of Practical's

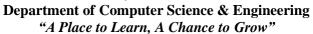|	Course Contents	Hours
0	Introduction to Java Lab.	02
1	Installation of JDK & write a simple program to display "Hello World".	02
2	Write simple programs based on basic syntactical constructs of Java like: - a) Operators and expressions. b) Looping statements. c) Decision making statements. d)Typecasting.	02
3	Write a Java Program to define a class, describe its constructor, overload	02

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Website: www.jdcoem.ac.in E-mail: info@jdcoem.ac.in
(An Autonomous Institute, with NAAC "A" Grade)
Affiliated to DBATU, RTMNU & MSBTE Mumbai
Department of Computer Science & Engineering
"A Place to Learn, A Chance to Grow"
Session: 2024-25

VISION	MISSION
To be recognized for excellent engineering, developing global leaders both in educational and research in the domain of computer science and wireless engineering.	1. To create self-learning environment by facilitating leadership qualities, team spirit and ethical responsibilities. 2. To improve department-industry collaboration, interaction with professional society through technical knowledge and internship program. 3. To promote research and development with current techniques through well qualified resources in the area of computer science and wireless engineering.

	the constructors and instantiate its object.	
4	Write a Java Program to define a class, define instance methods for setting and retrieving values of instance variables and instantiate its object	02
5	Write a Java Program on: - use of single Dimensional array. - use of multidimensional array	02
6	Write a Java Program to implement multilevel inheritance by applying various access controls to its data members and methods.	02
7	Write a program to demonstrate - use of implementing interfaces. - use of extending interfaces.	02
8	Write a Java program to implement the concept of importing classes from user defined package and creating packages.	02
9	Write a program using Applet: - to display a message in the Applet. - for configuring Applets by passing parameters.	02
10	Write program to demonstrate use of I/O streams.	02

Text Books	
1.	Herbert Schildt, The Complete Reference-Java, Tata Mcgraw-Hill Edition, Eighth Edition, 2014.
2.	Nicholas S. Williams, Professional Java for Web Applications, Wrox Press, 2014.
3.	Complete Reference J2EE by James Keogh mcgraw publication.

Reference Books	
1.	Black Book " Java server programming" J2EE, 1st ed., Dream Tech Publishers, 2008. 3. Kathy walrath .
2.	Core Java, Volume II: Advanced Features by Cay Horstmann and Gary Cornell Pearson Publication.
3.	Spring in Action 3rd edition , Craig walls, Manning Publication.
4.	Hibernate 2nd edition, Jeff Linwood and Dave Minter, Beginning Après publication

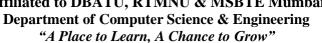| Useful Links	
1.	https://www.youtube.com/watch?v=m3jW02Kp6vg
2.	https://www.youtube.com/watch?v=Hkas0ILReoA
3.	https://www.youtube.com/watch?v=2KRp6YJdUkM
4.	https://onlinecourses.nptel.ac.in/noc22_cs47/preview

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
IV	**CS4L005**	**Design & Analysis of Algorithm Lab**	0	0	2	01

Prerequisites for the course	
1.	Basic knowledge of C & C++ programming language.
2.	Familiarity with trees and graph data structures,

Prior Reading Material/useful links	
1.	https://onlinecourses.nptel.ac.in/noc21_cs02/preview
2.	https://www.youtube.com/watch?v=BwCnIuM81Iw
3.	https://onlinecourses.nptel.ac.in/noc22_cs42/preview

Course Outcomes:

Sr. No	Course Outcome Number	CO statement
1	CO1	Students will be able to calculate the time complexity of algorithm
2	CO2	Students will be able to sort the given numbers using various sorting algorithms.
3	CO3	Students will be able to write programs for the problems using Divide and Conquer.
4	CO4	Students will be able to write programs for the problems using Greedy Method.
5	CO5	Students will be able to write programs for the problems using Dynamic programming

List of Practical's

	Course Contents	Hours
0	Introduction to DAA Lab.	02
1	Write a program to perform operation count for a given pseudo code	02
2	Write a program to perform Bubble sort for any given list of numbers.	02
3	Write a program to perform Insertion sort for any given list of numbers.	02
4	Write a program to perform Quick Sort for the given list of integer values.	02
5	Write a program to find Maximum and Minimum of the given set of integer values	02

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6	Write a Program to perform Merge Sort on the given two lists of integer values.	02
7	Write a Program to perform Binary Search for a given set of integer values recursively and no recursively.	02
8	Write a program to find solution for knapsack problem using greedy method	02
9	Write a program to solve N-QUEENS problem.	02
10	Write a program to solve Sum of subsets problem for a given set of distinct numbers.	02

Text Books	
1.	Data Structures and Algorithms by G.A.V. Pai, 2017, TMH.
2.	Fundamentals of Computer Algorithms by Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran,2 nd edition, University Press.
3.	S. Sridhar, Design and Analysis of Algorithms, Oxford University Press, India.

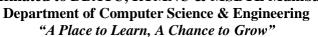| Reference Books	
1.	Aho, Ullman, Data Structure and Algorithms, Addison-Wesley Publication, 1st Edition, 1983.
2.	Michel Goodrich, Roberto Tamassia, Algorithm Design - Foundation, Analysis & Internet Examples, Wiley Publication, 2nd Edition, 2006.
3.	George T. Heineman, Gary Pollice, Stanley Selkow, Algorithms in a Nutshell, A Practical Guide, O'Reilly Media, 2nd Edition, 2016.

Useful Links	
1.	https://archive.nptel.ac.in/courses/106/101/106101060/
2.	https://nptel.ac.in/courses/106106131
3.	https://www.digimat.in/nptel/courses/video/106106131/L01.html
4.	https://onlinecourses.nptel.ac.in/noc19_cs47/preview

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
IV	**CS4L007**	**R Programming Lab**	0	0	2	**1**

Prerequisites for the course	
1.	Object Oriented Programming
2.	Basic Knowledge of MS-EXCEL.

Prior Reading Material/useful links	
1.	https://www.techtarget.com/searchapparchitecture/definition/object-oriented-programming-OOP
2.	https://www.programiz.com/python-programming/object-oriented-programming
3.	https://www.youtube.com/watch?v=-DP1i2ZU9gk

Course Outcomes:

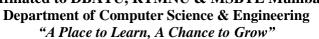| Sr. No	Course Outcome Number	CO statement
1	CO1	Students will be able to Understanding the types, classes and functions of R Programming..
2	CO2	Students will be able to Accessing and Processing of Data.
3	CO3	Students will be able to Understanding the I/O interface programming.
4	CO4	Students will be able to Study and Analyse Data Visualisation.
5	CO5	Students will be able to Implement any application level simulation using R.

List of Practical's

	Course Contents	Hours
0	Introduction to R programming Lab.	02
1	Study of basic Syntaxes in R.	02
2	Implementation of vector data objects operations.	02
3	Implementation of matrix, array and factors and perform va in R.	02
4	Implementation and use of data frames in R.	02
5	Study and implementation of various control structures in R.	02
6	Data Manipulation with dplyr package.	02

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7	Create Sample (Dummy) Data in R and perform data manipulation with R.	02
8	Data Manipulation with data.table package.	02
9	Study and implementation of Data Visualization with ggplot2.	02
10	Study and implementation data transpose operations in R.	02

Text Books	
1.	Cotton, R., Learning R: a step by step function guide to data analysis. 1st edition. O'reilly Media Inc
2.	Lawrence, M., & Verzani, J. (2016). Programming Graphical User Interfaces in R. CRC press. (ebook)

Reference Books	
1.	R for Data Science: Import, Tidy, Transform, Visualize, and Model Data by Hadley Wickham, O'RELLY, 2017
2.	Hands-On Programming with R: Write Your Own Functions and Simulations, Garrett Goleman, O'RELLY, 2014 http://cran.r-project.org(link is external)

Useful Links	
1.	https://onlinecourses.nptel.ac.in/noc19_ma33/preview
2.	https://www.stats.ox.ac.uk/~evans/Rprog/LectureNotes.pdf

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Program: B. Tech. in Computer Science & Engineering

Semester	Course Code	Name of the course	L	T	P	Credits
IV	**CS4L007**	**Graphics Programming & Animations**	0	0	4	2

Prerequisites for the course	
1.	Learn to create 2D and 3D objects.
2.	Apply various transformations on the 2D and 3D objects.

Prior Reading Material/useful links	
1.	https://nou.edu.ng/coursewarecontent/CIT371.pdf
2.	https://elearning.lagoscitypolytechnic.edu.ng/wpcontent/uploads/2021/01/COMPUTER-GRAPHICS-Isibor-O-O-2018-2.pdf
3.	https://mu.ac.in/wp-content/uploads/2022/03/USIT-405-Computer-Graphics-and-Animation.pdf

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Students will be able to Classify various graphics hardware and software devices.
2	CO2	Students will be able to Use primitive operations to create 2D and 3D objects and perform various operations thereon.
3	CO3	Students will be able to Perform complex 2D and 3D transformations on objects.
4	CO4	Students will be able to Implement various hidden surface removal techniques.
5	CO5	Students will be able to Relate and apply the features of animation for animated application.

Syllabus:

Course Contents	Hours
Unit I — **Geometry and line generation:** Overview of Computer Graphics, graphics systems, Pixels and frame buffers, Types of display devices, Random scan methods, Raster scan methods, DDA and Bresenham's algorithms for line generation, Circle generation algorithm, Antialiasing	05
Unit II — **Graphics primitives & 2D transformations:** Graphics primitives: Display files, algorithms for polygon generation, polygon filling	05

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	algorithms.2D transformations: translation, scaling, rotation, , rotation about arbitrary point, reflections, shearing 3D Transformation, Projections	
Unit III	**Animation & its concepts:** Animation: Introduction to Animation, History of animation, Types of Animation, Principles of animation, Key-Frame Animation, Animation Tools, Morphing 3D animation & its concepts- 2D and 3D animation ,3D pipeline, Motion Capture software, Special Effects, Visual Effects	05

Activity

Sr. No	Activity Topic
1	Computer Aided Design- Use of CAD, Computer Art, Entertainment, Kahoot, Use of Presentation graphics, Visualization, Image Processing, GUI in computer graphics.
2	Working of Digital Differential Analyzer Algorithm.
3	Study and implementation of Ellipse Generation Algorithm
4	Implementation and use of Creating two dimensional objects
5	Study and implementation of Two Dimensional Transformations
6	Study and implementation of Coloring the Pictures
7	Create Three Dimensional Transformations.
8	Implementation of Curve Generation.
9	Study and implementation of Simple Animations using transformations.
10	Study and implementation of Key Frame Animation

Text Books	
1.	Computer Graphics, D. Hearn, M.P .Baker, II edition, Pearson Education
2.	Principles of Interactive Computer Graphics, W .M. Newman & R.F. Sproul, McGraw Hill
3.	Principles of Multimedia, Rajan Parekh, Tata McGraw-Hill

Reference Books	
1.	Computer Graphics Using Open GL, F.S. Hill, II Edition, Pearson Education.
2.	Fundamentals of Multimedia, Ze-Nian, Li, Mark S. Drew, Pearson Education

Useful Links	
1.	https://vardhamancse.yolasite.com/resources/Computer%20Graphics%20Lab%20Manual.pdf
2.	https://dam.org/museum/wp-content/uploads/2020/10/DAM-King-ProgrammedGraphics.pdf