GOVERNMENT OF INDIA
MINISTRY OF
PARLIAMENTARY AFFAIRS

Azadi Ka Amrit Mahotsav

mygov मेरी सरकार

PREAMBLE TO THE CONSTITUTION

PREAMBLE

WE, THE PEOPLE OF INDIA,

having solemnly resolved to constitute India into a SOVEREIGN SOCIALIST SECULAR DEMOCRATIC **REPUBLIC** and to secure to all its citizens:

JUSTICE, social, economic and political;

LIBERTY of thought, expression, belief, faith and worship;

EQUALITY of status and of opportunity;

and to promote among them all

FRATERNITY assuring the dignity of the individual and the unity and integrity of the Nation;

IN OUR CONSTITUENT ASSEMBLY this 26th day of November, 1949, do HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.

I have read the Preamble

[redacted]

Signature

23-01-2022

SRI SIDDHARTHA ACADEMY OF HIGHER EDUCATION

("Deemed to be University u/s 3 of the UGC Act, 1956")
Accredited 'A+' Grade by NAAC
Agalakote, B.H.Road, Tumkur – 572 107.KARNATAKA, INDIA.

No. SSAHE/ACA-S&C/ 45/UG(BE)/2024 Date: 15/07/2024

N O T I F I C A T I O N

Sub: - Ordinance pertaining to Curriculum of Undergraduate Programme Bachelor of Engineering (2nd Year Computer Science & Engineering in CYBER SECURITY)

Ref: Proceedings of the Academic Council meeting held on 10/07/2024 vide agenda No. SSAHE/AC/XXVIII-12/2024

In exercise of the powers vested under section 6 of 6.05 of MoA / Rules of SSAHE, the Revised Ordinance pertaining to Curriculum of Undergraduate Programme Bachelor of Engineering (2nd Year Computer Science & Engineering in CYBER SECURITY) is notified herewith as per Annexure.

By Order,

REGISTRAR

REGISTRAR
Sri Siddhartha Academy of Higher Education
TUMKUR - 572 107, Karnataka.

To,
Dean / Principal, Sri Siddhartha Institute of Technology,

Copy to
1) Office of the Chancellor, SSAHE, for kind information,
2) PA to Vice-Chancellor / PA to Registrar / Controller of Examinations / Finance Officer, SSAHE
3) All Officers of the Academy Examination Branch / Academic Section
4) Guard File / Office copy.

S.S.A.H.E TUMKUR

SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU
(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)
Academic Year 2024-25

Scheme of Teaching and Examination-2022 (160 Credits Scheme, NEP)

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

III Semester B.E

3rd Semester BE (Group 2: ISE/ECE/ETE/MLE/DSE/Cyber Security) **Academic year 2024-25**

Sl No.	*Course Code*		*Course Title*	*Teaching Dept.*	*L*	*T*	*P*	*Credits*	*CIE*	*SEE*	*Total Marks*	*Exam Hrs*
01	BS	22SS301	Statistics and Probability	MA	3	-	0	3	50	50	100	3
02	PC	22CY302	Cyber Security Essentials	CY	3	-	0	3	50	50	100	3
03	PC	22CY303	Embedded system design and IOT	CY	3	-	2	4	50	50	100	3
04	PC	22CY304	Data structures	CY	3	-	2	4	50	50	100	3
05	PC	22CY305	Operating System	CY	3	-	-	3	50	50	100	3
06	PC	22CY306	Dept. Skill Lab - I (Python lab)	CY	1	-	2	2	50	50	100	3
07	HS	22SK307	Skill Development-1	T&P	1	-	-	1	50	-	50	-
08	HS	22HS308	Constitution of India	HS	1	-	-	1	50	-	50	-
L-Lecture, T-Tutorial, P-Practical,/Drawing, CIE-continuous Internal Evaluation, SEE-Semester End Examination				**Total**	**18**	**-**	**6**	**21**	**400**	**300**	**700**	**-**

Credits Distribution: Basic Science (BS)=08+08+03=19, Engineering Science (ES)=10+11=21, Humanities & Social Sciences (HS)=1+2=3, Program Core (PC)=02+16=18, Total Credits=20+20+21=61

SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU
(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)
Academic year 2024-2025

Department: : Computer Science and Engineering (Cyber Security)		**Semester:**	**III**

Subject:	**Statistics and Probability**			
Subject Code:	**22SS301**		**L – T – P - C:**	**3 – 0 – 0 – 3**

Sl. No	Course Objectives
1	Introduce the concept of correlation and regression and fitting of a curve.
2	Apply discrete and continuous probability distributions for single and two variables in analyzing the probability models arising in engineering field.
3	To understand the concepts of the stochastic process of a statistic and estimation of parameters
4	Develop analytical capability and to impart knowledge of Probability, Statistics and Queuing

Unit	Description	Hrs
I	**Statistical Methods**: Correlation and regression- Karl Pearson's coefficient of Correlation, Regression analysis- lines of regression (without proof), rank correlation, problems. **Curve fitting:** Curve fitting by the method of least squares- Fitting of the straight line, second degree parabola and exponential form of the curve $y = ab^x$ (All results without proof) –Problems.	**08**
II	**Probability Distributions:** Review of basic probability theory. Random variables (Discrete and Continuous), Probability of mass/density functions, Binomial distribution, Poisson's distribution, Exponential distribution and Normal distribution (without derivations) and problems.	**08**
III	**Joint probability distributions:** Joint probability distribution for discrete random variables, Mathematical expectations, Covariance and Correlation. **Analysis of variance**: Definition and properties, one way classification, verification within and between treatments	**08**
IV	**Markov Chain:** Probability Vector, Stochastic Matrix, Regular Stochastic Matrix, definition of Markov Chain, Transition Probabilities and Transition probability Matrix, Higher Transition Probabilities, state transition diagram, stationary distribution of regular Markov chains, problems. **Queuing theory:** Introduction, Concepts and M/G/1 and M/M/1 queuing systems, problems.	**08**
V	**Sampling and Statistical Inference:** Sampling distributions, Concepts of hypothesis, standard error and confidence interval, Type-1 and Type-2 errors, Level of significance, One tailed and two tailed tests. Z-test: for single mean, for single proportion. Student's t – distribution, Chi-square test for goodness of fit.	**08**

Course Outcomes:

Course outcome	Descriptions
CO1	Understand the concepts of Curve Fitting, Correlation, Regression, probability distribution and Markov chain.
CO2	Formulate and solve mathematical problems on probability distribution, sampling theory and queuing theory.
CO3	Analyze the behavior of Markov chain-based problems in the long run and compute the correlation, covariance of random variables using joint PDF concept
CO4	Apply the concepts of Analysis variance, testing of hypothesis and queuing models in engineering fields

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2	3	2												
CO3	3	1												
CO4	3	2												

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Higher Engineering Mathematics	B.S. Grewal	43rd Edition Khanna Publications, 2015. ISBN:9788174091956
2	Introduction to Probability Models	Sheldon M. Ross	Elsevier, 9th Edition, 2007

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Probability, Random Variables and Stochastic Process	Athanosios Papoulis & S. Unnikrishna Pillai	Tata McGraw Hill, 4th Edition, 2002.
2	Higher Engineering Mathematics	B.V. Ramana	1 st Edition, Tata McGraw-Hill, 2006. ISBN:9780070634190

Department: Computer Science and Engineering (Cyber Security)		**Semester:**	**III**

Subject: Cyber Security Essentials				
Subject Code:	**22CY302**		**L – T – P - C:**	**3 – 0 – 0 – 3**

Sl. No	Course Objectives
1	To Interpret various types of cyber-attacks and cyber-crimes (L2)
2	To learn threats and risks within context of the cyber security and to have an overview of the cyber laws & concepts of cyber forensics(L2)
3	To study the defensive techniques against these attacks(L2)
4	To understand various cyber security privacy issues. (L2).

Unit	Description	Hrs
I	**Introduction to Cyber Security**: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.	**07**
II	**Cyberspace and the Law & Cyber Forensics**: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics	**08**
III	**Cybercrime:** Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Organizational security Policies and Measures in Mobile Computing Era, Laptops.	**08**
IV	**Cyber Security:** Organizational Implications: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations	**08**

V	**Privacy Issues:** Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc	**08**

Course Outcomes:

Course outcome	Descriptions
CO1	Analyze and evaluate the cyber security needs of an organization
CO2	Understand Cyber Security Regulations and Roles of International Law.
CO3	Design and develop a security architecture for an organization
CO4	Understand fundamental concepts of data privacy attacks

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2		-	-	-	3	-	3	-	-	-	-	-	-
CO2		2		2	-	3	-	-	-	-	-	-	-	-
CO3	2	2	3	3	2	2	-	-	-	-	-	-	-	-
CO4	1			-	-	2	-	-	-	-	-	-	-	-

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Cyber Security Understanding Cyber Crimes,	Nina Godbole and Sunit Belpure	Computer Forensics and Legal Perspectives, Wiley
2	Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives,	B.B. Gupta, D.P. Agrawal, Haoxiang Wang,	CRC Press, ISBN 9780815371335,2018.

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Cyber Security Essentials	James Graham, Richard Howard and Ryan Otson,	CRC Press..
2	Introduction to Cyber Security	Chwan-Hwa(john) Wu,J. David Irwin	CRC Press T&F Group.

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Academic year 2024-2025

Department: : Computer Science and Engineering (Cyber Security)		**Semester:**	**III**

Subject:	**Embedded Systems and IoT (Integrated course)**			
Subject Code:	**22CY303**		**L – T – P - C:**	**3 – 0 – 2 – 4**

Sl. No	Course Objectives
1	To learn the internal architecture and programming of an embedded processor.
2	To introduce interfacing, I/O devices to the processor.
3	To introduce the evolution of the Internet of Things (IoT).
4	To build a small low-cost embedded IoT system using Arduino/Raspberry Pi/ open platform. .

Unit	Description	Hrs
I	**8-Bit Embedded Processor:** 8-Bit Microcontroller, Architecture, Instruction Set and Programming, Programming Parallel Ports, Timers and Serial Port, Interrupt Handling.	**08**
II	**Embedded C Programming:** Memory And I/O Devices Interfacing, Programming Embedded Systems in C, Need For RTOS, Multiple Tasks and Processes Context Switching, Priority Based Scheduling Policies.	**08**
III	**Iot And Arduino Programming:** Introduction to the Concept of IoT Devices, IoT Devices Versus Computers, IoT Configurations, Basic Components, Introduction to Arduino, Types of Arduinos, Arduino Toolchain, Arduino Programming Structure, Sketches, Pins – Input/Output from Pins Using Sketches, Introduction to Arduino Shields, Integration of Sensors and Actuators with Arduino.	**08**
IV	**Iot Communication And Open Platforms:** IoT Communication Models and APIs, IoT Communication Protocols, Bluetooth, Wi-Fi ZigBee, GPS, GSM modules, Open Platform (like Raspberry Pi), Architecture Programming, Interfacing, Accessing GPIO Pins, Sending and Receiving Signals Using GPIO Pins, Connecting to the Cloud.	**08**
V	**Applications Development:** Complete Design of Embedded Systems Development of IoT Applications, Home Automation, Smart Agriculture, Smart Cities Smart Healthcare.	**08**

LAB CONTENT

Sl. No	Experiment Description
1	(i) Write 8051 Assembly Language experiments using simulator. (ii) Test data transfer between registers and memory. (iii)Perform ALU operations.
2	Write Basic and arithmetic Programs Using Embedded C.
3	Introduction to Arduino platform and programming
4	Explore different communication methods with IoT devices (Zigbee, GSM, Bluetooth)
5	Introduction to Raspberry PI platform and python programming
6	Interfacing sensors with Raspberry PI
7	Communicate between Arduino and Raspberry PI using any wireless medium
8	Setup a cloud platform to log the data
9	Log Data using Raspberry PI and upload to the cloud platform
10	Design an IOT based system

Course Outcomes:

Course outcome	Descriptions
CO1	Explain the architecture of embedded processors.
CO2	Design simple embedded applications and ability to write embedded C programs.
CO3	Compare the communication models in IOT.
CO4	Design IoT applications using Arduino/Raspberry Pi /open platform

Course Articulation Matrix

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	3	2	3	-	-	-	-	-	-	-	-	-	-
CO3	2	2	3	2	-	-	-	-	-	-	-	-	-	-

CO4	-	2	3	2	-	2	-	-	-	-	-	2	-	-

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	"The 8051 Microcontroller and Embedded Systems"	Muhammed Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay,	Pearson Education, Second Edition, 2014
2	"IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things".	Robert Barton, Patrick Grossetete, David Hanes, Jerome Henry, Gonzalo Salgueiro	CISCO Press, 2017.

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Michael J. Pont, "Embedded C", Pearson Education, 2007.	Robert Kruse, C L Tondo, Bruce Leung, ShashiMogalla	PHI, 2nd Edition, 2015,ISBN13: 978-0132883665.
2	"Computers as Components: Principles of Embedded Computer System Design"	Wayne Wolf	Elsevier, 2006
3	"Arm System Developer's Guide",	Andrew N Sloss, D. Symes, C. Wright	Morgan Kauffman/ Elsevier, 2006.
4	"Internet of Things – A hands-on approach"	Arshdeep Bahga, Vijay Madisetti	Universities Press, 2015

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Academic year 2024-2025

Department: : Computer Science and Engineering (Cyber Security)		**Semester:**	**III**

Subject:	**Data Structures**			
Subject Code:	**22CY304**		**L – T – P - C:**	**3 – 0 – 2 – 4**

Sl. No	Course Objectives
1	To provide the knowledge of basic data structures and their implementations.
2	Define and Analyze the concepts of Linear & Non-Linear Data Structures.
3	To understand importance of data structures in context of writing efficient programs.
4	To develop skills to apply appropriate data structures in solving real world problems.

Unit	Description	Hrs
I	**Pointers and Structures revisited, Stacks and its applications: Pointers and Structures revisited**: accessing variables through pointers, passing pointers to a function, pointers to pointers, array of pointer, memory allocation functions,. Structure definition and declaration, Types of structures. Stacks: Definition and Examples, Representing Stacks in C. Example: infix, postfix and prefix: basic definitions and examples, evaluating a postfix expression with program, converting an expression from infix to postfix with program. Recursion: binary search and towers of Hanoi.	**08**
II	**Queue, Circular queue and Priority queue: Queues:** The Queue and its Sequential Representation, C implementation of Queue. Circular Queue, and The priority queue – Array implementation of priority queue.	**08**
III	**Singly Linked List, Circular Singly Linked List**: Inserting and removing nodes from a list, Header nodes, Array implementation of lists, limitations of array implementation. Linked implementation of Stack, linked implementation of queue. **Circular lists:** primitive operations on circular list.	**08**
IV	**Doubly linked list, Circular Doubly linked list**: Doubly linked lists: Inserting and removing nodes from a double linked list. Primitive operations on circular doubly linked list.	**08**
V	**Trees**: Basic tree concepts: Terminology, tree representation, Binary trees: properties, binary tree structure. Binary tree traversals: Tree traversal techniques: preorder, inorder and postorder, Expression trees: infix, postfix and prefix traversal. General trees: Changing general tree to binary tree, insertion into general trees.	**08**

LAB CONTENT

Sl. No	Experiment Description
1	Write a C program to construct a stack of integers and to perform the following operations on it: a. Push b. Pop c. Display The program should print appropriate messages for stack overflow and stack underflow
2	Write a recursive C programs for the following: a. Searching an element on a given list of integers using the binary search method. b. Solving the Towers of Hanoi problem.
3	Write a C Program to convert and print a given valid parenthesized infix expression consists of single character operands and the binary operators + (plus), - (minus), * (multiply) , /(divide) to suffix / postfix expression.
4	Write a C program to evaluate a valid suffix / postfix expression using stack. The suffix / postfix expression is read as a non-negative single digit operands and binary operators + (plus), - (minus), * (multiply) , /(divide)
5	Write a C program to simulate the working of a Queue of integers using an array. provide the following operations: a. Insert b. Delete c. Display The program should print appropriate messages for Queue full and Queue empty
6	Write a C program to simulate the working of a Circular Queue of integers using an array. Provide the following operations: a. Insert b. Delete c. Display The program should print appropriate messages for Circular Queue full and Circular Queue empty
7	Write a C program to simulate the working of a Priority Queue of integers using an array. Provide the following operations: a. Insert b. Delete c. Display.
8	Write a C program using dynamic variables and pointers, to construct a Singly Linked List consisting of the following information in each node: student ID (integer), student name (string) and semester (integer). The operations to be supported are: a. The insertion operation: i. At the front of a list ii. At the back of the list iii. At any position in the list b. Deleting a node based on student id. c. Searching a node based on student id and update the information content. d. Displaying all the nodes in the list. (Note: Only either (a, b and d) or (a, c and d) may be asked in the examination).
9	Write a C program using dynamic variables and pointers, to construct a Doubly Linked List consisting of the following information in each node: student ID (integer), student name (string) and semester (integer). The operations to be supported are: a. Create a doubly linked list by adding each node at the front. b. Insert a new node to the left of the node whose key value is read as an input c. Delete the node of a given data, if it is found, otherwise display appropriate message. d. Display the contents of the list. (Note: Only either (a, b and d) or (a, c and d) may be asked in the examination).
10	Write a C Program to a. Construct a binary search tree of integers. b. Traverse the tree using inorder, preorder and postorder methods. c. Display the elements in the tree.

Course Outcomes

Course outcome	Descriptions
CO1	Understand the basic data structure operations and analyze the time and spacecomplexity of searching algorithms
CO2	Develop algorithms using the basic operations of stacks and queues and analyze theircomplexity
CO3	Implement the basic operations of linked lists and analyze their algorithm complexity.
CO4	Identify the basic terminologies and operations on binary trees, binary search tress,AVL trees and B+ trees
CO5	Compare the performance of selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort algorithms in term of Space and Time complexity

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	3	2	3	-	-	-	-	-	-	-	-	-	-
CO3	2	2	3	2	-	-	-	-	-	-	-	-	-	-
CO4	-	2	3	2	-	2	-	-	-	-	-	2	-	-
CO5	2	2	2	-	-	-	-	-	-	-	-	-	-	-

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Data Structures: A Pseudocode Approach with C	Richard F. Gilberg and Behrouz A. Forouzan	Second Edition, Cengage publication, 2007, ISBN- 13: 9788131503140
2	Data Structure using C	Aaron M. Tenenbaum, YedidyahLangsam and Moshe	Data Structure using C

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Data Structures and Program	Robert Kruse, C L	PHI, 2nd Edition,

	Design in C	Tondo, Bruce Leung, ShashiMogalla	2015,ISBN13: 978-0132883665.
2	Data Structures	Seymour Lipschutz	McGraw Hill publications, 2018, ISBN-13:978-0-070198-4

Department: : Computer Science and Engineering (Cyber Security)		**Semester:**	**III**

Subject:	**Operating Systems**			
Subject Code:	**22CY305**		**L – T – P - C:**	**3 – 0 – 0 – 3**

Sl. No	Course Objectives
1	To explain main components of OS and their working
2	To familiarize the operations performed by OS as a resource Manager
3	To impart various scheduling policies of OS
4	To teach the different memory management techniques.

Unit	Description	Hrs
I	**Operating Systems Overview:** Introduction, operating system operations, process management, memory management, storage management, protection and security, distributed systems. **Operating Systems Structures:** Operating system services and systems calls, system programs, operating system structure, operating systems generations.	**08**
II	**Process Management:** Process concepts, process state, process control block, scheduling queues, process scheduling, multithreaded programming, threads in UNIX, comparison of UNIX and windows. **Concurrency And Synchronization:** Process synchronization, critical section problem, Peterson's solution, synchronization hardware, semaphores, classic problems of synchronization, readers and writers problem, dining philosophers problem, monitors, synchronization examples(Solaris), atomic transactions. Comparison of UNIX and windows.	**08**
III	**Deadlocks**: System model, deadlock characterization, deadlock prevention, detection and avoidance, recovery from deadlock banker's algorithm. **Memory Management**: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation, virtual memory, demand paging, page-replacement algorithms, allocation of frames, thrashing, case study - UNIX.	**08**
IV	**File System:** Concept of a file, access methods, directory structure, file system mounting, file sharing, protection. File system implementation: file system structure, file system implementation, directory implementation,	**08**

	allocation methods, free-space management, efficiency and performance, comparison of UNIX and windows.	
V	**I/O System:** Mass storage structure - overview of mass storage structure, disk structure, disk attachment, disk scheduling algorithms, swap space management, stable storage implementation, tertiary storage structure. I/O: Hardware, application I/O interface, kernel I/O subsystem, transforming I/O requests to hardware operations, streams, performance	**08**

Course Outcomes:

Course outcome	Descriptions
CO1	Outline various concepts and features of Operating systems.
CO2	Compare various operating systems with respect to characteristics and features
CO3	Implement algorithm of CPU Scheduling, Memory Scheduling and disk scheduling
CO4	Make changes in the OS configurations as per need

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	3	2	3	-	-	-	-	-	-	-	-	-	-
CO3	2	2	3	2	-	-	-	-	-	-	-	-	-	-
CO4	-	2	3	2	-	2	-	-	-	-	-	2	-	-

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Operating System Principles,	Abraham Silberschatz, Peter Baer Galvin, Greg Gagne (2006),	7th edition, Wiley India Private Limited, New Delhi.

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Operating Systems, Internals and Design Principles	Stallings (2006),	5th edition, Pearson Education, India.
2	Modern Operating Systems,	Andrew S. Tanenbaum (2007),	2nd edition, Prentice Hall of India, India.
3	Operating systems,	Deitel & Deitel (2008),	3rd edition, Pearson Education,India

Department: : Computer Science and Engineering (Cyber Security)		**Semester:**	**III**

Subject: Skill Lab 1 (Python Lab)				
Subject Code:	**22CY306**		**L – T – P - C:**	**1-0-2-2**

Sl. No	Course Objectives
1	Understand the purpose and practical application of various Python programming constructs
2	Explore the operational principles of various Python data structures
3	Gain hands on experience on using Python Libraries for efficient data manipulation, analysis and visualization
4	Understand the purpose and practical application of various Python programming constructs

LAB CONTENT

Sl. No	Experiment Description
Minimum of two lab exercises have to be conducted on each of the following topics and the students have to submit case studies by integrating all the concepts	
1	Python Data Types, Operators and Expressions Conditionals and Iterations Functions and Modules Strings and Tuples
2	Lists, Dictionaries and Sets File handling Exception Handling
3	NumPy Arrays: Creating NumPy Arrays Array Indexing Reshaping Arrays Array Math Array Assignment Manipulating Tabular Data using Pandas: Pandas Series Pandas Data Frame Data Visualization using Matplotlib and Seaborn: Plotting Line Charts Plotting Bar Charts Plotting Pie Charts Plotting Scatter Plots Plotting Using Seaborn

Course outcome	Descriptions
CO1	Demonstrate expertise in handling various Python programming constructs
CO2	Identify and use appropriate data structures for efficient data representation and access

CO3	Develop Python scripts to analyze and visualize datasets

Course Outcomes:

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1											3		
CO2	1	3			1							3		
CO3	1	3			1			2	2			3		

Department: : Computer Science and Engineering (Cyber Security)			**Semester:**	**III**
Subject: SKILL DEVELOPMENT-I				
Subject Code:	**22SK307**		**L – T – P - C:**	**1 –0–0– 1**

Sl. No	Course Objectives
1	Improve Communication Skills: Enhance students' ability to express ideas clearly, listen actively, and adapt communication style to different contexts and audiences.
2	Foster Effective Teamwork: Develop students' teamwork skills, including cooperation, active participation, conflict resolution, and leveraging diverse strengths for collaborative success.
3	Enhance Leadership Abilities: Cultivate leadership qualities by helping students develop self- awareness, problem-solving skills, and decision-making abilities
4	Promote Professional Etiquette: Instill a sense of professionalism in students, emphasizing appropriate workplace behavior, business etiquette, and ethical conduct.

COURSE TOPICS

The course has 28 lectures in 5 Units. The 2- lecture hours per week of 1-hour duration. The syllabus for the lectures is given below

Unit	Description	Hrs
I	**Communication Skills**: Basics, Method, Means, Process and Purpose, Basics of Business Communication, Written & Oral Communication, Listening. **Communication with Confidence & Clarity**: Interaction with people, the need the uses and the methods, Getting phonetically correct, using politically correct language, Debate & Extempore.	**06**
II	**Assertive Communication**: Concept of Assertive communication, Importance and applicability of Assertive communication, Assertive Words, being assertive. **Presentation Skills:** Discussing the basic concepts of presentation skills, Articulation Skills, IQ & GK, How to make effective presentations, body language & Dress code in presentation, media of presentation.	**06**
III	**Team Work:** Team Work and its important elements Clarifying the advantages and challenges of team work Understanding bargains in team	**06**

	building Defining behavior to sync with team work Stages of Team Building Features of successful teams. **Body Language & Proxemics** : Rapport Building - Gestures, postures, facial expression and body movements in different situations, Importance of Proxemics, Right personal space to maintain with different people.	
IV	**Group discussion, Motivation and Stress Management** : a. Theory & Evaluation: Understanding why and how the group discussion is conducted. b. Techniques of group discussion c. Discussion on FAQs of group discussion d. Body language during group discussion Self-motivation, group motivation, leadership abilities, Stress clauses and stress busters to handle stress and de-stress; Understanding stress - Concept of sound body and mind, Dealing with anxiety, tension, and relaxation techniques. Individual Counseling & Guidance, Career Orientation. Balancing Personal & Professional Life	**04**
V	**Interview Skills, Professional Practice** : a. Personal and Group Interviews b. Mock Interviews - Questions asked & how to handle them c. Body language in interview d. Etiquette, Dress code in interview e. Behavioral and technical interviews Practice on stress interviews, technical interviews, General HR interviews **Professional Practice**: Professional Dress Code, Time Sense, Respecting People & their Space, Relevant Behavior at different Hierarchical Levels. Positive Attitude, Self- Analysis and Self-Management. Professional Ethics values to be practiced, standards and codes to be adopted as professional engineers in the society for various projects. Balancing Personal & Professional Life	**06**

Course outcome	Descriptions
CO1	Improved Communication Skills: Students will demonstrate enhanced verbal and written communication abilities, effectively expressing ideas, actively listening, and adapting their communication style to different situations.
CO2	Effective Teamwork and Collaboration: Students will exhibit improved teamwork skills, actively contributing to group projects, resolving conflicts constructively, and leveraging the strengths of team members to achieve shared goals.
CO3	Professional Etiquette and Conduct: Students will display professional behavior, adhering to workplace etiquette, demonstrating appropriate appearance, punctuality, and practicing ethical conduct in professional settings.
CO4	Strengthened Aptitude Skills: Students will demonstrate improved aptitude skills, including logical reasoning, analytical thinking, and problem-solving

	abilities, enabling them to excel in competitive exams, interviews, and real-life problem- solving scenarios

Course Outcomes:

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1					2		3	3	3				
CO2	1					2		3	3	3				
CO3	1					2		3	3	3				
CO4	1					2		3	3	3				

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Technical Communication Principles and Practices,	Meenakshi Raman and Sangeeta Sharma,	Oxford Publishers, 2004
2	Tools for Talking When Stakes are High,	Kerry Patterson, Joseph Grenny, Ron McMillan, Crucial Conversation	McGraw-Hill Publication, ISBN: 9780071772204

SUGGESTED ASSESSMENT:

Internal Assessment through 2-Tests, each carries 25 marks
The overall pass percentage is 40%. In case the student fails, he/she must repeat the course.

Department: : Computer Science and Engineering (Cyber Security)			**Semester:**	**III**
Subject: Constitution of India				
Subject Code:	**22HS308**		**L – T – P - C:**	**1 –0–0– 1**

Sl. No	Course Objectives
1	To be familiar with salient features and preamble of the constitution of India. Including fundamental rights of the citizen of India and types of Fundamental rights
2	To understand the relevance of directive principles under part-IV, and the responsibilities of the individuals towards society.
3	To understand the powers and functions of the Legislature, Executive, and judicial bodies.
4	To provide the information of FDs, Electoral Process, emergencies and amending procedures.

COURSE TOPICS

The course has 28 lectures in 5 Units. The 2- lecture hours per week of 1-hour duration. The syllabus for the lectures is given below

Unit	Description	Hrs
I	Introduction, Meaning and definitions. Salient features, Sources, Constituent Assembly, Drafting Committee. Preamble to the constitution of India.	**06**
II	Fundamental rights under part III – details of exercise of rights, Scopes & Limitations and, important cases	**06**
III	Relevance of directive principles of state policy under part-IV Fundamental duties and their significance-part-IV A	**06**
IV	Union Executive- President, Prime minister, Parliament and Supreme Court of India. State Executive – Governors, Chief Ministers, State legislature and High Courts.	**06**
V	Constitutional Special Provisions for Scheduled Castes and Tribes, Women, Children and backward classes. Emergency provisions under Part XVIII. Electoral process, Amendment procedure, 42nd, 44th, 74th, 76th, and 91stConstitutional amendments.	**06**

Course Outcomes:

Course outcome	Descriptions
CO1	Have general knowledge and legal literacy and thereby to take up competitive examinations
CO2	Understand the freedom, rights and restrictions including directives, through fundamental duties
CO3	Understand the importance of the three main organs of the constitution, Viz- the legislature, the executive and the judiciary.
CO4	Understand the power and functions of political institutions established throughout the country

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						2	1	3	3	2				
CO2						2	2	3	3	2				
CO3						2	3	3	2	2				
CO4						2	2	3	3	2				

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Introduction to the Constitution of India" (student edition)	DurgaDas Basu,	EEE, 19th / 20th Edn.,2001
2	An Introduction to Constitution of India	MV Pylee.	Volume-1 Vikas Publishing, 2002

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	An Introduction to	Brij kishore	prentice-Hall of India,

	Constitution of India"	Sharma,	Volume12002
2	Constitution of India and Professional Ethics	V. Rajaram	Second Edition New Age International Publication. 2011

SUGGESTED ASSESSMENT:

Internal Assessment through 2-Tests, each carries 25 marks
The overall pass percentage is 40%. In case the student fails, he/she must repeat the course

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Academic Year 2024-25

Scheme of Teaching and Examination-2022 (160 Credits Scheme, NEP)

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

IV Semester B.E.

4th Semester BE (Group 2: ISE/ECE/ETE/MLE/DSE/Cyber Security) **Academic year 2024-25**

Sl No	Course Code		Course Title	Teaching Dept.	L	T	P	Credits	CIE Marks	SEE Marks	Total Marks	Exam Hrs
1	BS	22SS401	Combinatorics and Advanced Linear Algebra	MA	3	-	-	3	50	50	100	3
2	PC	22CY402	Information theory for Cyber Security	CY	3	-	-	3	50	50	100	3
3	PC	22CY403	Computer Communication Networks	CY	3	-	2	4	50	50	100	3
4	PC	22CY404	Database Management System	CY	3	-	2	4	50	50	100	3
5	PC	22CY405	Algorithm Design and Analysis	CY	3	-	-	3	50	50	100	3
6	PC	22CY406	Dept. Skill Lab-2 (Algorithm Design and Analysis)	CY	1	-	2	2	50	50	100	3
7	HS	22HS407	Universal Human Values	HS	1	-	-	1	50	-	50	-
8	HS	22HS408	Environment Studies	HS	1	-	-	1	50	-	50	-
L: Lecture, T-Tutorial, P-Practical/Drawing, CIE: Continuous Internal Evaluation, SEE: Semester End Examination				Total	18	-	6	21	400	350	700	-

Credits Distribution: Basic Science (BS)=08+08+3+3=22, Engineering Science (ES)=10+11=21, Humanities & Social Sciences (HS)=1+2+2=5 , Program Core (PC)=02+16+16=34, Total Credits=20+20+21+21=82.

Total 60 AICTE Activity points need to earn by each regular student and Total 35 AICTE Activity points need to earn by each Lateral entry student at the end of 2nd Year BE.

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Department: Computer Science and Engineering (Cyber Security) **Semester: IV**

Subject: Combinatorics and Advanced Linear Algebra

Subject Code: 22MA401 **L – T – P - C: 3 – 0 – 0 – 3**

Sl. No	Course Objectives
1	To introduce the concept of generating function, exponential generating functions.
2	Describe the concepts of Derangements, Rook polynomials.
3	To solve simultaneous algebraic equations using methods of matrix algebra.
4	To introduce concepts of inner products to matrix decomposition.

Unit	Description	Hrs
I	**The principle of Inclusion and Exclusion:** The principle of Inclusion and Exclusion, Generalizations of Principle. Derangements, Rook Polynomials, Arrangements with forbidden positions.	**08**
II	**Generating functions:** Ordinary Generating functions, Definition and problems. Calculational Techniques, Partition of Integers, Exponential generating function, problems.	**07**
III	**Vector spaces:** Solution of system of equations by LU decomposition method. Vector space, Subspaces, Linear Combinations, Linear Spans, row space and column space of a Matrix, Linear Dependence and Independence (all statements only). **Basis and Dimensions:** Basis and Dimensions of Vector space and problems.	**09**
IV	**Linear transformation:** Introduction, Linear Mappings, Kernel and Image of a linear transformations, Matrix representation of linear transformations, Range space, Null space, Nullity, Rank-Nullity Theorem, Singular and Nonsingular linear transformations (all statements only), Problems.	**08**
V	**Inner Product spaces:** Inner product, norms of a vector, angle between vectors. Orthogonal vectors, orthogonal and orthonormal basis, projections of a vector. Gram-Schmidt orthogonalization process, QR-factorization (all statements only), problems. Diagonalization of a matrix (symmetric matrices) and singular value decomposition, Problems.	**08**

Course Outcomes:

Course outcome	Descriptions
CO1	Understand the concept Principle of inclusion-exclusion, Rook polynomial, generating function, vector space, linear transformations
CO2	Apply the techniques of QR and singular value decomposition for data compression, least square approximation in solving inconsistent linear systems.
CO3	Apply the knowledge of Rook polynomial, linear algebra to model and solve that appears in engineering sciences.

CO4	Apply the idea of generating functions, transformations and orthogonal projection in Engineering field. Analysis.

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	4	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	4	3	-	-	-	-	-	-	-	-	-	-	-	-
CO3	4	3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	4	3	-	-	-	-	-	-	-	-	-	-	-	-

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Discrete and Combinatorial Mathematics	Ralph P. Grimaldi	5th Edition, 2006, Pearson Education, ISBN13: 978-81-7758-424-0.
2	Linear Algebra and its Applications	David C. Lay,	3rd Edition, 2002, Pearson Education India, ISBN-13: 978-81-7758-333-5.

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Linear Algebra and its Applications	Gilbert Strang	4th Edition, 2006, Cengage Learning India Edition, ISBN: 81-315-0172-8.

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Department: Computer Science Engineering (Cyber Security)	**Semester:**	**IV**

Subject: Information theory for cyber security				
Subject Code:	**22CY402**		**L – T – P - C:**	**3– 0 – 0– 3**

Sl. No	Course Objectives
1	To understand information theoretic behavior of a communication system.
2	To understand various channel coding techniques and their capability.
3	To understand various source coding techniques for data compression
4	To Build and understanding of fundamental concepts of data communication and networking.

Unit	Description	Hrs
I	**Information Theory:** Introduction, Measure of information, Average information content of symbols in long independent sequences, Average information content of symbols in long dependent sequences. Mark-off statistical model for information source, Entropy and information rate of mark-off source.	**08**
II	**Source Coding:** Encoding of the source output, Shannon's encoding algorithm. Communication Channels, Discrete communication channels, Continuous channels**.** Fundamental Limits on Performance: Source coding theorem, Huffman coding, Discrete memory less Channels, Mutual information, Channel Capacity.	**08**
III	**Channel coding theorem**: Differential entropy and mutual information for continuous ensembles, Channel capacity Theorem.	**08**
IV	**Introduction to Error Control Coding:** Introduction, Types of errors, examples, Types of codes Linear Block Codes: Matrix description, Error detection and correction, Standard arrays and table look up for decoding.	**08**
V	**Binary Cycle Codes:** Algebraic structures of cyclic codes, Encoding using an (n-k) bit shift register, Syndrome calculation. BCH codes. RS codes, Golay codes, Shortened cyclic codes, Burst error correcting codes. Burst and Random Error correcting codes	**08**

Course Outcomes:

Course outcome	Descriptions
CO1	Analyze the principles and applications of information theory
CO2	Apply information theory and linear algebra in source coding and channel coding
CO3	Understand various error control encoding and decoding techniques
CO4	Analyze the performance of error control codes

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	-	-	-	-	2	-	-	-	-	-	-
CO2	2	3	2	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	3	2	-	-	-	-	-	-	-	-	-	-
CO4	-	2	3	-	-	-	-	-	-	-	-	-	-	-

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Digital and analog communication systems	K. Sam Shanmugam,	John Wiley,
2	Digital communication,	Simon Haykin	, John Wiley, 2003.

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	ITC and Cryptography,	Ranjan Bose,	TMH, II edition, 2007
2	Digital Communications -	Glover and Grant	Pearson Ed. 2nd Ed 2008

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Department: Computer Science and Engineering (Cyber Security) **Semester: IV**

Subject: Computer Communication Networks
Subject Code: 22CY403 **L – T – P - C: 3 – 0 – 2 – 4**

Sl. No	Course Objectives
1	Familiarize the students with functions of various layers in the network model(OSI,TCP/IP) for data communications
2	Analyse Guided/Un-guided media, Framing techniques, flow control, error control mechanisms and Data link, MAC protocols
3	Understand Network layer Services, IP addressing, Packet formats & Routing protocols
4	Comprehend the Transport layer Services, TCP/UDP Packet formats & Protocols

Unit	Description	Hrs
I	**Data Communications:** Introduction, Components, Representations, Data Flow, Networks: Network criteria, Physical Structures, Network Types: LAN, WAN, Switching, The Internet, Accesing the internet. **Network Models:** TCP/IP Protocol Suite: Layered Architecture, The OSI model: OSI versus TCP/IP. **Data-Link Layer:** Introduction, Nodes and Links, Services, Categories of link, Two sub layers, Link Layer addressing: ARP, Data Link Control (DLC) services: Framing, Flow and Error Control, Simple protocol, Stop and wait protocol (**Text 1:** 1.1, 1.1.1, to 1.1.3, 1.2, 1.2.1, 1.2.2, 1.3, 1.3, 1.3.1, to 1.3.5 , 2.2, 2.2.1, to 2.2.3, 2.3, 2.3.1 , 9.1, 9.1.1, 9.1.2, 9.1.4, 9.2, 9.2.2, 11.1, 11.1.1, 11.1.2, 11.2.1, 11.2.2)	**09**
II	**Media Access Control:** Introduction. Random Access: ALOHA, CSMA, CSMA/CD, CSMA/CA. Controlled Access: Reservation, Polling, Token Passing. Channelization: FDMA, TDMA, CDMA. **Physical Layer:** Introduction to Guided and unguided physical media. **Wired and Wireless LANs:** IEEE project 802, Ethernet Evolution, Standard Ethernet: Characteristics, Efficiency, and Implementation. **Wireless LANs:** Characteristics, Access control, IEEE 802.11 project: Architecture, , MAC Sub layer, Bluetooth: Architecture. (**Text 1:** 12.1, to 12.1.4, 12.2.1, to 12.2.3, 12.3, 12.3.1, to 12.3.3, 7.2, 7.2.1, to 7.2.3, 7.3, 7.3.1, to 7.3.3, 13.1.1, 13.1.2, 13.2, 13.2.1, 13.2.4, 13.2.5, 15.1.2, 15.1.3, 15.2, 15.2.1, 15.2.2, 15.3, 15.3.1)	**08**

III	**Connecting Devices:** Introduction, Hubs, link layer Switches, Routers, Virtual LANs: Membership, Configuration **Network Layer:** Introduction, Network Layer services: Packetizing, Routing and Forwarding. **IPV4Addresses:** Address Space, Classful Addressing, Classless Addressing, Network Address Translation. (**Text 1:** 17.1.1, 17.1.2, 17.1.3, 17.2, 18.1, 18.1.1, 18.1.2, 18.4, 18.4.1, to 18.4.3, 18.4.5)	**08**
IV	**Network Layer Protocols:** Introduction, Internet Protocol (IP): Datagram Format, Security of IPv4 Datagram, Mobile IP: Addressing, Agents, Three Phases, Inefficiency in Mobile IP. **Next Generation IP:** IPV6 Addressing, Representation, Address Space, IPV6 Protocol- packet format, Transition from IPv4 To IPv6, Strategies. **Uni-cast Routing:** Routing Algorithms: Distance Vector Routing, Link State Routing. (**Text 1:**19.1, 19.1.1, 19.1.4, 19.3, 19.3.1, to 19.3.4, 22.1, 22.1.1, 22.1.2, 22.2, 22.2.1, 22.4, 22.4.1 , 20.2, 20.2.1, 20.2.2)	**08**
V	**Transport Layer:** Transport Layer Services, Protocols, Transport Layer Protocols: Stop & wait protocol, Go-Back-N Protocol, Selective Repeat protocol. **Transport Layer Protocols in the Internet:** User Datagram Protocol: User Datagram, UDP Services, UDP Applications, Transmission Control Protocol: TCP Services, TCP Features, TCP Segment, TCP Connection. (**Text 1:** 23.1.1, 23.2, 23.2.2, 23.2.3, 23.2.4 , 24.2, 24.2.1, to 24.2.3, 24.3, 24.3.1, to 24.3.4)	**07**

LAB CONTENT

Sl. No	Experiment Description
	PART-A : Experiments using C/Python programming
	01) Implement Bit stuffing & De-stuffing Algorithm 02) Implement Character stuffing & De-stuffing Algorithm 03) Implement Encryption and Decryption algorithms 04) Implement STOP and WAIT protocol, Sliding window protocol.
	PART-B : Simulation Experiments using Cisco Packet tracer/NS2/NS3
	1) Simulate a four-node point to point network with duplex links between them and set the queue size to vary bandwidth and to find the number of packets dropped. 2) Simulate different types of internet traffic such as FTP and TELNET over a network to analyze the throughput. 3) Simulate Ethernet LAN using n nodes and set multiple traffic nodes to determine collision across different node. 4) Test and verify Network configurations using Packet Tracer. 5) Performing an Initial Router configuration Cisco Packet Tracer. 6) Performing OSPF configuration using Cisco Packet Tracer.

Course Outcomes:

Course outcome	Descriptions
CO1	Identify the functions of various layers in the network model(OSI,TCP/IP) for data communications.(L1)
CO2	Demonstrate Guided/Un-guided media, Framing techniques, flow control, error control mechanisms and Data link, MAC protocols.(L3)
CO3	Summarize & Simulate Network layer devices, Services, IP Packet formats, Protocols.(L2)
CO4	Interpret Transport layer Services, Packet formats, Protocols(L3)

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													3
CO2	2	2	2	1	2					1			2	2
CO3	2	2	1		2					1			2	2
CO4	2	2	1		2					1				2

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Data Communication and Networking	B Forouzan	McGraw Hill,2013, 5th Edition
2	Computer networks	Andrew S.Tenenbaum	Pearson Prentice hall, 2010, 4th Edition

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Computer Networks	James F.Kurose, Keith W.Ross	Pearson Edu., 2nd Edition, 2003
2	Introduction to Data Communication and Networking	Wayne Tomasi	Pearson Edu., 2007
3	Computer Networks	V.S. Bagadandl. A .Dotre	Technical publications, 2nd edition, 2009.

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Department: Computer Science and Engineering (Cyber Security)			**Semester:**	**VI**
Subject: Database Management System				
Subject Code:	**22CY404**		**L-T- P- C:**	**3-0-2-4**

Sl. No	Course Objectives
1	Provides a strong foundation in Database concepts, technology, and practice
2	Practice SQL programming through a variety of database problems.
3	Demonstrate use of concurrency and transactions in the database.
4	Design and build database applications for real-world problems.

Unit	Description	Hrs
I	**Introduction to Database Systems** -Databases and Database users: Introduction, An example, Characteristics of Database Approach, Advantages of using the DBMS approach, Data Models, Schemas and Instances, Degrees of data abstraction and Data Independence, Three-schema Architecture, The Database System Environment. **Data Modeling Using the Entity-Relationship Model**- High-Level Conceptual Data Models for Database Design; Entity Types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and Structural Constraints; Weak Entity Types, Specialization and Generalization.	**08**
II	**Relational Model** - Relational Model Concepts, Relational Model Constraints, and Relational database schemas, Update operations, transactions, and dealing with constraint violations. **Relational Algebra** -Unary and Binary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Additional relational operations (aggregate, grouping, etc.), Examples of Queries in Relational Algebra. Binary Relational Operations: JOIN and DIVISION; Examples of Queries in Relational Algebra. **Mapping Conceptual design into Logical design**- ER Diagrams, Constraints, Codd's rules, and Relational Database design using ER-to-Relational Mapping.	**08**

III	**SQL-** SQL data definition and data types, specifying constraints in SQL, retrieval queries in SQL, INSERT, DELETE, and UPDATE statements in SQL, Additional features of SQL. **Constraints** -What are constraints, Different types of constraints **Views**- Introduction to views, data independence, security, updates on views, comparison between tables and views. **Application Development-** Accessing databases from applications, An introduction to JDBC, JDBC classes and interfaces, SQLJ, and Stored procedures.	**08**
IV	**Normalization-** Introduction to Normalization, Functional and Multivalued Dependencies, Design guidelines for relation schema, Functional Dependencies, First Normal Form, Second and Third Normal Forms, Boyce-Codd Normal Form, Multivalued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal Form. Examples of normal forms.	**08**
V	**Transaction management** -Introduction to Transaction Processing, Transaction and System concepts, Serializability and concurrency control characterizing schedules based on recoverability, and Transaction support in SQL. **Concurrency Control in Databases**- Lock based concurrency control (2PL, Deadlocks), Timestamp ordering, optimistic methods, Multiple version Concurrency control technique, database recovery management..	**08**

LAB CONTENT

Sl. No	Experiment Description
1	Consider the following schema for Insurance database: PERSON (driver_id , name, address) CAR (regno, model, year) ACCIDENT (reportno, accd_date, location) OWNS (driver_id, regno) PARTICIPATED (driver_id, regno, reportno, damage_amt)
2	Consider the following database schema for student database: STUDENT (usn, name, major, bdate) COURSE (courseno, cname, dept) TEXT (book_ISBN, book_title, publisher, author) ENROLL (usn,courseno, sem, marks) BOOK _ ADOPTION (courseno, sem, book_ISBN)

3	Consider the schema for Company Database: DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate) EMPLOYEE (SSN, Name, Address, Sex, Salary, SuperSSN, DNo) DLOCATION (DNo,DLoc) PROJECT (PNo, PName, PLocation, DNo) WORKS_ON (SSN,PNo, Hours)
4	Consider the following schema for Movie Database: ACTOR (Act_id, Act_Name, Act_Gender) DIRECTOR (Dir_id, Dir_Name, Dir_Phone) MOVIES (Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id) MOVIE_CAST (Act_id,Mov_id, Role) RATING (Mov_id, Rev_Stars
5	Mini-Project: A Mini Project should be implemented and shall be carried out in a batch of two students. The students will finalize a topic in consultation with the faculty. The mini project must be carried out in the college only. The Mini Project tasks would involve: a. Understand the complete domain knowledge of application and derive the complete data requirement specification of the Mini Project b. Design of the project c. Normalization of the Relational design. d. Documentation and submission of report. Typical Mini Projects: a. Placement management system. b. Result management & analysis system. c. SSIT Blog management system. d. Student Feedback system. e. Library management. f. Electricity Bill Management System. g. Online Retail Application Database. h. Inventory Control Management. i. Library Management System. j. Student Database Management. k. Payroll Management System. l. Voice-based Transport Enquiry System. m. SMS-based Remote Server Monitoring System. n. Restaurant Management. o. Pharmacy Management System. p. Hospital Management System. q. Centralized College Database. r. Art Gallery Management Database

Course Outcomes:

Course outcome	Descriptions
CO1	Identify, analyze, and define database objects, enforce integrity constraints on a database using RDBMS
CO2	Use Structured Query Language (SQL) for database manipulation and demonstrate the basics of query evaluation..
CO3	Design and build simple database systems and relate the concepts of transaction, concurrency control, and recovery in the database..
CO4	Develop applications to interact with databases and relational algebra expression.

Course Articulation Matrix:

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	3							1		3		
CO2	3	3	3	2	3						2	3		
CO3	3	3	3	3	2		3	2				3		
CO4	2	3		2			3					3		

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Fundamentals of Database Systems	Ramez Elmasri and Shamkant B. Navathe	7th Edition, Pearson Education 2017 ISBN 978-9332582705
2	Database management systems	Ramakrishnan, and Gehrke	3rd Edition, McGraw Hill 2014.

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Database System Concepts 6th Edition	Abraham Silberschatz, Henry F. Korth and S. Sudarshan's	ISBN 978-9332901384 2013

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Department: Computer Science and Engineering (Cyber Security)	**Semester:**	**IV**

Subject: Algorithm Design and Analysis				
Subject Code:	**22CY405**		**L – T – P – C:**	**3 – 0 – 0 – 3**

Sl. No	Course Objectives
1	Understand basic efficiency classes and asymptotic notations to express the complexity of algorithms.
2	Know the different Algorithm Design Techniques for effective problem solving.
3	Analyze the algorithm with respect to space and time complexity.
4	Comparison of algorithm efficiency in different design techniques.

Unit	Description	Hrs
I	**Introduction, Fundamentals of the Analysis of Algorithm Efficiency, Brute Force:** Algorithm Definition, Fundamentals of algorithmic problem solving, Analysis Framework, Formal Definitions of Asymptotic Notations, Basic efficiency classes, Mathematical analysis of Non-Recursive and recursive Algorithms with Examples. Brute Force: String Matching.	**08**
II	**Divide and Conquer:** Merge Sort, Quick Sort, Finding the Maximum and Minimum. Decrease and Conquer: Insertion Sort, Topological Sorting.	**08**
III	**Transform and Conquer:** Heaps and Heap Sort and AVL Trees. **Space and Time Tradeoffs:** Input Enhancement in String Matching- Horspool‟s algorithm, Hashing: Hash table, Hash functions, Collision handling by open addressing and chaining.	**08**
IV	**Greedy Technique:** Prim‟s algorithm, Kruskal‟s algorithm, Dijkstra‟s algorithm. **Dynamic Programming:** Floyd‟s Algorithms, Knapsack Problem and Memory Functions.	**08**
V	**Back tracking:** n-Queen‟s Problem, Subset-Sum Problem. **Branch and Bound:** Assignment Problem, Knapsack Problem, and Traveling Salesman Problem.	**08**

Course Outcomes:

Course outcome	Descriptions
CO1	Understand the basic concepts of algorithm analysis.
CO2	Demonstrate various algorithm design techniques.
CO3	Design an algorithm and analyze its complexity to rank order of growth.
CO4	Apply the appropriate algorithm design technique to solve the given problem instance.

Course Articulation Matrix

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	2	3							3		
CO2	3	3	3	3	2							3		
CO3	2	3	3	3	3							2		
CO4		3	3	3	3							3		

Text Books:

Sl	Author	Text Book title	Publisher	Volume / Issue	Year of Publica t ion
1	Anany Levitin	Introduction to the Design &Analysis of Algorithms	PEARSON	3rd Edition, ISBN-13: 978-0-13-231681-1	2012
2	Ellis Horowitz, SatrajSahni and Rajasekaran	Computer Algorithms/C++	UniversitiesPress	2nd Edition, ISBN-13: 978-8173716119	2019

Reference Books:

Sl. No.	Author	Text Book title	Publisher	Volume / Issue	Year of Publication
1	Cormen T.H, Leiserson C.E.&Rivest R.L	Introduction to Algorithms	Vikas Publishin g House Pvt Limited	3rd Edition ISBN- 13: 978-026203384 8	2012
2	Jon Kleinberg and Eva Tardos,	Algorithm Design Pearson,	-	1st Edition	2013
3	S. Sridhar	Design and Analysis ofAlgorithms	Oxford university press,	-	2014.

SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU
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Academic year 2023-2024

Department: Computer Science and Engineering (Cyber Security)	**Semester:**	**IV**

Subject: Algorithm Design and Analysis Lab				
Subject Code:	**Dept. Skill Lab – 2 22CY406**		**L – T – P - C:**	**1-0-2-2**

Sl. No	Course Objectives
1	Understand basic efficiency classes and asymptotic notations to express the complexity of algorithms.
2	Know the different Algorithm Design Techniques for effective problem solving.
3	Analyze the algorithm with respect to space and time complexity
4	Comparison of algorithm efficiency in different design techniques

LAB CONTENT:

Sl. No	Experiment Description
1	**Brute Force:** String matching.
2	**Divide and Conquer:** • Sort a given set of elements using Merge sort. • Sort a given set of elements using Quick Sort. • Finding the Maximum and Minimum element in an array of „n‟ integers.
3	**Decrease and Conquer:** • Print the vertices of the directed acyclic graph in topologicalorder using Source Removal Method. Sort a given set of elements using Insertion Sort.
4	**Transform and Conquer:** • Create a heap tree for a given list of N elements using Bottom-up approach and sort the elements using Heap Sort Technique.
5	**Space and Time Tradeoffs:** Implement Horspool algorithm for String Matching..
6	**Greedy Technique:** • Find Minimum Cost Spanning Tree of a given undirected graph using Prim‟s algorithm. • Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal‟s algorithm. From a given vertex in a weighted connected graph, find theshortest paths to other vertices using Dijkstra's algorithm.
7	**Dynamic Programming:** • Solve Knapsack problem and print the solution vector. Find all pair shortest path using Floyd‟s Algorithm..
8	**Back Tracking:** • Implement N Queen's algorithm.Find a subset of a given set S of N positive integers whosesum is equal to a given positive integer D.

Course Outcomes:

Course outcome	Descriptions
CO1	Understand the basic concepts of algorithm analysis.
CO2	Demonstrate various algorithm design techniques.
CO3	Design an algorithm and analyze its complexity to rank order of growth.
CO4	Apply the appropriate algorithm design technique to solve the given problem instance.

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2											
CO2	1	3	3	2										
CO3		2	2	2								1		
CO4	2	3	3	2										

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Academic year 2023-2024

Department: : Computer Science and Engineering (Cyber Security)			**Semester:**	**III**
Subject: Universal Human Values				
Subject Code:	**22HS407**		**L – T – P - C:**	**1 –0–0– 1**

Sl. No	Course Objectives
1	This introductory course input is intended: To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings
2	To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards Value-based living in a natural way.
3	To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.
4	This course is intended to provide a much needed orientation input in value education to the young enquiring minds.

COURSE TOPICS
The course has 28 lectures in 5 Units. The 2- lecture hours per week of 1-hour duration. The teacher is expected to present the issues to be discussed as propositions and encourage the students to have a dialogue

Unit	Description	Hrs
I	Introduction to Value Education: 1.Understanding Value education-Need, Guidelines, content, Role of education-Sanskar 2. Process for Value Education- Self-exploration, the Dialogue Within. 3.Continuous Happiness and Prosperity – the Basic Human Aspirations 4.Right Understanding, Relationship and Physical Facility 5. Exploring the Meaning of Happiness and Prosperity. 6.Method to Fulfill the Basic Human Aspirations	**06**
II	Harmony in the Human Being: 7.Understanding the Human being (As the Co-existence of the Self and Body) 8.Distinguishing between the Needs of the Self and the Body 9.The Body as an Instrument of the Self-The response of the self and the body 10: Understanding Harmony in the Self-State of imagination 11: understanding Harmony of the Self with the Body 12: Programme to ensure self-regulation and Health-Nurturing the body	**06**
III	Understanding Harmony in the Family and Society 13: Harmony in the Family – the Basic Unit of Human Interaction 14: Values in	**06**

	Human-to-Human Relationship 15: 'Trust' – the Foundational Value in Relationship 16: 'Respect' – as the Right Evaluation 17: Other Naturally Acceptable Feelings in Relationship-Affection, Care, Guidance, Reverence, Glory, Gratitude and Love 18: Vision for the Universal Human Order-from family to world family	
IV	Understanding Harmony in the Nature/Existence: 19: Understanding Harmony in the Nature 20: Interconnectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature 21:Realizing Existence as Co-existence at All Levels 22: The Holistic Perception of Harmony in Existence	**04**
V	Implications of the Holistic Understanding – a Look at Professional Ethics 23: Natural Acceptance of Human Values 24: Definitiveness of (Ethical) Human Conduct 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order 26: Competence in Professional Ethics 27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies 28: Strategies for Transition towards Value-based Life and Profession	**06**

Course Outcomes:

Course outcome	Descriptions
CO1	By the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
CO2	They would have better critical ability, also become sensitive to their Commitment towards what they have understood (human values, human relationship and human society).
CO3	It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.
CO4	This is only an introductory foundational input. It would be desirable to follow it up by a)Faculty-student or mentor-mentee programs throughout their time with the institution b)Higher level courses on human values in every aspect of living

SUGGESTED ASSESSMENT:

This is a compulsory credit course. The assessment is to provide a fair state of development of the student, so participation in classroom discussions; self-assessment will be used in evaluation.
Example: Assessment through 2-Tests, each carries 25 marks
The overall pass percentage is 40%. In case the student fails, he/she must repeat the course.

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1				1		3	3	3	2	3				
CO2				2		3	3	3	2	3				
CO3				2		3	3	3	2	3				
CO4				2		3	3	3	2	3				

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	A Foundation Course in Human Values and Professional Ethics,	R R Gaur, R Sangal G P Bagaria,	Excel Books, New Delhi,2010
2	The Teacher's Manual Teachers' Manual for A Foundation Course in Human Values and, Professional Ethics,	R R Gaur, R Asthana, G P Bagaria	2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Jeevan Vidya: EkParichaya,.	A Nagaraj,	Jeevan Vidya Prakashan, Amarkantak, 1999.
2	Human Values,	A.N. Tripathi,	New Age Intl. Publishers, New Delhi, 2004
3	The Story of Stuff (Book). . i) Small is Beautiful ii) Slow is Beautiful	- E. F Schumacher. - Cecile Andrews	
4	The Story of My Experiments with Truth	- by Mohandas Karamchand Gandhi	

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Academic year 2023-2024

Department: : Computer Science and Engineering (Cyber Security)			**Semester:**	**III**
Subject: Environmental Studies				
Subject Code:	**22HS408**		**L – T – P - C:**	**2 –0–0– 1**

Sl. No	Course Objectives
1	To analyze an overall impact of specific issues and develop environmental management plan.
2	Develop analytical skills, critical thinking and demonstrate socio-economic skills for sustainable development.
3	To gain knowledge on different types of pollution in the environment.
4	To gain knowledge on different types of pollution in the environment.

COURSE TOPICS

The course has 28 lectures in 5 Units. The 2- lecture hours per week of 1-hour duration

Unit	Description	Hrs
I	**Introduction**: Environment - Components of Environment Ecosystem: Types of Ecosystem, Balanced ecosystem. Human Activities – Food, Shelter, And Economic & Social Security, Effects of human activities on environment- Agriculture, Housing, Industry, Mining & Transportation. Environmental Impact Assessment (EIA), Sustainable Development.	**06**
II	**Natural Resources-**Introduction, types of resources, Water resources – Availability & Quality aspects, Water borne diseases & water induced diseases, Fluoride problem in drinking water. Mineral resources, Forest Wealth. Material Cycles – Carbon Cycle, Nitrogen Cycle & Sulphur Cycle.	**06**
III	**Energy** – Different types of energy, Conventional sources & Non-conventional sources of energy Solar energy, Hydro electric energy, Wind Energy, Nuclear energy, Biomass & Biogas Fossil Fuels, Hydrogen as an alternative energy.	**04**
IV	**Environmental Pollution** – Air Pollution & Automobile Pollution Water Pollution, Noise pollution, Land Pollution, Public Health Aspects. Global Environmental Issues: Population Growth, Urbanization, Land Management, Water & Waste Water Management.	**06**
V	**Definition, Effects** – Global Warming, Acid rain & Ozone layer depletion, controlling measures. Solid Waste Management, E - Waste Management & Biomedical Waste Management -Sources, Characteristics & Disposal methods. Environmental Acts & Regulations, Role of government, Legal aspects, Role of Non-governmental Organizations (NGOs) , Environmental Education	**06**

Course Outcomes:

Course outcome	Descriptions
CO1	By the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
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Course Articulation Matrix

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CO1	2	2	1	1	1	3	3	2	2	2	1	3		
CO2	2	2	1	1	1	3	3	2	2	2	1	1		
CO3	2	2	1	1	1	3	3	2	2	2	1	1		
CO4	2	2	1	1	1	3	3	2	2	2	1	1		

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Environmental Studies	Benny Joseph	Tata McGraw– Hill Publishing Company Limited (2005), Delhi.
2	Environmental Studies	R Rajagopalan	From Crisis to Cure", Oxford University Press, 2005,93-87034-53-2

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Environmental Science and Engineering	Aloka Debi,	J Universities Press (India) Pvt. Ltd. 2012
2	Environmental Studies	R.J.Ranjit Daniels and Jagadish Krishnaswamy	Wiley India Private Ltd., New Delhi(2009),
3	Text Book of Environmental and Ecology",	- Dr.Pratiba Sing, Dr.AnoopSingh and Dr.Piyush - Malaviya,	Acme Learning Pvt. Ltd. New Delhi
4	Environmental Science – working with the Earth	G.Tyler Miller Jr.,	Eleventh Edition, Thomson Brooks /Cole, 2006

SUGGESTED ASSESSMENT:

Internal Assessment through 2-Tests, each carries 25 marks
The overall pass percentage is 40%. In case the student fails, he/she must repeat the course.