School of Engineering & Technology

B.Tech. CSE (Hons)

B.Tech. CSE (Hons) with specialization AI&ML / AI&DS / Cyber Security

Programme Code:01

Evaluation Scheme & Syllabus W.e.f.-2024-25

B. Tech.(Hons), B. Tech.(Hons) with specialization AI&ML / AI&DS / Cyber Security

TITLE: Four Year Programme Structure for B.Tech (CSE) with AI&ML / AI&DS / Cyber Security

DURATION OF THE COURSE: 4 Years

Total Credits- 186

Total credit of the 04 year UG Programme year wise	01st Year	48
	02nd Year	49
	03rd Year	48
	04th Year	41

Minimum credit required for multiple entry and exit:

Award on Exit after 2 Semesters: Undergraduate Certificate 48 credits + [Vocational / Internship] (04 Credits) = 52 Credits.

Award on Exit after 4 Semesters: Undergraduate Diploma 97 credits + [Vocational / Internship] (04 Credits) = 101 Credits.

Award on Exit after 6 Semesters: Undergraduate Degree (core) 145 credits + [Vocational / Internship] (04 Credits) = 149 Credits.

Vision of the University

To be recognized as an Institution of excellence, facilitating learning, fostering creativity, knowledge creation, innovations, consultancy and leadership in multiple areas to build a conscious community that will positively impact living beings for a sustainable future.

Mission of the University

1. To Create conducive environment for an interactive and application oriented experiential learning making the Institute a preferred destination for work and study.
2. To Foster creativity, research and innovation orientation in students and faculty in basic and applied areas in all of its disciplines, provide cost effective solutions and nurture entrepreneurial capabilities to accelerate growth.
3. To act as a catalyst in social change by developing academic, social, political, technological, scientific, industrial and business leadership in the spirit “Think Globally and Act Locally”; by providing ample opportunities to develop team spirit, sportsmanship and love for culture and national heritage.

Core Values

1. Integrity
2. Honesty
3. Transparency
4. Empathy

School of Engineering & Technology

Vision of School

To be a globally recognized hub of excellence in engineering and technology education, renowned for nurturing creative problem solvers, fostering interdisciplinary collaboration, and driving impactful solutions for the

Mission of School

To empower future generations through transformative education and innovation, our mission is to:

1. Cultivate visionary leaders and creative problem solvers through interdisciplinary collaboration, driving impactful solutions that advance society's well-being and sustainable development.

2. Be a preeminent global center for engineering and technology.

Core Values

1. Excellence
2. Innovation
3. Sustainability
4. Global Perspective

Programme Educational Objectives (PEO's)

B. Tech.(Hons) with specialization AI&ML / AI&DS / Cyber Security

PEO-1 The graduates will establish themselves as professionals by solving real-life problems using exploratory and analytical skills acquired in the field of Computer Science and Engineering.

PEO-2 The graduates will provide sustainable solutions to ever changing interdisciplinary global problems through their Research & Innovation capabilities.

PEO-3 The graduates will become employable, successful entrepreneur as an outcome of Industry-Academia collaboration.

PEO-4 The graduates will embrace professional code of ethics while providing solution to multidisciplinary social problems in industrial, entrepreneurial and research environment to demonstrate leadership qualities.

Programme Outcomes (PO's):

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes (PSO):

PSO1: Experiment and prepare programming concepts and provide new ideas and innovations towards research and societal issues.

PSO2: Analyse and develop computer programs in the areas related to algorithms, system software, cloud computing, artificial intelligence & machine learning, bioinformatics, big data analytics, block chain, cyber security and networking for efficient design of computer-based systems of varying complexity.

PSO3: Apply standard Software Engineering practices and strategies in software project development using open-source programming environment to deliver a quality product for business success.

Semester-wise Teaching Scheme
UG Program

B. Tech. CSE (Hons)
B. Tech. CSE (Hons) with specialization AI&ML / AI&DS / Cyber Security

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

Programme: B. Tech. CSE (Hons)

Semester: I **W.E.F. Session: 2024-2025**

S. No	Status	Paper Code	Subjects	Study Scheme Lec / Week			Hours	Credits	CIE	ESE	Total	Pass Marks
				L	T	P						
1	CC-1	B010123101	Applied Mathematics-I	3	1	0	4	3	50	50	100	40
2	CC-2	B010123102	Problem Solving with 'C'	4	0	0	4	4	50	50	100	40
3	DSC(minor)-1	B010124103	Fundamental of Electrical and Electronics Engineering	3	0	0	3	3	50	50	100	40
4	MDC-1	B010123104	Applied Chemistry	3	0	0	3	3	50	50	100	40
5	AEC-1	BSGUAE2401	English Language Proficiency	2	0	0	2	2	50	50	100	40
6	VAC-1	BSGUVA2401	Environmental Education	3	0	0	3	3	50	50	100	40
7	SEC-1	BSGUSE2420	Engineering Graphics	2	0	2	4	3	60	40	100	40
8	CC-3	B010123152	Problem Solving with 'C' lab	0	0	2	2	1	60	40	100	40
9	DSC(minor)-2	B010124153	Fundamental of Electrical and Electronics Engineering lab	0	0	2	2	1	60	40	100	40
10	MDC-2	B010123154	Applied Chemistry Lab	0	0	2	2	1	60	40	100	40
			Total	20	1	8	29	24	540	460	1000	400

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

Programme: B. Tech.CSE(Hons)

Semester: II **W.E.F. Session: 2024-2025**

S. No	Status	Paper Code	Subjects	Study Scheme Lec / Week			Hours	Credits	CIE	ESE	Total	Pass Marks
				L	T	P						
1	CC-1	B010123201	Applied Mathematics-II	3	1	0	4	3	50	50	100	40
2	CC-2	B010123203	Introduction to Python Programming	3	0	0	3	3	50	50	100	40
3	DSC(minor)-1	B010124204	Digital Electronics	4	0	0	4	4	50	50	100	40
4	VAC-1	BSGUVA2302	Human Values & Professional Ethics (HVPE)	3	0	0	3	3	50	50	100	40
5	AEC-1	BSGUAE2305	Professional Communication	2	0	0	2	2	50	50	100	40
6	MDC-1	B010123202	Engineering Physics	3	1	0	4	3	50	50	100	40
7	SEC-1	BSGUSE2301	Workshop & Manufacturing Practices Lab	2	0	2	4	3	60	40	100	40
8	MDC-2	B010123252	Engineering Physics Lab	0	0	2	2	1	60	40	100	40
9	DSC(minor)-2	B010124254	Digital Electronics Lab	0	0	2	2	1	60	40	100	40
10	CC-3	B010123253	Python Programming Lab	0	0	2	2	1	60	40	100	40
			Total	20	2	8	30	24	540	460	1000	400

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

Programme: B. Tech.(Hons) with specialization AI&ML / AI&DS / Cyber Security

Semester: III **W.E.F. Session: 2024-2025**

S. No	Status	Paper Code	Subjects	Study Scheme Lec / Week			Hours	Credits	CIE	ESE	Total	Pass Marks
				L	T	P						
1	CC-1	B010123301	Web Designing	3	1	0	4	3	50	50	100	40
2	CC-2	B010123302	Data Structures using C	3	1	0	4	3	50	50	100	40
3	CC-3	B010123303 / B010223303 / B010323303 / B010423303	Discrete Structure & Theory of Logic / Mathematical Foundations for Artificial Intelligence / Mathematical Foundations for Artificial Intelligence / Information Theory for Cyber Security	3	1	0	4	3	50	50	100	40
4	DSC(minor)-1	B010123304	Object Oriented Programming using C++	4	0	0	4	4	50	50	100	40
5	MDC-1	B010123305	Computer Organization & Architecture	3	1	0	4	3	50	50	100	40
6	AEC-1	BSGUAE2405	Team Building & Leadership	2	0	0	2	2	50	50	100	40
7	SEC-1	BSGUSE2419	Advanced Excel	2	0	2	4	3	60	40	100	40
8	CC-4	B0101230351	Web Designing Lab	0	0	2	2	1	60	40	100	40
9	CC-5	B010123352	Data Structures Lab	0	0	2	2	1	60	40	100	40
10	CC-6	B010123354	OOPS with C++ Lab	0	0	2	2	1	60	40	100	40
				20	4	8	32	24	540	460	1000	400

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

Programme: B. Tech.(Hons) with specialization AI&ML / AI&DS / Cyber Security

Semester: IV **W.E.F. Session: 2024-2025**

S. No	Status	Paper Code	Subjects	Study Scheme Lec / Week			Hours	Credits	CIE	ESE	Total	Pass Marks
				L	T	P						
1	CC-1	B010123401	Programming in Java	4	0	0	4	4	50	50	100	40
2	CC-2	B010123402	Artificial Intelligence	4	0	0	4	4	50	50	100	40
3	CC-3	B010123403	Operating System	4	0	0	4	4	50	50	100	40
4	CC-4	B010123404/ B010223404 / B010323404 / B010423404	Introduction to Cyber Security / AI & ML with Experiential Learning / AI & DS with Experiential Learning / Experiential Learning for Cyber Security	3	1	0	4	3	50	50	100	40
5	DSC(minor)-1	B010123405	Finite Automata and Formal Languages	4	0	0	4	4	50	50	100	40
6	AEC-1	BSGUAE2406	Research paper Writing	2	0	0	2	2	50	50	100	40
7	CC-5	B010123451	Java Programming Lab	0	0	2	2	1	60	40	100	40
8	CC-7	B010123453	OS Lab using Unix	0	0	2	2	1	60	40	100	40
9	CC-8	B010223454 / B010323454 / B010423454	Cyber Security Lab/ AI & ML with Experiential Learning Lab / AI & DS with Experiential Learning Lab / Experiential Learning for Cyber Security Lab	0	0	2	2	1	60	40	100	40
10	Mini Project	B010123450	Mini Project	0	0	2	2	1	100		100	40
				21	1	08	30	25	590	410	1000	400

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

Programme: B. Tech.(Hons) with specialization AI&ML / AI&DS / Cyber Security

Semester: V Session: 2024-2025

S. No	Status	Paper Code	Subjects	Study Scheme Lec / Week			Hours	Credits	CIE	ESE	Total	Pass Marks
				L	T	P						
1	CC-1	B010123501/ B010223501 / B010323501 / B010423501	Analyzing, Visualizing and Applying data science with Python / Fuzzy Logic Based ML Models/ Analyzing, Visualizing and Applying data science with Python/ Cyber Forensic Analytics	3	1	0	4	3	50	50	100	40
2	CC-2	B010123502	Software Engineering	3	0	0	3	3	50	50	100	40
3	CC-3	B010123503	Data Base Management Systems	4	0	0	4	4	50	50	100	40
4	CC-4	B010123504	Computer Networks	4	0	0	4	4	50	50	100	40
5	DSC(minor)-1	B010123505	Cloud Computing	4	0	0	4	4	50	50	100	40
6	CC-5	B010123551/ B010223551 / B010323551 / B010423551	Analyzing, Visualizing and Applying data science with Python Lab / Fuzzy Logic Based ML Models Lab/ Analyzing, Visualizing and Applying data science with Python Lab/ Cyber Forensic Analytics Lab	0	0	2	2	1	60	40	100	40
7	CC-6	B010123552	Software Engineering Lab	0	0	2	2	1	60	40	100	40
8	CC-7	B010123553	DBMS Lab	0	0	2	2	1	60	40	100	40
9	CC-8	B010123554	Computer Networks Lab	0	0	2	2	1	60	40	100	40
10	Internship	B010123557	Internship Evaluation	0	0	2	2	1	100		100	40
			Total	18	1	10	29	23	590	410	1000	400

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

Programme: B. Tech.(Hons) with specialization AI&ML / AI&DS / Cyber Security
Semester: VI Session: 2024-2025

S. No	Status	Paper Code	Subjects	Study Scheme Lec / Week			Hours	Credits	CIE	ESE	Total	Pass Marks
					L	T	P					
1	CC-1	B010123601/ B010223601/ B010323601/ B010423601	Machine Learning Techniques / Machine Learning Techniques / Data Analytics using R / Data Encryption & Compression	3	1	0	4	3	50	50	100	40
2	CC-2	B010123602	Design & Analysis of Algorithms	4	0	0	4	4	50	50	100	40
3	CC-3	B010123603	Full Stack Web Development	4		0	4	4	50	50	100	40
4	CC-4	B010123604	Compiler Design	4	0	0	4	4	50	50	100	40
5	DSC(minor)-1	B010123605	Blockchain and its Applications	4	0	0	4	4	50	50	100	40
6	CC-5	B010123651/ B010223651 / B010323651 / B010423651	Machine Learning Lab/ Machine Learning Lab / Data Analytics Lab / Data Encryption Lab	0	0	2	2	1	60	40	100	40
7	CC-6	B010123653	DAA Lab	0	0	2	2	1	60	40	100	40
8	CC-7	B010123654	Full Stack Web Development Lab	0	0	2	2	1	60	40	100	40
9	CC-8	B010123606	Career Skills	0	0	2	2	1	60	40	100	40
10	Mini Project	B010123650	Mini Project	0	0	2	2	2	100		100	40
			Total	19	1	10	30	25	590	410	1000	400

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

Programme: B. Tech.(Hons) with specialization AI&ML / AI&DS / Cyber Security
Semester: VII Session: 2024-2025

S. No	Status	Paper Code	Subjects	Study Scheme Lec / Week			Hours	Credits	CIE	ESE	Total	Pass Marks
				L	T	P						
1	CC-1	B010123701/ B010223701/ B010323701/ B010423701	Deep Learning/ Deep Learning / NOSQL Databases / Web Application Security	3	1	0	4	3	50	50	100	40
3	CC-2	B010123702	Data Warehouse & Data Mining	4	0	0	4	4	50	50	100	40
4	CC-3	B010123703	Business Intelligence	4	0	0	4	4	50	50	100	40
5	DSC(minor)-1	B0101DE1-701 TO B0101DE1-705	Discipline Specific Elective-I	4	0	0	4	4	50	50	100	40
6	CC-4	B010123751/ B010223751/ B010323751/ B010423751	Deep Learning Lab/ Deep Learning Lab / NOSQL Dtatabases Lab / Web Application Security Lab	0	0	2	2	1	60	40	100	40
7	Major Project	B0101230750	Major Project Phase I	0	0	10	10	5	60	40	100	40
			Total	15	1	12	28	21	320	280	600	240

DISCIPLINE SPECIFIC ELECTIVE - 1	
B0101DE1-701	Knowledge Representation
B0101DE1-702	Agile Software Engineering
B0101DE1-703	Mobile Computing
B0101DE1-704	Quantum Computing
B0101DE1-705	Mobile Applications

	Development

Specialization	Specialization Code
AI & ML	**02**
AI & DS	**03**
Cyber Security	**04**

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

Programme: B. Tech.(Hons) with specialization AI&ML / AI&DS / Cyber Security
Semester: VIII Session: 2024-2025

S. No	Status	Paper Code	Subjects	Study Scheme Lec / Week			Hours	Credits	CIE	ESE	Total	Pass Marks
				L	T	P						
1	CC-1	B010123801/ B010223801/ B010323801/ B010423801	Cryptography and Network Security/ Natural language processing /Big Data Analytics using Hadoop / Cryptography and Network Security	3	1	0	4	3	50	50	100	40
2	CC-2	B010123802	Introduction to Project Management	4	0	0	4	4	50	50	100	40
3	DSC(minor)-1	B010123803	Research Methodology and IPR	4	0	0	4	4	50	50	100	40
4	CC-3	B010123851/ B010223851/ B010323851/ B010423851	Cryptography and Network Security Lab / Natural language processing Lab /Big Data Analytics using Hadoop Lab/ Cryptography and Network Security Lab	0	0	2	2	1	60	40	100	40
5	Major Project	B010123850	Major Project Phase II	0	0	16	16	8	200	100	300	120
			Total	11	1	18	30	20	410	290	700	280

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

DETAILED SYLLABUS

Programme: B. Tech. CSE(Hons) with specialization AI&ML / AI&DS / Cyber Security

Applied Mathematics –I
(Course Code: B010123101)

Year: **I**st
Semester: **I**st

L	T	P	C
3	**1**	**0**	**3**

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able :		
CO 1	Understand the concept of matrices and apply for solving linear simultaneous equations.	K1, K3
CO 2	Understand the concept of limit , continuity and differentiability and apply in the study of Rolle's , Lagrange,s and Cauchy mean value theorem and Leibnitz theorems .	K2, K3
CO 3	Identify the representation and application of vector algebra.	K2, K4
CO 4	Illustrate the working methods of Fourier Transformation, Fourier series, Fourier coefficient.	K2, K3
CO 5	Illustrate the working methods of multiple integral and apply for finding area, volume, centre of mass and centre of gravity.	K3, K2

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	**Linear Algebra** Linear Algebra-Matrices: Rank of a matrix, Consistency of a system of linear equations, Linear dependence and independence of vectors, Eigen-values and Eigen vectors of a matrix, Cayley-Hamilton theorem, Diagonalization of a matrix.	**09**
II	**Differential Calculus** Limit of a function, Continuity, Differentiability of a function, Rolle's theorem, Lagrange's mean Value theorem, Taylor's theorem, Maclaurin's theorem, Indeterminate Forms, L' Hospitals Rule.	**09**
III	**Vector Algebra** Introduction, Representation of vector Addition and subtraction of vectors, Double and Triple Scalar and Vector Product and its Properties, System of reciprocal of Vectors, Gradient, Divergence and curl of a vector.	**09**
IV	**Fourier Transformation** Fourier series, Fourier coefficients, Half range series, Fourier series of odd and even functions, Fourier series of T-periodic function.	**09**
V	**Multiple Integration** Double and triple integrals, Change of variables, Change of order of integration, Applications to area and volume.	**09**

Text Books

1. R.K. Jain and S.R.K. Iyengar; Advanced Engineering Mathematics, NarosaPublishing House.
2. Thomas and Finney; Calculus and Analytical Geometry, Narosa PublishingHouse

Reference Books

3. Grewal B.S. Higher engineering mathematics Khanna publisher new delhi, 43edition

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

Problem Solving using 'C'
(Course Code:
B010123102)

Year: **I**st
Semester: **I**st

L	T	P	C
4	0	0	4

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able :		
CO 1	To Develop Simple Algorithms for Arithmetic and Logical Problems.	K2, K3
CO 2	To Translate the Algorithms to Programs & Execution (in C Language).	K3
CO 3	To Implement Conditional Branching, Iteration and Recursion.	K3, K4
CO 4	To Decompose a Problem into Functions and Synthesize a Complete Program Using Divide and Conquer Approach.	K4, K3
CO 5	To Use Arrays, Pointers and Structures to Develop Algorithms and Programs.	K3, K2

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	**Introduction to Programming** Introduction, Basic block diagram and functions of various components of computer, Concept of Hardware and Software, Types of software, Compiler and Interpreter. Introduction to Programming: Basic Overview of Procedure Oriented Language, Concepts of Machine level, Assembly level and High level programming, Flow charts and Algorithms.	**10**
II	**Fundamentals of 'C'** Features of C language, structure of C program, comments, header files, data types, constants and variables, operators, expressions, evaluation of expressions, type conversion, precedence and associativity, I/O functions. Control Structures in 'C': Simple statements, Decision making statements, Looping statements, Nesting of control structures, break and continue statement, goto statement.	**10**
III	**Array, Functions & Recursion** Array & String: Concept of array, One and Two dimensional arrays, declaration and initialization of arrays, String, String storage, Built-in string functions. Functions: Concept of user defined functions, prototype, definition of function, parameters, parameter passing, calling a function, Macros, Preprocessing. Recursion: Definitions, recursive function, Examples, Applications.	**10**
IV	**Pointers** Basics of pointers, pointer to pointer, pointer and array, pointer to array, array of pointers, function returning a pointer. Structure and Union : Basics of structure, structure members, accessing structure members, nested structures, array of structures, structure and functions, structures and pointers,	**10**

	unions, bit-fields.	
V	**File Management** Introduction to file management, Simple file management functions for text files, Reading from and writing to files. The Preprocessor: Introduction, Macro substitution, File Inclusion, Compiler Control Directives.	**10**

Text Books

1. Programming in ANSI C, Fourth Edition, E Balagurusamy, TMH
2. C: The Complete Reference, Herbert Schildt, McGrawHill.

Reference Books:

3. Let us C, Yashwant Kanitkar
4. Computer fundamentals and Programming in C, Pradip dey and Manas Ghosh,Oxford

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

Fundamental of Electrical and Electronics Engineering
(Course Code: B010124103)

Year: Ist **L T P C**

Semester: Ist **3 0 0 3**

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able :		
CO 1	Apply the concepts of Semiconductor Diodes.	K_1, K_2
CO 2	Analyze the behavior of Bipolar Junction Transistors.	K_2, K_3
CO 3	The behavior of Operational Amplifiers.	K_2, K_4
CO 4	Illustrate the working of DC & AC circuits.	K_2, K_3
CO 5	Describe the components of transformers circuits.	K_3, K_2

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	Semiconductor Diodes: Classification of semiconductors, PN junction diode, VI characteristics of PN junction diode, Diode Applications: Half wave Rectifier, Full wave rectifier: Bridge and Centre tape, Clippers, Clampers, Zener diodes, VI characteristics, Zener and Avalanche breakdown, Light emitting Diode (LED).	**09**
II	Bipolar Junction Transistors: Types of transistors, transistor Construction and operation, Common-Base Configuration, Common-Emitter configuration, Transistor as an amplifier, DC Biasing-BJTs: Operating point and DC load line, Fixed-Bias Circuit, Collector to Base Bias, Voltage-Divider bias circuit . Field Effect Transistors: Introduction, Construction and characteristics of JFETs, drain and transfer characteristics, pinch off voltage, parameters of JFET: Transconductance (gm), ac drain resistance (rd), amplification factor(μ), MOSFET: Basic operation and characteristics of depletion type and enhancement type MOSFETs, pinch-off voltage.	**09**
III	Operational Amplifiers: Op-Amp Basic, Practical Op-Amp circuit, Virtual ground, Applications of Operational Amplifier: Inverting Amplifier, Non-inverting Amplifier, Adder, Subtracter, Integrator, Differentiator, Differential amplifier, Schmitt trigger, Op-amp Comparator, CMRR.	**09**
IV	DC Circuits: Classification of network elements, Ideal and Practical Voltage and Current sources; Source Transformation, Kirchhoff's laws, Thevenin's and Norton's theorem, Star Delta Transformation; Mesh and Nodal analysis (With DC Independent Sources only). AC Fundamentals: Sinusoidal voltage and currents, their mathematical and graphical	**09**

	representation, concept of cycle period, frequency, instantaneous, peak, average, RMS values, peak factor and form factor, phase difference, lagging, leading and in phase quantities and phasor representation. Peak and RMS Value, AC Circuits: Resistive, Inductive, Capacitive, RL, RC & RLC series, parallel combination, Impedance Triangle, Concept of AC power and power factor.	
V	Transformers: Single Phase Transformer: Construction, principle of operation; Equivalent circuit, EMF equation, Losses and Efficiency, basic idea of an auto transformer DC Machines: Electromechanical energy consumption, Principle of operations, Constructions, EMF and Torque equations, Classification, Application of various types of de Motors. Induction Motor: Constructions, Principle of Operation of Single phase and three phase induction motors, Applications of Induction Motors.	**09**

Text Books:

1. Boylestad & Nashelsky: Electronic Devices & Circuit Theory, PHI.
2. Millman & Halkias: Integrated Electronics, TMH.
3. Kennedy, G., Electronic Communication Systems, McGraw-Hill (2008) 4th ed.
4. Lathi. B. P., Modern Digital and Analog Communications Systems 3rd ed.
5. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
6. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", McGraw Hill.
7. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill.
8. J.B. Gupta, "Basic Electrical Engineering", S.K. Kataria & Sons.

Reference Books:

1. B.G. Streetman, Solid State Electronic Devices, Prentice Hall of India, New Delhi, 1995.
2. E S. Yang, Microelectronic Devices, McGraw Hill, Singapore, 1988.
3. A.S. Sedra and K.C. Smith, Microelectronic Circuits, Saunder's College Publishing, 1991.
4. S Salivahanan and N Naresh Kumar, Electronics devices and circuits, McGraw Hill,1998.
5. J.B Gupta, “Electronic and Electrical Measurements and Instrumentation”, SK Kataria Bhargav, Kulshreshtha, “Basic Electronics and Linear Circuits”, Tata McGraw Hill
6. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press.

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

Applied Chemistry
(Course Code: B010123104)

Year: **I**st
Semester: **I**st

L	T	P	C
3	0	0	3

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able :		
CO 1	Get an understanding of the theoretical principles of chemistry of molecular structure, bonding and properties, Chemistry of advanced materials (liquid crystals, Nanomaterials, Graphite & Fullerene) as well as the Principles of Green Chemistry.	K2
CO 2	Develop understanding of the sources, impurities and hardness of water, apply the concept of water purification treatments.	K2, K3
CO 3	Develop the understanding of Chemical structure of polymers and its effect on their various properties when used as engineering materials. Understanding the applications of specific polymers and Chemistry applicable in industrial process.	K2, K4
CO 4	Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion and develop understanding of Chemistry of Engineering materials (Cement).	K2, K3
CO 5	To enable the students to understand and apply he detailed concept of spectroscopic technique	K3, K2

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	**ATOMIC AND MOLECULAR STRUCTURE** Atomic and Molecular Structure: Molecular orbital's of diatomic molecules, Bond Order, Magnetic characters and numerical problems. Chemistry of Advanced Materials: Liquid Crystals; Introduction, Types and Applications of liquid crystals, Industrially important materials used as liquid crystals. Graphite and Fullerene: Introduction, Structure and applications. Nanomaterials: Introduction, and applications Green Chemistry: Introduction, 12 principles and importance of green Synthesis, Green Chemicals, Environmental impact of Green chemistry on society.	**09**
II	**WATER AND ITS TREATMENT** Introduction – Hardness of water - its causes, expression of hardness- units. Types of hardness. Boiler troubles – Scale, sludge and caustic embrittlement. Treatment of boiler feed water: Internal treatment & External treatment. **External treatments:** Ion exchange and Zeolite processes. Desalination of brakish water by Reverse-osmosis. Numerical problems. Potable water	**09**

III	**ENGINEERING MATERIALS** Classification of polymers. Plastics: Thermoplastics & Thermosets, Properties and applications of plastics: Poly-vinyl chloride and Bakelite, Rubbers: Natural rubber and its vulcanization, Synthetic rubbers: Buna-S and Buna –N, Fibers: Properties and applications of Polyester and Nylon. Conducting Polymers and its applications.	**09**
IV	ELECTROCHEMISTRY: Introduction, EMF: Galvanic Cells BATTERIES: Introduction to Primary cells and secondary cells. Applications of batteries. Fuel cells – Hydrogen– Oxygen fuel cell; Advantages and Applications. CORROSION AND ITS CONTROL: Introduction, causes of corrosion. Electrochemical corrosion. Corrosion control methods: Cathodic protection, sacrificial anode, impressed current cathode methods.	**09**
V	**SPECTROSCOPIC TECHNIQUES AND APPLICATIONS** Spectroscopic Techniques and Applications: Elementary idea and simple applications of UV, IR and NMR. **Fuels and Combustion:** Definition, Classification, Characteristics of a good fuel, Calorific Values, Gross & Net calorific value, Determination of calorific value by Bomb Calorimeter	**09**

Reference Books

1. PC Jain & Monica Jain, (2010). Engineering Chemistry, Dhanpatrai PublishingCompany. New Delhi
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rathan, Cengage Learning, New Delhi (2016).
3. S.S Dara & Mukkanti, (2006). Engineering Chemistry, S. Chand & Co. NewDelhi.

Reference Books

4. J.C Kuriacase & J Raja ram (2004), Engineering Chemistry, Tata McGraw HillsCo. New Delhi.
5. Engineering Chemistry by M Tirumala Chary & E. Laxminarayana (Second Edition), Scitech Publications, Chennai.

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

English Language Proficiency
(Course Code: BSGUAE2401)

Year: **I**st
Semester: **I**st

L	T	P	C
2	0	0	2

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able :		
CO 1	To enhance students' understanding and usage of English grammar and vocabulary.	K2
CO 2	To develop effective reading and comprehension skills.	K2, K3
CO 3	To improve writing proficiency across various forms and styles.	K2, K3
CO 4	To foster critical thinking and analytical skills through literature.	K2, K3
CO 5	To build effective communication skills for academic and professional purposes.	K3, K2

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	**English Grammar and Usage** Parts of Speech, Tenses: Past, Present, Future, Subject-Verb Agreement, Active and Passive Voice, Direct and Indirect Speech.	**06**
II	**Vocabulary Building** Synonyms and Antonyms, Word Formation, Idioms and Phrases, Homophones and Homonyms, One Word Substitutions.	**06**
III	**Reading and Comprehension** Techniques for Effective Reading, Skimming and Scanning, Summarizing and Paraphrasing, Comprehension Passages, Analysing Texts.	**06**
IV	**Writing Skills** Essay Writing: Argumentative, Descriptive, Narrative, Letter Writing: Formal and Informal, Report Writing, Email Writing, Creative Writing.	**06**
V	**Literature and Critical Thinking** Short Stories :"The Last Leaf" by O. Henry, "The Necklace" by Guy de Maupassant Poems:"The Road Not Taken" by Robert Frost, "If" by Rudyard Kipling Drama:Excerpts from "Macbeth" by William Shakespeare Literary Analysis and Interpretation	**06**

Text Books:

1. "High School English Grammar and Composition" by Wren & Martin
2. "Word Power Made Easy" by Norman Lewis
3. "Reading Comprehension: Strategies for Independent Learners" by Camille Blachowicz and Donna Ogle
4. "Writing Skills Handbook" by John Langan.
5. "The Norton Anthology of English Literature" by M.H. Abrams

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

Environmental Education
(Course Code: BSGUVA2401)

Year: **I**st
Semester: **I**st

L	T	P	C
3	0	0	3

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able :		
CO-1	Gain in-depth knowledge on natural processes that sustain life, and govern economy.	K2
CO-2	Estimate and predict the consequences of human actions on the web of life, global economy and quality of human life.	K3
CO-3	Develop critical thinking for shaping strategies (scientific, social, economic and legal) for environmental protection and conservation of biodiversity, social equity and sustainable development.	K4
CO-4	Acquire values and attitudes towards understanding complex environmental-economic social challenges, and participate actively in solving current Environmental problems and preventing the future ones.	K3
CO-5	Adopt sustainability as a practice in life, society and industry.	K3

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	**Environment:** Definition, Types and Segments of Environment, Importance and Need for Public Awareness, Effects of Human Activities on Environment (Housing, Agriculture, Industry, Mining and Transportation). Sustainable Development and its challenges. Sustainable life style.	**09**
II	**Natural Resources and their Conservation;** Introduction and Classification natural Recourses, Water, Mineral, Forest Resources; Depletion and their Conservation, Energy Resources; Conventional and Non-conventional Sources of Energy and their impact on Environment.	**09**
III	**Concept of Ecosystem**; Definition, Structure and function of an Ecosystem, Types of Ecosystem, Balanced Ecosystem-Food chains, food webs and ecological pyramids. Biodiversity and Its Conservation-Value of biodiversity, Threats to biodiversity, In-situ and Ex- situ conservation of biodiversity.	**09**
IV	**Environmental Pollution and Waste management** Definition and types of Environmental Pollution, Air, Water, Soil, Noise Pollution; cause, effect and control measures. E-waste and Solid Waste; cause, effect and management.	**09**

V	**Current Environmental issues and Protection;** Global Warming and Climate Change, Acid Rain and Ozone Layer Depletion, Population Growth and Women Education. Role of Government in Environmental Protection, Environmental Protection Act 1986.	**09**

Text Books:

1. Textbook of Environment and Ecology by Dave, Katewa & Singh, and 2nd Edition, Cengage Learning India Pvt Ltd Delhi.

Reference Books:

1. Environmental Studies by S Deswal, Dhanpat Rai & Co.
2. Environmental Studies by VK Ahluwalia, 2nd Edition,TERI Press, New Delhi.
3. Environmental Studies by R Rajgopalan, Oxford University Press.
4. Environment & Ecology by Singh & Malviya, Acme Learning

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

Engineering Graphics
(Course Code: BSGUSE2420)

Year: **I**st
Semester: **I**st

L	T	P	C
2	0	2	3

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able :		
CO 1	Use scales and draw projections of objects.	K2
CO 2	Explain views of solids and their sectional surfaces.	K2, K3
CO 3	Analyze and draw isometric projections of objects.	K2, K3
CO 4	Demonstrate orthographic representation of perspective views using modern tools.	K2, K3
CO 5	Apply AutoCAD software for creation of engineering drawing and models	K3, K2

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	**Introduction** Engineering Graphics/Technical Drawing, Introduction to drawing equipment's and use of instruments, Types of lines and their uses, Introduction to dimensioning and types. Theory of Projections: Projection-Terms, Orthographic System of projections.	**09**
II	**Projection** Projection of Points: Projection of Points in different quadrants. Projection of Lines: Line Parallel to both H.P. and V.P., Parallel to one and inclined to other, line inclined to both planes, traces of line.	**09**
III	**Projection of Planes** Projection of Planes Parallel to one and perpendicular to other, Perpendicular to one and inclined to other, Inclined to both reference planes, traces of planes.	**09**
IV	**Projection of Solids** Projection of solids in first or third quadrant, Axis parallel to one and perpendicular to other, Axis parallel to one inclined to other, Axis inclined to both the principle plane, Axis perpendicular to profile plane and parallel to both H.P. and V.P.	**09**
V	**Section of Solids** Sectional views of simple right regular solids like prism, pyramid, Cylinder and Cone. Development of Surface: Development of surfaces of Right Regular Solids-Prism, Pyramid, Cylinder and Cone.	**09**

Text Books:

1. Gill P.S., "Engineering Drawing", 2013 Ed., S.K Kataria & Sons, New Delhi, 2013.
2. Bhatt N.D., "Engineering Drawing", 53rd Ed., Charotar Publishing House Pvt. Ltd., Gujarat(2017).
3. Frederick E. Giesecke, Shawna Lockhart, Marla Goodman, Cindy M. Johnson, "TechnicalDrawing with Engineering Graphics", 15th Ed., Prentice Hall, USA, 2016.
4. M.B. Shah, B.C. Rana, "Engineering Drawing", 3rd Ed., Pearson Education, New Delhi, 2009.

Reference Books:

5. Kirstie Plantenberg, "Engineering Graphics Essentials-Text and Digital Learning", 5th Ed., SDCPublications, USA (2016).

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

Programming in C lab
(Course Code:
B010123152)

	L	T	P	C
Year: **I**st				
Semester: **I**st	0	0	2	1

List of Experiments (Indicative & not limited to)

1. Basic Introduction to C program and turbo C setup(Compile/Run program).
2. Simple program using scanf/printf.
3. Program using if/else.
4. Program using operators(++,--,%,&,|,etc).
5. Switch case programs.
6. Programs of loops(while loop) Programs of loops(do…while loop).
7. Simple program of one-Dimentional/2-Dimensional array.
8. String Programs(using all string functions).
9. Program to implement union and structures.
10. Program to demonstrate working of pointers.
11. Program to read data from file and write into a file.

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Fundamental of Electrical and Electronics Engineering lab
(Course Code: B010124153)

Year: **I**st	L	T	P	C
Semester: Ist	**0**	**0**	**2**	**1**

List of Experiments (Indicative & not limited to)

1. To study the VI characteristics of p-n diode in forward and reverse bias and find the threshold voltage from the VI curve.
2. To study the operation of Zener diode as a voltage regulator.
3. To study the operation of half-wave and full wave rectifiers and calculate their ripple factor values.
4. To study the operation of series and parallel Clippers using P-N junction diodes.
5. To study the operation of clampers using P-N junction diodes.
6. To experimentally plot the input and output characteristics of a given BJT transistor in CE configuration and calculate its various parameters.
7. To experimentally plot the input and output characteristics of a given BJT transistor in CB configuration and calculate its various parameters.
8. To study the transfer and drain characteristics of JFET and calculate its various parameters.
9. To study the transfer and drain characteristics of MOSFET and calculate its various parameters.
10. Understand the basic concept of inverting amplification using an OPAMP.
11. Explore the non-inverting amplification configuration of an OPAMP.
12. Learn about the summing amplifier configuration using OPAMPs.
13. To verify KCL and KVL Law
14. Verification of Thevenin's and Norton's theorem.
15. Resonance in series RLC circuit.
16. To perform short circuit and Open circuit test on a single-phase transformer.
17. DC Motor Characteristics: Study of the construction and working principle of a DC motor, Measurement of no-load and loaded characteristics and Determination of efficiency and losses.
18. Induction Motor Performance: Determination of no-load and blocked rotor tests to obtain equivalent circuit parameters, Measurement of efficiency and power factor at

various loads and Study of the effect of voltage variation on performance.

Applied Chemistry Lab

(Course Code: B010123154)

Year: **I**st	L	T	P	C
Semester: **I**st	0	0	2	1

List of Experiments (Indicative & not limited to)

1. Calibration of Analytical Equipment and apparatus.
2. Determination of Hardness of water sample by EDTA method.
3. Determination of Alkalinity of water sample.
4. Determination of pH by titrimetric method.
5. Determination of surface tension of given liquid.
6. Determination of Viscosity of a given liquid by viscometer.
7. Determination of the strength of ferrous ammonium sulphate using external indicator.
8. Determination of the strength of Potassium dichromate using internal indicator.
9. Determination of available chlorine in bleaching powder.
10. Determination of chloride content in water sample.
11. Preparation of Phenol formaldehyde (PF) resin.
12. Preparation of Urea formaldehyde (UF) resin.
13. Preparation of Adipic acid / Paracetamol.
14. Determination of Rate constant of hydrolysis of esters.
15. Element detection and identification of functional groups in organic compounds

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

Digital Electronics
(Course Code: B010124203)

Year: Ist **L T P C**
Semester: IInd **4 0 0 4**

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able :		
CO 1	Apply concepts of Digital Binary System and implementation of Gates.	K1, K3
CO 2	Analyze and design of Combinational logic circuits.	K2, K4
CO 3	Analyze and design of Sequential logic circuits with their applications.	K2, K4
CO 4	Implement the Design procedure of Synchronous & Asynchronous Sequential Circuits.	K2, K3
CO 5	Apply the concept of Digital Logic Families with circuit implementation.	

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	Digital System And Binary Numbers: Number System and its arithmetic Signed binary numbers, Logic simplification and combinational logic design: Binary codes, code conversion, review of Boolean algebra and Demorgans theorem, SOP & POS forms, Canonical forms, Karnaugh maps method up to five variable, Don't care conditions, POS simplification, NAND and NOR implementation, Quine McClusky method (Tabular method).	**10**
II	Combinational Logic: MSI devices like Magnitude comparator, Multiplexers, Demultiplexers, Decoders, Encoders. Multiplexed display, half and full adders, subtractors, serial and parallel adders, BCD adder.	**10**
III	Sequential Logic And Its Applications: Storage elements: latches & flip flops, Characteristic Equations of Flip Flops, Flip Flop Conversion, Shift Registers, Ripple Counters, Synchronous Counters, Other Counters: Johnson & Ring Counter.	**10**
IV	Synchronous & Asynchronous Sequential Circuits: Analysis of clocked sequential circuits with state machine designing, State reduction and assignments, Design procedure. Analysis procedure of Asynchronous sequential circuits, circuit with latches, Design procedure, Reduction of state and flow table,Race-free state assignment, Hazards.	**10**
V	Memory & Programmable Logic Devices: Digital Logic Families: DTL, DCTL, TTL, ECL & CMOS etc., Fan Out, Fan in, Noise Margin; RAM, ROM, PLA, PAL; Circuits of Logic Families, Interfacing of Digital Logic Families, Circuit Implementation using ROM, PLA and PAL.	**10**

Text Books:

1. **M. Morris Mano and M. D. Ciletti, "Digital Design", Pearson Education.**
2. **Digital Circuits and Design, S. Salivahanan, Oxford University Press**
3. **David J. Comer, "Digital Logic & State Machine Design", Oxford University Press.**
4. **RP Jain, "Modern Digital Electronics", McGraw Hill Publication.**

Reference Books:

5. **A. Anand Kumar, "Fundamental of Digital Circuits," PHI 4th edition, 2018.**
6. **D.V. Hall, "Digital Circuits and Systems," McGraw Hill, 1989.**

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

Applied Mathematics-II
(Course Code: B010123201)

Year: Ist | **L** | **T** | **P** | **C**
Semester: IInd | **3** | **1** | **0** | **3**

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able :		
CO 1	Understand and apply the effective mathematical tools for the solution of differential equations of model physical processes.	K1, K2
CO 2	Understand the concept of convergence to analyze the convergence of series.	K2
CO 3	Remember the concept of partial differential equation and to solve partial differential equations .	K3
CO 4	Analyze the concept of partial differential equations to evaluate the problems concerned with partial differential equations	K4, K3
CO 5	Understand and apply the concept of Laplace Transform to evaluate differential equations.	K3, K2

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	**Ordinary Differential Equations** Exact differential equations, Equations reducible to exact form by integrating factors, Bernoulli's differential equations, Linear differential equations of higher orders with constant coefficients, Complementary functions, Particular Integrals, Method of variation of parameters (second order only), Simultaneous linear differential equations with constant coefficients. Application to engineering problems (without derivation).	09
II	**Sequence and Series** Definition of Sequence and series with examples, Convergence of series, Tests for convergence of series, Ratio Test, D' Alembert's test, Raabe's test, Comparison Test.	09
III	**Partial Differential Equation** Introduction and formation of partial differential equation, Solution of first order Lagrange's linear partial differential equations, Second order linear partial differential equations with constant coefficients.	09
IV	**Applications of Partial Differential Equations** Classification of second order partial differential equations, Method of separation of variables for solving partial differential equations, Solution of one and two dimensional wave and heat conduction equations, Laplace equation in two dimension, Equation of transmission lines.	09
V	**Laplace Transform** Laplace Transform, Existence theorem, Laplace transform of derivatives and integrals, Initial and final value theorems, Unit step function, Laplace transform of periodic function, Inverse Laplace transform, Convolution theorem, Application to solve simple linear and simultaneous differential equations.	09

Text Books:

1. Jain, R. K. and Iyengar, S. R. K. "Advanced Engineering Mathematics", Narosa, 2003 (2 nd Ed.).
2. B.S. Grewal, Higher Engineering mathematics, Khanna Publishers, 2005. 3. Dr. Hari Arora, S.K. Kataria & Sons, Second edition 2022
3. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Ltd., 2008.
4. Wylie, R., "Advanced Engineering Mathematics", McGraw-Hill, 1995.

Reference Books:

5. Advanced Engineering Mathematics By Chandrika Prasad, Reena Garg Khanna Publishing House, Delhi.
6. Peter V. O'Neil, Advance Engineering Mathematics, Thomson (Cengage) Learning, 2007.

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

Engineering Physics
(Course Code: B010123204)

Year: Ist **L T P C**

Semester: IInd **3 1 0 3**

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able :		
CO 1	To solve the classical and wave mechanics problems and studies the laws of motion and gravity at extremely high speeds and in strong gravitational fields.	K3, K4
CO 2	To explain the distribution of energy in black body radiation and to understand the difference in particle and wave nature with explanation of Compton effect and Schrodinger wave equation with its physical interpretation.	K2
CO 3	To understand concepts of communication through electrodymanics. Identify the applications of electrodynamics using Maxwell equation.	K3
CO 4	To understand the behavior of waves through various examples/applications of interference and diffraction phenomenon and the concept of grating and resolving power.	K4, K3
CO 5	To create and an ability to understand laser system, optical Fibre in industries, laboratories and in communication	K3, K2

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	**Relativistic Mechanics** Law of motions, frames of references, Michelson- Morley experiment, Postulates of special theory of relativity, Lorentz transformation equations, Length contraction & Time dilation, Doppler effect, mass and energy equivalence, Massless particles.	09
II	**Quantum Mechanics** Need of quantum mechanics, Wave- particle duality, Black body radiation, Compton effect, de-Broglie matter waves, Phase and Group velocities, Davisson- Germer experiment, Heisenberg uncertainty principle and its applications, Wave function and its significance, Schrödinger's wave equation – particle in one dimensional potential box, Eigen values and Eigen function.	09
III	**Electrostatics and Electrodynamics** Gauss's law in dielectric medium, Displacement current, continuity equation, Maxwell equations in differential and integral form, Wave equation for electromagnetic radiation, transverse nature and characteristics of electromagnetic wave, Poynting theorem & Poynting vector.	09
IV	**Wave Optics** Interference: Interference of light, Young's double slit experiment, Interference in thin films (parallel and wedge shaped film), Newton's rings. Diffraction: Single, double and N-Slit Diffraction, Diffraction grating, Grating spectra, dispersive power, Rayleigh's criterion and resolving power of grating.	09

V	**Laser and Fibre Optics** Laser: Emission process of radiation, population inversion, pumping action, concept of 3 and 4 level Laser, construction and working of Ruby, He-Ne lasers and semiconductor lasers, laser applications. Fiber Optics: Fundamental ideas about optical fiber, Propagation mechanism, Acceptance angle and Acceptance cone, Numerical aperture, Single Mode - Multi Mode and refractive index in Fibers.	**09**

Text Books

1. Engineering Physics vol.1 & 2 – Dr. S.L. Gupta.
2. Engineering Physics – "Dr. Rakesh Dogra", Katiyar and Pandey (Wiley India).
3. Concise Engineering Physics – "Dr. Shiva Kant Pathak", 2nd edition 2023
4. Modern Engineering Physics – "A.S. VASUDEVA", S. Chand & Company LTD.
5. Concepts of Modern Physics - Aurthur Beiser (Mc- Graw Hill).

Reference Books

6. Optics - Brij lal & Subramanian (S. Chand).
7. Introduction to Solid State Physics by Kittle C. John Wiley & Sons, 2005. 8. Lasers Fundamentals and Applications by Ghatak A. K, Springer, 2010.

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

Human Values & Professional Ethics (HVPE)
(Course Code: BSGUVA2302)

	L	T	P	C
Year: Ist				
Semester: IInd	**3**	**0**	**0**	**3**

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able :		
CO1	Understand the significance of value inputs in a classroom, distinguish between values and skills, understand the need, basic guidelines, content and process of value education, explore the meaning of happiness and prosperity and do a correct appraisal of the current scenario in the society	**K 1**
CO2	Distinguish between the Self and the Body, understand the meaning of Harmony in the Self the Co-existence of Self and Body	**K 2**
CO3	Understand the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human-human relationships and explore their role in ensuring a harmonious society	**K3**
CO4	Understand the harmony in nature and existence, and work out their mutually fulfilling participation in the nature.	**K4**
CO5	To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life	**K 5**

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	Introduction - Need, Basic Guidelines, Content and Process for Value Education, Understanding the need and basic guidelines for Value Education, Self-Exploration–what is it? - Its content and process; on the basis of Natural Acceptance, Right understanding, Relationship and Physical Facilities- the basic requirements for fulfilment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario at various level.	**09**
II	**Understanding Harmony in the Human Being - Harmony in Myself!** Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha, Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer), Understanding the activities in the self and activities in the body. Harmony with the Body: Sanyam and Swasthya (Correct appraisal of Physical needs).	**09**
III	**Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship.** Understanding Harmony in the family – the basic unit of human interaction, Four element of Justice; Ensure Mutual Happiness, Values in Human Relationship (Nine Values): Understanding the meaning of Values, Foundation Value (Trust): Difference between intention and competence, Undivided Society (Akhand Samaj) From Individual to world family**.**	**09**

IV	**Understanding Harmony in the Nature and Existence - Whole existence as Co-existence. .** Understanding the harmony in the Nature: The Four Order in Nature, Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature. Understanding Existence as Co-existence (Sah-astitva) of mutually interacting, Holistic perception of harmony at all levels of existence.	**09**
V	**Implication of the above Holistic Understanding of Harmony on Professional Ethics** Basis for Universal Human Values and Ethical Human Conduct, Professional Ethics in Light of Right Understanding. Vision for Holistic Technologies, Production Systems and Management Models, Evolving Holistic Models of Living.	**09**

Text Books

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA.
3. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
4. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991.
5. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
6. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
7. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.

Reference Books

8. A N Tripathy, 2003, Human Values, New Age International Publishers.
9. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) Krishi Tantra Shodh, Amravati.

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

Introduction to Python Programming
(Course Code: B010123202)

Year: Ist | **L** | **T** | **P** | **C**
Semester: IInd | **3** | **0** | **0** | **3**

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able :		
CO 1	Demonstrate knowledge of basic programming constructs in python.	K_1, K_2
CO 2	To be able to demonstrate proficiency in utilizing control structures and string manipulation techniques in Python programming to solve a variety of problems.	K_3, K_4
CO 3	To be able to apply data structures primitives for creating and implementing mutable objects.	K_3, K_4
CO 4	To be able to adeptly create tuples, understanding their immutable nature and their role in data storage and manipulation.	K_3, K_4
CO 5	To comprehend the concept of function as reusable blocks of code that perform specific task when called.	K_2, K_4

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	**Basic Introduction:** Origin, Need of Python Programming, Features, program structure, identifiers, reserved words, escape sequences, IDLE-Python Interpreter. Python Programming Introduction: Variables and assignment statements, data types, Operators: Assignment, Unary, Binary, Arithmetic, Relational, Logical, Bitwise Operator and membership operator.	**09**
II	**Control Structures** Control Structures: if-conditional statements, if –else condition, if-elif-else condition, nested if-elif-else condition, Iteration (for Loop and while loop), Nested Loops, break and continue statement. Strings: Slicing, Membership, Built in functions (count, find, capitalize, title, lower, upper and swap case, replace, join, isspace (), isdigit(), split(), startswith(), endswith()).	**09**
III	**Mutable objects:** List: creating, initializing, accessing, slicing, and traversing List. List operations: length, concatenation, repetition, in, not in, max, min, sum, all, any. List methods: append, extend, count, remove, index, pop, insert, sort, reverse.	**09**
IV	**Immutable objects:** Tuples: creating tuples, Tuple operations: length, concatenation, repetition, membership, maximum, minimum, tuple methods: count, index. Dictionary: creating, accessing values, adding, modifying and deleting items in dictionary, Dictionary methods: len, str, clear, copy, get, update, copy. Difference between list and dictionary.	**09**
V	**Concept of Functions** Functions: Defining, Calling and Types of Functions, Arguments and Return Values, Formal vs. Actual Arguments, Scope and Lifetime, Keyword Arguments, Default Arguments, Recursion. Modules: importing Modules, Math and Random Module, creating your own modules, and concept of Packages.	**09**

Text Books

1. John V Guttag, "Introduction to Computation and Programming Using Python", Revised and expanded Edition, MIT Press, 2013.
2. Programming in Python 3: A Complete Introduction to the Python Language (2nd Edition), Mark Summerfield
3. Python Programming: A Modular Approach by Taneja Sheetal, Kumar Naveen, Eleventh Impression, Pearson India Education Services Pvt. Ltd.
4. Let Us Python 2Nd Ed: Python Is Future, Embrace It Fast (Second Edition): Yashvant Kanetkar.

Reference Books

5. Guido van Rossum and Fred L. Drake Jr, ―An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
6. Programming Python, 4th Edition by Mark Lutz Released December 2010 Publisher(s): O'Reilly Media, Inc

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

Digital Electronics Lab

(Course Code: **B010124253**)

	L	T	P	C
Year: Ist				
Semester: IInd	**0**	**0**	**2**	**1**

List of Experiments (Indicative & not limited to)

1. Introduction to digital electronics lab- nomenclature of digital ICs, specifications,
study of the data sheet, Concept of Vcc and ground, verification of the truth tables
of logic gates using TTL ICs.
2. Implementation of the given Boolean function using logic gates in both SOP and POS forms.
3. Verification of state tables of RS, JK, T and D flip-flops using NAND & NOR gates.
4. Implementation and verification of Decoder using logic gates.
5. Implementation and verification of Encoder using logic gates.
6. Implementation of 4:1 multiplexer using logic gates.
7. Implementation of 1:4 demultiplexer using logic gates.
8. Implementation of 4-bit parallel adder using 7483 IC.
9. Design, and verify the 4-bit synchronous counter.
10. Design, and verify the 4-bit asynchronous counter.

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Engineering Physics Lab
(Course Code: B010123254)

	L	T	P	C
Year: Ist				
Semester: IInd	**0**	**0**	**2**	**1**

List of Experiments (Indicative & not limited to)

1 To determine the wavelength of monochromatic light by Newton's ring.

2 To determine the wavelength of monochromatic light with the help of Fresnel's biprism.

3 To determine the focal length of two lenses by nodal slide and locate the position of cardinal points.

4 To determine the specific rotation of cane sugar solution using polarimeter.

5 To determine the wavelength of spectral lines using plane transmission grating.

6 To study the polarization of light by simple reflection using laser.

7 Measurement of Wavelength of a laser (He- Ne) light using single slit diffraction.

8 To determine the specific resistance of a given wire using Carey Foster's bridge.

9 To study the variation of magnetic field along the axis of current carrying – Circular coil and then to estimate the radius of the coil.

10 To verify Stefan's Law by electrical method.

11 To calibrate the given ammeter and voltmeter by potentiometer.

12 To study the Hall effect and determine Hall coefficient, carrier density and - mobility of given semiconductor using Hall effect set up.

13 To determine the energy band gap of a given semiconductor material.

14 To determine the value of acceleration due to gravity (g) using compound pendulum.

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Workshop & Manufacturing Practices Lab
(Course Code: **BSGUSE2301**)

	L	T	P	C
Year: Ist				
Semester: IInd	**2**	**0**	**2**	**3**

List of Experiments (Indicative & not limited to)

1. Make a right angle on one side of the plate and make 3 hacksaw cuts of the given dimension on the MS flat plate.
2. Making a V-groove of the given size on an MS flat plate
3. Perform a turning operation on a given round bar in the given dimension.
4. Perform a facing operation on a given round bar in the given dimension.
5. Making butt welding joints with the arc welding process.
6. Making a lap welding joint with the arc welding process.
7. Making a chisel in the given dimension from the given MS bar.
8. Making a screwdriver in the given dimension from the given MS bar.
9. Making a flat lock seam joint in the GI sheet.
10. Making a sop tray in the given dimension from the GI sheet.
11. Making a cross-lap joint from a given wooden piece.
12. Making a dovetail joint from given wooden pieces.
13. Making a green sand mold for casting.
14. Study different types of joints and bends in plumbing.
15. Perform external thread cutting on a G.I. pipe using die assembly.

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Introduction to Python Programming Lab

(Course Code: **B010123252**)

Year: Ist	**L**	**T**	**P**	**C**
Semester: IInd	**0**	**0**	**2**	**1**

List of Experiments (Indicative & not limited to)

1. Hello World Program: Print "Hello, World!" to the console.
2. Variables and Data Types: Declare variables of different data types (int, float, string) and perform basic operations on them.
3. User Input and Output: Accept user input, process it, and display the result.
4. Conditional Statements: Use if, else, and elif statements to implement basic conditional logic.
5. Loops: Use for and while loops to iterate through lists, perform calculations, and print patterns.
6. Lists and Arrays: Create and manipulate lists. Perform basic operations like indexing, slicing, and appending.
7. Functions: Define functions, pass arguments, and return values.
8. String Manipulation: Work with strings, perform concatenation, slicing, and explore string methods.
9. Dictionaries: Understand and use dictionaries to store key-value pairs.
10. File Handling: Read from and write to text files.
11. Exception Handling: Implement try, except, and finally blocks to handle exceptions.
12. Classes and Objects: Create classes, define methods, and instantiate objects.
13. Inheritance: Understand and implement inheritance between classes.
14. Modules and Libraries: Import and use external libraries or modules to extend functionality.

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WEF: Session (2024-25)

Web Designing
(Course Code: B010123301)

Year: 2nd | **L T P C**
Semester: IIIrd | **3 1 0 3**

Course Outcome (CO)		**Bloom's Knowledge Level (KL)**
At the end of course , the student will be able to understand		
CO 1	Understand principle of Web page design and about types of websites	K_3, K_4
CO 2	Visualize and Recognize the basic concept of HTML and application in web designing.	K_1, K_2
CO 3	Recognize and apply the elements of Creating Style Sheet (CSS).	K_2, K_4
CO 4	Understanding the basic concept of Java Script and its application.	K_2, K_3
CO 5	Introduce basics concept of Web Hosting and apply the concept of SEO	K_2, K_3

Unit	**Topic**	**Proposed Lecture**
I	**Introduction :** Basic principles involved in developing a web site, Planning process , Domains and Hosting, Responsive Web Designing , Types of Websites (Static and Dynamic Websites), Web Standards and W3C recommendations, **Introduction to HTML:** What is HTML , HTML Documents, Basic structure of an HTML document , Creating an HTML document , Mark up Tags , Heading-Paragraphs , Line Breaks	**09**
II	**Elements of HTML:** HTML Tags., Working with Text , Working with Lists, Tables and Frames, Working with Hyperlinks, Images and Multimedia, Working with Forms and controls	**09**
III	**Concept of CSS:** Creating Style Sheet, CSS Properties , CSS Styling(Background, Text Format, Controlling Fonts) , Working with block elements and objects , Working with Lists and Tables , CSS Id and Class, Box Model(Introduction, Border properties, Padding Properties, Margin properties) CSS Advanced(Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector) , CSS Color , Creating page Layout and Site Designs.	**09**
IV	Introduction to Client Side Scripting , Introduction to Java Script , Javascript Types , Variables in JS, Operators in JS , Conditions Statements , Java Script Loops, JS Popup Boxes , JS Events , JS Arrays, Working with Arrays, JS Objects ,JS Functions , Using Java Script in Real time , Validation of Forms, Related Examples	**09**
V	**Web Hosting:** Web Hosting Basics , Types of Hosting Packages, Registering domains , Defining Name Servers , Using Control Panel, Creating Emails in Cpanel , Using FTP Client, Maintaining a Website **Concepts of SEO :** Basics of SEO, Importance of SEO, Onpage Optimization Basics	**09**

Text Books:

1. Steven M. Schafer, "HTML, XHTML, and CSS Bible, 5ed", Wiley India
2. Ian Pouncey, Richard York, "Beginning CSS: Cascading Style Sheets for Web Design", Wiley India

Computer Organization & Architecture

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

(Course Code: B010123305)

	L	T	P	C
Year: 2nd				
Semester: IIIrd	**3**	**1**	**0**	**3**

Course Outcome (CO)		**Bloom's Knowledge Level (KL)**
At the end of course , the student will be able to understand		
CO 1	Study of the basic structure and operation of a digital computer system.	K1, K2
CO 2	Analysis of the design of arithmetic & logic unit and understanding of the fixed point and floating- point arithmetic operations.	K2, K4
CO 3	Implementation of control unit techniques and the concept of Pipelining	K3
CO 4	Understanding the hierarchical memory system, cache memories and virtual memory	K2
CO 5	Understanding the different ways of communicating with I/O devices and standard I/O interfaces	K2, K4

DETAILED SYLLABUS

Unit	**Topic**	**Proposed Lecture**
I	**Introduction**: Functional units of digital system and their interconnections, buses, bus architecture, types of buses and bus arbitration. Register, bus and memory transfer. Processor organization, general registers organization, stack organization and addressing modes.	**09**
II	**Arithmetic and logic unit:** Look ahead carries adders. Multiplication: Signed operand, multiplication, Booths algorithm and array multiplier. Division and logic operations. Floating point arithmetic operation, Arithmetic & logic unit design. IEEE Standard for Floating Point Numbers	**09**
III	**Control Unit:** Instruction types, formats, instruction cycles and sub cycles (fetch and execute etc), micro operations, execution of a complete instruction. Program Control, Reduced Instruction Set Computer, Pipelining. Hardwire and micro programmed control: micro programme sequencing, concept of horizontal and vertical microprogramming.	**09**
IV	**Memory:** Basic concept and hierarchy, semiconductor RAM memories, 2D & 2 1/2D memory organization. ROM memories. Cache memories: concept and design issues & performance, address mapping and replacement Auxiliary memories: magnetic disk, magnetic tape and optical disks Virtual memory: concept implementation.	**09**
V	**Input / Output**: Peripheral devices, I/O interface, I/O ports, Interrupts: interrupt hardware, types of interrupts and exceptions. Modes of Data Transfer: Programmed I/O, interrupt initiated I/O and Direct Memory Access., I/O channels and processors. Serial Communication: Synchronous & asynchronous communication, standard communication interfaces.	**09**

Text books:

1. Computer System Architecture - M. Mano
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky Computer Organization, McGraw-Hill, Fifth Edition, Reprint 2012
3. John P. Hayes, Computer Architecture and Organization, Tata McGraw Hill, Third Edition, 1998. Reference books
4. William Stallings, Computer Organization and Architecture-Designing for Performance, Pearson Education, Seventh edition, 2006.

Reference Books:

5. Behrooz Parahami, "Computer Architecture", Oxford University Press, Eighth Impression, 2011.
6. David A. Patterson and John L. Hennessy, "Computer Architecture-A Quantitative Approach", Elsevier, a division of reed India Private Limited, Fifth edition, 2012

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WEF: Session (2024-25)

Data Structures using C
(Course Code: B010123302)

Year: 2nd **L T P C**
Semester: IIIrd **3 1 0 3**

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able :		
CO 1	Describe how arrays, linked lists, stacks, queues, trees, and graphs are represented in memory, used by the algorithms and their common applications.	K1, K2
CO 2	Discuss the computational efficiency of the sorting and searching algorithms.	K2
CO 3	Implementation of Trees and Graphs and perform various operations on these data structure.	K3
CO 4	Understanding the concept of recursion, application of recursion and its implementation and removal of recursion.	K4, K3
CO 5	Identify the alternative implementations of data structures with respect to its performance to solve a real world problem.	K3, K2

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	**Introduction:** Basic Terminology, Elementary Data Organization, Built in Data Types in C. Algorithm, Efficiency of an Algorithm, Time and Space Complexity, Asymptotic notations: Big Oh, Big Theta and Big Omega, Time-Space trade-off. Abstract Data Types (ADT) Arrays: Definition, Single and Multidimensional Arrays, Representation of Arrays: Row Major Order, and Column Major Order, Derivation of Index Formulae for 1-D,2-D,3-D and n-D Array Application of arrays, Sparse Matrices and their representations. Linked lists: Array Implementation and Pointer Implementation of Singly Linked Lists, Doubly Linked List, Circularly Linked List, Operations on a Linked List. Insertion, Deletion, Traversal, Polynomial Representation and Addition Subtraction & Multiplications of Single variable & Two variables Polynomial.	**09**
II	**Stacks:** Abstract Data Type, Primitive Stack operations: Push & Pop, Array and Linked Implementation of Stack in C, Application of stack: Prefix and Postfix Expressions, Evaluation of postfix expression, Iteration and Recursion- Principles of recursion, Tail recursion, Removal of recursion Problem solving using iteration and recursion with examples such as binary search, Fibonacci numbers, and Hanoi towers. Queues: Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, Array and linked implementation of queues in C, Dequeue and Priority Queue.	**09**
III	**Searching:** Concept of Searching, Sequential search, Index Sequential Search, Binary Search. Concept of Hashing & Collision resolution Techniques used in Hashing. Sorting: Insertion Sort, Selection, Bubble Sort, Quick Sort, Merge Sort, Heap Sort and Radix Sort.	**09**

IV	**Graphs:** Terminology used with Graph, Data Structure for Graph Representations: Adjacency Matrices, Adjacency List, Adjacency. Graph Traversal: Depth First Search and Breadth First Search, Connected Component, Spanning Trees, Minimum Cost Spanning Trees: Prims and 08 Kruskal algorithm. Transitive Closure and Shortest Path algorithm: Warshal Algorithm and Dijikstra Algorithm.	**09**
V	**Trees:** Basic terminology used with Tree, Binary Trees, Binary Tree Representation: Array Representation and Pointer(Linked List) Representation, Binary Search Tree, Strictly Binary Tree ,Complete Binary Tree . A Extended Binary Trees, Tree Traversal algorithms: Inorder, Preorder and Postorder, Constructing Binary Tree from given Tree Traversal, Operation of Insertation , Deletion, Searching & Modification of data in Binary Search . Threaded Binary trees, Traversing Threaded Binary trees. Huffman coding using Binary Tree. Concept & Basic Operations for AVL Tree , B Tree & Binary Heaps.	**09**

Text Books

1. Aaron M. Tenenbaum, Yedidyah Langsam and Moshe J. Augenstein, "Data Structures Using C and C++", PHI Learning Private Limited, Delhi India
2. Horowitz and Sahani, "Fundamentals of Data Structures", Galgotia Publications Pvt Ltd Delhi India.
3. Lipschutz, "Data Structures" Schaum's Outline Series, Tata McGraw-hill Education (India) Pvt. Ltd.
4. Thareja, "Data Structure Using C" Oxford Higher Education.
5.AK Sharma, "Data Structure Using C", Pearson Education India.
6. P. S. Deshpandey, "C and Data structure", Wiley Dreamtech Publication.

Reference Books

7. R. Kruse etal, "Data Structures and Program Design in C", Pearson Education.
8. Jean Paul Trembley and Paul G. Sorenson, "An Introduction to Data Structures with applications", McGrawHill.

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WEF: Session (2024-25)

Object Oriented Programming with C++
(Course Code: B010123304)

Year: 2nd | **L T P C**

Semester: IIIrd | **4 0 0 4**

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able :		
CO 1	Develop the object-oriented programming concepts.	K3, K4
CO 2	Implement Structure of C++ Programs.	K2
CO 3	Defining member Functions in C++ Program with Class and objetcs.	K3
CO 4	Defining Derived Classes and implement inheritance.	K4, K3
CO 5	Implement file handling in C++.	K3, K2

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	**Introduction** Introduction to object oriented programming: Basic Concepts of OOP, Benefits of OPP, Application of OOP, Class, Object, Inheritance Super Class, Sub Class, Overriding, Overloading, Encapsulation, Polymorphism, Abstraction, Interfaces, and Abstract Class.	**10**
II	**Introduction to C++** What is C++, A simple C++ Program, More C++ statements, Structure of C++ Program. Tokens, Expression and controls Structures Tokens , Keywords, Identifiers and Constants, C++ data types, Variables: Declaration, Dynamic initialization of variables, Reference variables, Operators in C++ : Scope resolution operator, Member deferencing Operators, Memory Management Operators, Manipulators, Type cast operators, Expressions and Control Structures. Functions The main() function, Function Prototyping, Call by reference, Return by reference, Inline function, Function Overloading.	**10**
III	**Classes and Objects** Introduction, Specifying a Class, Defining member Functions, C++ Program with Class, Nesting of Member functions, Private member functions, Memory Allocation for Objects, Static Data members, Static Member Functions, Arrays within a Class, Arrays of Objects, Objects as Function Arguments, Friendly Functions, Returning Objects. Pointers: Declaration and initializing, Manipulation of pointers, pointers Expression and Pointer Arithmetic, Pointer with Arrays, Arrays of Pointers, Pointers to objects, this pointers, Arrays of Pointers to Objects. Constructors and Destructors Constructors, Parameterized Constructors, Multiple Constructors in a class, Copy constructor, Destructors. Operator overloading Defining Operator Overloading, Overloading Unary Operators, Overloading Binary Operators, Type Conversions.	**10**
IV	**Inheritance and Polymorphisms** **Inheritance and Polymorphisms** Introduction, Defining Derived Classes, Single inheritance, Multiple inheritance,	**10**

	Hierarchical inheritance, Multilevel inheritance, Hybrid inheritance, Virtual Base Classes, Polymorphism, static and dynamic binding, Constructor in Derived Classes, Pointers to Derived Classes, Virtual Functions, Pure Virtual Functions.	
V	**I/O Operations and Files** C++ Stream Classes, Unformatted I/O Operations, Formatted I/O operations, Classes for File Streams, Opening and Closing a File : open() and close() functions, Manipulators of File Pointers : seekg(), seekp(), tellg(), tellp() functions, Sequential Input and output Operations : put (), get(), write(), read() functions, Error handling File Operations : eof(), fail(), bad(), good( ).	**10**

Text Books

1. E. Balagurusamy - Object Oriented Programming with C++ - TMH.

Reference Books:

2.Robert Lafore - Object Oriented Programming in Microsoft C++ - Galgotia.

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

Discrete Structures & Theory of Logic
(Course Code: B010123303)

Year: 2nd | **L T P C**
Semester: IIIrd | **3 1 0 3**

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able to understand		
CO 1	Write an argument using logical notation and determine if the argument is or is not valid.	K3, K4
CO 2	Understand the basic principles of sets and operations in sets.	K1, K2
CO 3	Demonstrate an understanding of relations and functions and be able to determine their properties.	K3
CO 4	Demonstrate different traversal methods for trees and graphs.	K1, K4
CO 5	Model problems in Computer Science using graphs and trees.	K2, K4

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	**Set Theory**: Introduction, Combination of sets, Multisets, Ordered pairs. Proofs of some general identities on sets. Relations: Definition, Operations on relations, Properties of relations, Composite Relations, Equality of relations, Recursive definition of relation, Order of relations. **Functions:** Definition, Classification of functions, Operations on functions, Recursively defined functions. Growth of Functions. **Natural Numbers:** Introduction, Mathematical Induction, Variants of Induction, Induction with Nonzero Base cases. Proof Methods, Proof by counter – example, Proof by contradiction.	**09**
II	**Algebraic Structures:** Definition, Groups, Subgroups and order, Cyclic Groups, Cosets, Lagrange's theorem, Normal Subgroups, Permutation and Symmetric groups, Group Homomorphisms, Definition and elementary properties of Rings and Fields.	**09**
III	**Lattices**: Definition, Properties of lattices – Bounded, Complemented, Modular and Complete lattice. Boolean Algebra: Introduction, Axioms and Theorems of Boolean algebra, Algebraic manipulation of Boolean expressions. Simplification of Boolean Functions, Karnaugh maps, Logic gates, Digital circuits and Boolean algebra.	**09**
IV	**Propositional Logic:** Proposition, well formed formula, Truth tables, Tautology, Satisfiability, Contradiction, Algebra of proposition, Theory of Inference. (8) **Predicate Logic:** First order predicate, well formed formula of predicate, quantifiers, Inference theory of predicate logic.	**09**

V	**Trees:** Definition, Binary tree, Binary tree traversal, Binary search tree. **Graphs:** Definition and terminology, Representation of graphs, Multigraphs, Bipartite graphs, Planar graphs, Isomorphism and Homeomorphism of graphs, Euler and Hamiltonian paths, Graph coloring, Recurrence Relation & Generating function: Recursive definition of functions, Recursive algorithms, Method of solving recurrences. **Combinatorics**: Introduction, Counting Techniques, Pigeonhole Principle	**09**

Text books:

1. Koshy, Discrete Structures, Elsevier Pub. 2008 Kenneth H. Rosen, Discrete Mathematics and Its Applications, 6/e, McGraw-Hill, 2006.
2. B. Kolman, R.C. Busby, and S.C. Ross, Discrete Mathematical Structures, 5/e, Prentice Hall, 2004.
3. E.R. Scheinerman, Mathematics: A Discrete Introduction, Brooks/Cole, 2000.
4. R.P. Grimaldi, Discrete and Combinatorial Mathematics, 5/e, Addison Wesley, 2004
5. Liptschutz, Seymour, " Discrete Mathematics", McGraw Hill.
6. Trembley, J.P & R. Manohar, "Discrete Mathematical Structure with Application to Computer Science", McGraw Hill.

Reference Books:

7. Deo,.Narsingh, "Graph Theory With application to Engineering and Computer.Science.", PHI.
8. Krishnamurthy, V., "Combinatorics Theory & Application", East-West Press Pvt. Ltd., New Delhi

SDGI GLOBAL UNIVERSITY
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WEF: Session (2024-25)

Mathematical Foundations for Artificial Intelligence
(Course Code: B010223303/ B010323303)

Year: 2nd **L T P C**
Semester: III **3 1 0 3**

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able :		
CO 1	Demonstrate a sound understanding of Descriptive Statistics & Probability and their role and importance in artificial intelligence and machine learning	K_3, K_4
CO 2	Demonstrate a good understanding of Sampling & Confidence Interval, Inference & Significance. Estimation and Hypothesis Testing,	K_2
CO 3	Understanding of random number generation and Monte Carlo Integration	K_3
CO 4	Understanding of concepts of vector spaces.	K_4, K_3
CO 5	Demonstrate a good understanding of linear transformations and matrices.	K_3, K_2

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	**Descriptive Statistics & Probability** Diagrammatic representation of data, measures of central tendency, measures of dispersion, measures of skewness and kurtosis, correlation, inference procedure for correlation coefficient, bivariate correlation, multiple correlations	09
II	**Inferential Statistics & Regression** Measures of probability, conditional probability, independent event, Bayes' theorem, random variable, discrete and continuous probability distributions, expectation and variance, markov inequality, chebyshev's inequality, central limit theorem	09
III	**Pseudo-Random Numbers & Monte Carlo Integration** Sampling & confidence interval, Inference & Significance. Estimation & Hypothesis Testing, Goodness of fit, Test of Independence t-test/z-test (one sample, independent, paired), ANOVA, chi-square. Regression, Linear Methods for Regression Analysis	09
IV	**Vector Spaces** Vector Space, Subspace , Linear Combination, Linear Independence, Basis, Dimension, Finding a Basis of a Vector Space , Coordinates, Change of Basis Inner Product Spaces-Inner Product, Length, Orthogonal Vectors, Triangle Inequality, Cauchy Schwarz Inequality, Orthonormal (Orthogonal) Basis, Gram-Schmidt Process.	09
V	**Linear Transformations** Linear Transformations and Matrices for Linear Transformation, Kernel and Range of a Linear Transformations, Change of Basis Eigenvalues and Eigenvectors-Definition of Eigenvalue and Eigenvector, Diagonalization , Symmetric Matrices	09

	and Orthogonal Diagonalization.	

Text Books
1. S.C. Gupta & V.K. Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand & Sons
2. Sheldon M. Ross, "Introduction to Probability and Statistics for Engineers and Scientists", Academic Press.
3. Dudewicz, E.J., Mishra, S.N., "Modern Mathematical Statistics", Willy.
4. Purohit S. G., Gore S. D., Deshmukh S. K., "Statistics using R, Narosa.

Reference Books:
5. Rizzo, M. L., "Statistical Computing with R", Boca Raton, FL: Chapman & Hall/CRC Press.
6. Normal Maltoff, The Art of R programming, William.
7. Dalgaard, Peter, "Introductory statistics with R", Springer Science & Business Media.
8. M. D. Ugarte, A. F. Militino, A. T. Arnholt, "Probability and Statistics with R", CRC Press.
9. Kundu, D. and Basu, A., "Statistical computing – existing methods and recent developments", Narosa.
10.Gentle, James E., Härdle, Wolfgang Karl, Mori, Yuich, "Handbook of Computational Statistics", Springer.
11. Givens and Hoeting, "Computational Statistics", Wiley Series in Prob. and Statistics.
12.Elementary Linear Algebra by Ron Larson, 8th edition, Cengage Learning, 2017

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SDGI GLOBAL UNIVERSITY
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WEF: Session (2024-25)

Information Theory for Cyber Security
(Course Code: B010423303)

Year: 2nd **L T P C**

Semester: IIIrd **3 1 0 3**

Course Outcome (CO)		
At the end of course , the student will be able to understand		
CO 1	To provide an insight to information coding techniques, error correction mechanism for cyber security.	K_1, K_3
CO 2	To introduce the principles and applications of information theory.	K_2, K_3
CO 3	To justify how information is measured in terms of probability and entropy.	K_2, K_1
CO 4	To learn coding schemes, including error correcting codes.	K_2, K_1
CO 5	To learn various secrecy metrics.	K_1, K_2

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	**Foundation of Information theory** Shannon's foundation of Information theory, Random variables, Probability distribution factors, Uncertainty/entropy information measures, Leakage, Quantifying Leakage and Partitions, Lower bounds on key size: secrecy, authentication and secret sharing. provable security, computationally-secure, symmetric cipher.	**09**
II	**Information Coding Techniques** Secrecy, Authentication, Secret sharing, Optimistic results on perfect secrecy, Secret key agreement, Unconditional Security, Quantum Cryptography, Randomized Ciphers, Types of codes**:** block codes, Hamming and Lee metrics, description of linear block codes, parity check Codes, cyclic code, Masking techniques.	**09**
III	**Introduction to Cryptography** Information-theoretic security and cryptograph, basic introduction to Diffie-Hellman, AES, and side-channel attacks.	**09**
IV	**Secrecy metrics** Secrecy metrics: strong, weak, semantic security, partial secrecy, Secure source coding: rate-distortion theory for secrecy systems, side information at receivers, Differential privacy, Distributed channel synthesis.	**09**
V	**Digital and network forensics** Digital and network forensics, Public Key Infrastructure, Light weight cryptography, Elliptic Curve Cryptography and applications	**09**

Text books:

1. Information Theory and Coding, Muralidhar Kulkarni, K S Shivaprakasha, John Wiley & Sons.
2. Communication Systems: Analog and digital, Singh and Sapre, Tata McGraw Hill.
3. Fundamentals in information theory and coding, Monica Borda, Springer.

Reference Books:

4. Information Theory, Coding and Cryptography R Bose.

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School of Engineering & Technology
WEF: Session (2024-25)

Team Building & Leadership
(Course Code: BSGUAE2405)

	L	T	P	C
Year: 2nd				
Semester: III	**3**	**0**	**0**	**3**

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able :		
CO 1	Identify and describe the key components of effective team building.	K1, K2
CO 2	Analyze various leadership styles and their application in team management.	K1, K2
CO 3	Demonstrate the ability to work collaboratively within a team, contributing to group goals.	K2
CO 4	Apply leadership skills in managing team dynamics and resolving conflicts.	K1, K2
CO 5	Evaluate team performance and provide constructive feedback for improvement.	K2
DETAILED SYLLABUS		
Unit		**Proposed Lecture**
I	**Introduction to Team Building** Definition and importance of teams in organizations, Stages of team development: Forming, Storming, Norming, Performing, Adjourning, Characteristics of effective teams, Role of communication in team building.	**09**
II	**Leadership Fundamentals** Definition and significance of leadership in team settings, Leadership vs. Management, Leadership theories: Trait theory, Behavioral theory, Contingency theory, Leadership styles: Autocratic, Democratic, Laissez-faire, Transformational, and Transactional leadership.	**09**
III	**Building and Leading Teams** Team roles and responsibilities, Creating and sustaining high-performing teams, Leadership in diverse and cross-functional teams, Strategies for effective team leadership.	**09**
IV	**Managing Team Dynamics** Understanding team dynamics and group behavior, Conflict resolution in teams, Motivating team members, Enhancing team collaboration and trust.	**09**
V	**Assessing Team Performance** Tools and techniques for evaluating team performance, Providing feedback and coaching, Continuous improvement in team processes, Case studies on successful team leadership.	**09**

Text Books

1. Adair, J. (2009). Effective Team Building. Pan Books.
2. Northouse, P. G. (2018). Leadership: Theory and Practice. Sage Publications.
3. Lencioni, P. (2002). The Five Dysfunctions of a Team: A Leadership Fable. Jossey-Bass.
4. Blanchard, K. (2007). Leading at a Higher Level. FT Press.
5. Levi, D. (2015). Group Dynamics for Teams. Sage Publications.

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

Advanced Excel

(Course Code: BSGUSE2419)

Year: 2nd	**L**	**T**	**P**	**C**
Semester: IIIrd	**3**	**1**	**0**	**3**

Course Outcome (CO)		**Bloom's Level**
At the end of course, the student will be able		
CO 1	To understand the concept of look-up functions in Excel	**K2**
CO 2	To gain the practical knowledge of worksheet	**K3**
CO 3	To gain the practical knowledge of Excel Function & Formulas	**K3,K4**
CO 4	To gain the practical knowledge of Financial modelling in Excel	**K3,K4**
CO 5	To gain the practical knowledge of Business Analytics in Excel	

Unit	**Topic**
I	Conditional Formatting - Inbulit Conditional Formatting, Custom Conditional Formatting, Dynamic Search & Highlight, Partial Match Vlookup/ Hlookup/ Xlookup – 18 Scenario
II	Offset Function–Basic, Offset with Sum – Horizontal, Offset with Sum – Vertical, Offset with Match, Offset with Average, Offset with Countif Cloud Features – Edit Report, Export to PowerPoint & PDF, Embed Code Generation Setting, Manage Permissions & Content Pack, Mail Subscription, Quick Insights
III	Index & Match Function - Index Function Basic, Index Function with Area Number, Match Function Basic, Index & Match Functions as replacement to Vlookup Function, Index & Match Functions with Drop Down, SUMIF, AVERAGEIF and COUNTIF Application of Excel Fu
IV	Financial Modelling in Excel: PMT, PPMT, IPMT,IRR, MIRR, XIRR, FV, FVSCEDULE, PV, CUMPRINC, Forecasting, Financial Statements Forecasting, Statistical tools-Standard Deviation , Correlation, Regression , histogram, testing-z-test,t-test, chi square
IV	Business Analytics, Use of Spread Sheet to anlayze data-Descriptive analytics and Predictive analytics. Macro, Designing Dashboard Power Query Protection New Functions of Excel 2019, VBA

References:

1.William Fischer ,Excel: Quick Start Guide from Beginner to Expert .
2.Grey Harvey, Excel 2019 All – in- One For Dummies.

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

Data Structures Lab
(Course Code: B010123352)

	L	T	P	C
Year: 2nd				
Semester: III	**0**	**0**	**2**	**1**

List of Experiments (Indicative & not limited to)

1. Implementing Sorting Techniques: Bubble Sort, Insertion Sort, Selection Sort, Shell , Sort, Radix Sort, Quick sort.

2. Implementing Searching and Hashing Techniques: Linear search, Binary search, Methods for Hashing: Modulo Division, Digit Extraction, Fold shift, Fold Boundary, Linear Probe for Collision Resolution. Direct and Subtraction hashing.

3. Implementing Stacks: Array implementation, Linked List implementation, Evaluation of postfix expression and balancing of parenthesis , Conversion of infix notation to postfix notation.

4. Implementing Queue: Linked List implementation of ordinary queue, Array implementation of circular queue, Linked List implementation of priority queue, Double ended queue.

5. Implementing Linked List: Singly Linked Lists, Circular Linked List, Doubly Linked Lists : Insert, Display, Delete, Search, Count, Reverse(SLL), Polynomial , Addition , Comparative study of arrays and linked list.

6. Implementing Trees: Binary search tree : Create, Recursive traversal: preorder, post order, in order, Search Largest , Node, SSmallest Node, Count number of nodes, Heap: Min Heap, Max Heap: reheap Up, reheap Down, Delete , Expression Tree, Heapsort.

7. Implementing Graphs: Represent a graph using the Adjacency Matrix, BFS, Find the minimum spanning tree (using any method Kruskal’s Algorithm or Prim’s Algorithm).

SDGI GLOBAL UNIVERSITY
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WEF: Session (2024-25)

OOPS LAB WIth C++

(Course Code: **B010123354**)

Year: 2nd	**L**	**T**	**P**	**C**
Semester: III	**0**	**0**	**2**	**1**

List of Experiments (Indicative & not limited to)

16. Program using Functions

- Functions with Default arguments, Friend Function, Inline Function
- Implementation of Call by Value, Address, Reference

2. Simple classes for understanding objects, member functions, constructors, destructor, copy constructor.

- Classes with Primitive Data Members
- Classes with Arrays as Data Members
- Classes with Pointers as Data Members
- Classes with Constant Data Members
- Classes with Static Member Functions

3. Compile Time Polymorphism

- Operator Overloading
- Function Overloading

4. Run Time Polymorphism

- Various Forms of Inheritance
- Virtual Functions
- Virtual Base Classes
- Templates

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

Programming in Java
(Course Code: B010123401)

Year: 2nd | **L** | **T** | **P** | **C**
Semester: IVth | **4** | **0** | **0** | **4**

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able :		
CO 1	Develop the object-oriented programming concepts using Java	K3, K4
CO 2	Implement exception handling, file handling, and multi-threading in Java	K2,K4
CO 3	Apply new java features to build java programs.	K3
CO 4	Analyse java programs with Collection Framework	K4
CO 5	Test web and RESTful Web Services with Spring Boot using Spring Framework concepts	K5

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	**Introduction to JAVA** Introduction: Why Java, History of Java, JVM, JRE, Java Environment, Java Source File Structure, and Compilation. Programming Structures in Java: Defining Classes in Java, Constructors, Methods, Access Specifies, Static Members, Final Members, Comments, Data types, Variables, Operators, Control Flow, Arrays & String. Object Oriented Programming: Class, Object, Inheritance Super Class, Sub Class, Overriding, Overloading, Encapsulation, Polymorphism, Abstraction, Interfaces, and Abstract Class. Packages: Defining Package, CLASSPATH Setting for Packages, Making JAR Files for Library Packages, Import and Static Import Naming Convention for Packages.	10
II	**Exception Handling & Multithreading** Exception Handling: The Idea behind Exception, Exceptions & Errors, Types of Exception, Control Flow in Exceptions, JVM Reaction to Exceptions, Use of try, catch, finally, throw, throws in Exception Handling, In-built and User Defined Exceptions, Checked and Un-Checked Exceptions. Input /Output Basics: Byte Streams and Character Streams, Reading and Writing File in Java. Multithreading: Thread, Thread Life Cycle, Creating Threads, Thread Priorities, Synchronizing Threads, Inter-thread Communication.	10
III	**Java New Features** Functional Interfaces, Lambda Expression, Method References, Stream API, Default Methods, Static Method, Base64 Encode and Decode, ForEach Method, Try-with resources, Type Annotations, Repeating Annotations, Java Module System, Diamond Syntax with 08 Inner Anonymous Class, Local Variable Type Inference, Switch Expressions, Yield Keyword, Text Blocks, Records, Sealed Classes.	10
IV	**Java Collections Framework** Collection in Java, Collection Framework in Java, Hierarchy of Collection Framework, Iterator Interface, Collection Interface, List Interface, ArrayList, LinkedList, Vector, Stack, Queue Interface,	10

	Set Interface, HashSet, LinkedHashSet, SortedSet Interface, TreeSet, Map Interface, HashMap Class, LinkedHashMap Class, TreeMap Class, Hashtable Class, Sorting, Comparable Interface, Comparator Interface, Properties Class in Java.	
V	**Spring Frameworks** Spring Core Basics-Spring Dependency Injection concepts, Spring Inversion of Control, AOP, Bean Scopes- Singleton, Prototype, Request, Session, Application, Web Socket, Auto wiring, Annotations, Life Cycle Call backs, Bean Configuration styles. Spring Boot: Spring Boot Build Systems, Spring Boot Code Structure, Spring Boot Runners, Logger, BUILDING RESTFUL WEB SERVICES, Rest Controller, Request Mapping, Request Body, Path Variable, Request Parameter, GET, POST, PUT, DELETE APIs, Build Web Applications.	**10**

Text Books

1. Herbert Schildt, "Java The complete reference", McGraw Hill Education .
2. Craig Walls, “Spring Boot in Action” Manning Publication 1. Steven Holzner, “Java Black Book”, Dreamtech.
3. Balagurusamy E, “Programming in Java”, McGraw Hill .

Reference Books

4 Java: A Beginner’s Guide by Herbert Schildt, Oracle Press .
5. Greg L. Turnquist “Learning Spring Boot 2.0 - Second Edition”, Packt Publication.
6. AJ Henley Jr (Author), Dave Wolf, “Introduction to Java Spring Boot: Learning by Coding”, Independently Published

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

Artificial Intelligence
(Course Code: **B010123402**)

Year: 2nd **L T P C**

Semester: IVth **4 0 0 4**

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able to understand		
CO 1	Understand the basics of the theory and practice of Artificial Intelligence as a discipline and about intelligent agents.	K_2
CO 2	Understand search techniques and gaming theory.	K_2, K_3
CO 3	The student will learn to apply knowledge representation techniques and problem solving strategies to common AI applications.	K_3 , K_4
CO 4	Student should be aware of techniques used for classification and clustering.	K_2 , K_3
CO 5	Student should aware of basics of pattern recognition and steps required for it.	K_2 , K_4

Unit	Topic	Proposed Lecture
I	**INTRODUCTION :** Introduction–Definition – Future of Artificial Intelligence – Characteristics of Intelligent Agents– Typical Intelligent Agents – Problem Solving Approach to Typical AI problems. **SOFTWARE AGENTS** Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent systems.	**10**
II	**PROBLEM SOLVING METHODS** Problem solving Methods – Search Strategies- Uninformed – Informed – Heuristics – Local Search Algorithms and Optimization Problems – Searching with Partial Observations – Constraint Satisfaction Problems – Constraint Propagation – Backtracking Search – Game Playing – Optimal Decisions in Games – Alpha – Beta Pruning – Stochastic Games	**10**
III	**KNOWLEDGE REPRESENTATION** First Order Predicate Logic – Prolog Programming – Unification – Forward Chaining-Backward Chaining – Resolution – Knowledge Representation – Ontological Engineering-Categories and Objects – Events – Mental Events and Mental Objects – Reasoning Systems for Categories –Reasoning with Default Information	**10**
IV	**APPLICATIONS** AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing – Machine Translation – Speech Recognition – Robot – Hardware –Perception – Planning – Moving	**10**
V	**GENERATIVE AI** Introduction to AI and Generative Models: Overview of AI and machine learning, what is Generative AI, Applications of Generative AI (text, images, music, etc.), Introduction to generative vs. discriminative models, Generator and Discriminator models.	**10**

Text books:
1. S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach‖, Prentice Hall, Third Edition, 2009.
2. I. Bratko, ―Prolog: Programming for Artificial Intelligence‖, Fourth edition, Addison-Wesley Educational Publishers Inc., 2011.
3. M. Tim Jones, ―Artificial Intelligence: A Systems Approach(Computer Science)‖, Jones and Bartlett Publishers, Inc.; First Edition, 2008
4. Nils J. Nilsson, ―The Quest for Artificial Intelligence‖, Cambridge University Press, 2009.
5. William F. Clocksin and Christopher S. Mellish,‖ Programming in Prolog: Using the ISO Standard‖, Fifth Edition, Springer, 2003.
6. Gerhard Weiss, ―Multi Agent Systems‖, Second Edition, MIT Press, 2013.
7. David L. Poole and Alan K. Mackworth, ―Artificial Intelligence: Foundations of Computational Agents‖, Cambridge University Press, 2010.

SDGI GLOBAL UNIVERSITY
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WEF: Session (2024-25)

Finite Automata and Formal Languages

(Course Code: **B010123405**)

Year: 2nd **L T P C**

Semester: IVth **4 0 0 4**

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able to understand		
CO 1	Analyse and design finite automata, pushdown automata, Turing machines, formal languages, and grammars	K_4, K_6
CO 2	Analyse and design, Turing machines, formal languages, and grammars	K_4, K_6
CO 3	Demonstrate the understanding of key notions, such as algorithm, computability, decidability, and complexity through problem solving	K_1, K_5
CO 4	Prove the basic results of the Theory of Computation.	K_2,K_3
CO 5	State and explain the relevance of the Church-Turing thesis.	K_1, K_5

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	**Basic Concepts and Automata Theory:** Introduction to Theory of Computation- Automata, Computability and Complexity, Alphabet, Symbol, String, Formal Languages, Deterministic Finite Automaton (DFA)- Definition, Representation, Acceptability of a String and Language, Non Deterministic Finite Automaton (NFA), Equivalence of DFA and NFA, NFA with ε-Transition, Equivalence of NFA's with and without ε-Transition, Finite Automata with output- Moore Machine, Mealy Machine, Equivalence of Moore and Mealy Machine, Minimization of Finite Automata.	**10**
II	**Regular Expressions and Languages:** Regular Expressions, Transition Graph, Kleen's Theorem, Finite Automata and Regular Expression- Arden's theorem, Algebraic Method Using Arden's Theorem, Regular and Non-Regular Languages- Closure properties of Regular Languages, Pigeonhole Principle, Pumping Lemma, Application of Pumping Lemma, Decidability- Decision properties, Finite Automata and Regular Languages	**10**
III	**Regular and Non-Regular Grammars**: Context Free Grammar(CFG)-Definition, Derivations, Languages, Derivation Trees and Ambiguity, Regular Grammars-Right Linear and Left Linear grammars, Conversion of FA into CFG and Regular grammar into FA, Simplification of CFG, Normal Forms- Chomsky Normal Form(CNF), Greibach Normal Form (GNF), Chomsky Hierarchy, Programming problems based on the properties of CFGs.	**10**
IV	**Push Down Automata and Properties of Context Free Languages**: Nondeterministic Pushdown Automata (NPDA)- Definition, Moves, A Language Accepted by NPDA, Deterministic Pushdown Automata(DPDA) and Deterministic Context free Languages(DCFL), Pushdown Automata for Context Free Languages, Context Free grammars for Pushdown Automata, Two stack Pushdown Automata, Pumping Lemma for CFL, Closure properties of CFL, Decision Problems of CFL, Programming problems based on the properties of CFLs.	**10**

V	**Turing Machines and Recursive Function Theory** : Basic Turing Machine Model, Representation of Turing Machines, Language Acceptability of Turing Machines, Techniques for Turing Machine Construction, Modifications of Turing Machine, Turing Machine as Computer of Integer Functions, Universal Turing machine, Linear Bounded Automata, Church's Thesis, Recursive and Recursively Enumerable language, Halting Problem, Post's Correspondance Problem, Introduction to Recursive Function Theory.	**10**

Text books:

1. Introduction to Automata theory, Languages and Computation, J.E.Hopcraft, R.Motwani, and Ullman. 2nd edition, Pearson Education Asia
2. Introduction to languages and the theory of computation, J Martin, 3rd Edition, Tata McGraw Hill

Reference Books:

3. Elements and Theory of Computation, C Papadimitrou and C. L. Lewis, PHI

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School of Engineering & Technology
WEF: Session (2024-25)

Operating Systems

(Course Code: B010123403)

	L	T	P	C
Year: 2nd				
Semester: IVth	**4**	**0**	**0**	**4**

Course Outcome (CO)		**Bloom's Knowledge Level (KL)**
At the end of course , the student will be able to understand		
CO 1	Understand the structure and functions of OS	K_1, K_2
CO 2	Learn about Processes, Threads and Scheduling algorithms.	K_1, K_2
CO 3	Understand the principles of concurrency and Deadlocks	K_2
CO 4	Learn various memory management scheme	K_2
CO 5	Study I/O management and File systems.	K_2,K_4

DETAILED SYLLABUS

Unit	**Topic**	**Proposed Lecture**
I	**Introduction** : Operating system and functions, Classification of Operating systems- Batch, Interactive, Time sharing, Real Time System, Multiprocessor Systems, Multiuser Systems, Multiprocess Systems, Multithreaded Systems, Operating System Structure- Layered structure, System Components, Operating System services, Reentrant Kernels, Monolithic and Microkernel Systems.	**10**
II	**Concurrent Processes**: Process Concept, Principle of Concurrency, Producer / Consumer Problem, Mutual Exclusion, Critical Section Problem, Dekker's solution, Peterson's solution, Semaphores, Test and Set operation; Classical Problem in Concurrency- Dining Philosopher Problem, Sleeping Barber Problem; Inter Process Communication models and Schemes, Process generation.	**10**
III	**CPU Scheduling:** Scheduling Concepts, Performance Criteria, Process States, Process Transition Diagram, Schedulers, Process Control Block (PCB), Process address space, Process identification information, Threads and their management, Scheduling Algorithms, Multiprocessor Scheduling. Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock.	**10**
IV	**Memory Management:** Basic bare machine, Resident monitor, Multiprogramming with fixed partitions, Multiprogramming with variable partitions, Protection schemes, Paging, Segmentation, Paged segmentation, Virtual memory concepts, Demand paging, Performance of demand paging, Page replacement algorithms, Thrashing, Cache memory organization, Locality of reference.	**10**
V	**I/O Management and Disk Scheduling**: I/O devices, and I/O subsystems, I/O buffering, Disk storage and disk scheduling, RAID. File System: File concept, File organization and access mechanism, File directories, and File sharing, File system implementation issues, File system	**10**

	protection and security.	
	Text books: 1. Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley 2. Sibsankar Halder and Alex A Aravind, "Operating Systems", Pearson Education 3. Harvey M Dietel, " An Introduction to Operating System", Pearson Education **Reference Books:** 4. D M Dhamdhere, "Operating Systems : A Concept based Approach", 2nd Edition,TMH 5. William Stallings, "Operating Systems: Internals and Design Principles ", 6th Edition, Pearson Education	

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

Introduction to Cyber Security
(Course Code: B010123404)

Year: 2nd **L T P C**

Semester: IVth **3 0 0 3**

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able to understand		
CO 1	Understand the basic concepts of cyber security and cybercrimes.	K1, K2
CO 2	Understand the security policies and cyber laws.	K1, K2
CO 3	Understand the tools and methods used in cyber crime	K2
CO 4	Understand the concepts of cyber forensics	K1, K2
CO 5	Understand the cyber security policies and cyber laws	K2

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	**Introduction To Cyber Crime :** Cybercrime- Definition and Origins of the word Cybercrime and Information Security, Who are Cybercriminals? Classifications of Cybercrimes, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens. Cyber offenses: How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cybercafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector.	**09**
II	**Cyber Crime :** 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, Mobile Devices: Security Implications for organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era.	**09**
III	**Tools And Methods Used In Cybercrime :** Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan-horses and Backdoors, Steganography, DoS and DDoS At-tacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks. Phishing and Identity Theft: Introduction to Phishing, Identity Theft (ID Theft)..	**09**
IV	**Understanding Computer Forensics:** Introduction, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation. Forensics and Social Networking Sites: The Security/Privacy Threats, Challenges in Computer Forensics.	**09**
V	**INTRODUCTION TO SECURITY POLICIES AND CYBER LAWS :** Need for An Information Security Policy, Introduction to Indian Cyber Law, Objective and Scope of the Digital Personal Data Protection Act 2023, Intellectual Property Issues, Overview of Intellectual Property Related Legislation in India, Patent, Copyright, Trademarks.	**09**

Text books:

1. Sunit Belapure and Nina Godbole, "Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives", Wiley India Pvt Ltd, ISBN: 978-81- 265-21791, Publish Date 2013.
2. Basta, Basta, Brown, Kumar, Cyber Security and Cyber Laws, 1st edition , Cengage Learning publication
3. Dr. Surya PrakashTripathi, RitendraGoyal, Praveen Kumar Shukla, KLSI. "Introduction to information security and cyber laws". Dreamtech Press. ISBN: 9789351194736, 2015.
4. Cyber Security and Date Privacy by Krishan Kumar Goyal , Amit Garg , Saurabh Singhal , HP HAMILTON LIMITED Publication, ISBN-13-978-1913936020
5. Thomas J. Mowbray, "Cybersecurity: Managing Systems, Conducting Testing
6. Investigating Intrusions", Copyright © 2014 by John Wiley & Sons, Inc, ISBN: 978 - 1-118 -84965 -1.
7. James Graham, Ryan Olson, Rick Howard, "Cyber Security Essentials", CRC Press, 15-Dec 2010.
8. Anti- Hacker Tool Kit (Indian Edition) by Mike Shema, McGraw-Hill Publication.

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

AI with Experiential Learning
(Course Code: B010223404)

Year: 2nd **L T P C**

Semester: IVth **3 0 0 3**

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able to understand		
CO 1	Provide you with the knowledge and expertise to become proficient in AI.	K1, K3
CO 2	Demonstrate an understanding of statistics and machine learning concepts.	K2, K3
CO 3	The student will learn to regression techniques and problem solving strategies to common AI applications.	K2, K4
CO 4	Critically evaluate logistic regression based on the stories from data.	K2, K3
CO 5	To understand the fundamental concept of clustering algorithms.	K3, K2

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	**Introduction to Artificial Intelligence** Defining Artificial Intelligence, Defining AI techniques, Using Predicate Logic and Representing Knowledge as Rules, Representing simple facts in logic, Computable functions and predicates, Procedural vs Declarative knowledge, Logic Programming, Mathematical foundations: Matrix Theory and Statistics for Machine Learning.	**09**
II	**Introduction to Machine Learning** Idea of Machines learning from data, Classification of problem –Regression and Classification, Supervised and Unsupervised learning.	**09**
III	**Regression** Linear Regression: Model representation for single variable, Single variable Cost Function, radient Decent for Linear Regression, Gradient Decent in practice, multiple regression, Logistic Regression.	**09**
IV	**Model Evaluation Generalization** Metrics for Out-of-Sample Evaluation Error – Cross Validation – Overfitting – Under fitting and Model Selection – Ridge Regression Prediction – Grid Search Testing Multiple Parameters.	**09**
V	**Clustering Algorithms** Discussion on clustering algorithms and use-cases cantered around clustering and classification.	**09**

Text books:

9. Saroj Kaushik, Artificial Intelligence, Cengage Learning, 1st Edition 2011.
10. Anindita Das Bhattacharjee, "Practical Workbook Artificial Intelligence and Soft Computing for beginners, Shroff Publisher-X team Publisher.
11. Yuxi (Hayden) Liu, "Python Machine Learning by Example", Packet Publishing Limited, 2017.
12. Tom Mitchell, Machine Learning, McGraw Hill, 2017.
13. Christopher M. Bishop, Pattern Recognition and Machine Learning, Springer, 2011.

Reference Books:

14. T. Hastie, R. Tibshirani, J. Friedman. The Elements of Statistical Learning, 2e, 2011.

Corresponding Online Resources:

1. Artificial Intelligence,https://swayam.gov.in/nd2_cec20_cs10/preview.

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

AI & DS with Experiential Learning
(Course Code: B010323404)

Year: 2nd **L T P C**

Semester: IVth **3 0 0 3**

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able to understand		
CO 1	Provide you with the knowledge and expertise to become proficient in AI.	K_1, K_3
CO 2	The student will learn to regression techniques and problem solving strategies to common AI applications.	K_2, K_3
CO 3	Critically evaluate model based on the stories from data.	K_2, K_4
CO 4	Understand the fundamentals of data science.	K_2, K_3
CO 5	To apply the pre-processing techniques for generating quality data inputs	K_3, K_2

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	**Introduction to Artificial Intelligence** Defining Artificial Intelligence, Defining AI techniques, Using Predicate Logic and Representing Knowledge as Rules, Representing simple facts in logic, Computable functions and predicates, Procedural vs Declarative knowledge, Logic Programming, Mathematical foundations: Matrix Theory and Statistics for Machine Learning.	**09**
II	**Regression & Model Development** Linear Regression: Model representation for single variable, Single variable Cost Function, radient, Decent for Linear Regression, Gradient Decent in practice, multiple regression, Logistic Regression.	**09**
III	**Model Evaluation Generalization** Metrics for Out-of-Sample Evaluation Error – Cross Validation – Overfitting – Under fitting and Model Selection – Ridge Regression Prediction – Grid Search Testing Multiple Parameters.	**09**
IV	**Introduction to Data Science** Evolution of Data Science, Introduction to Data Science – Types of Data, Data Science Vs Big Data, Concept of Big Data, Concept of Data Warehousing, Introduction to Data Mining, Role of Data Scientist, Data Science Life Cycle, Data Science Roles – Data Science Project Stages – Data Science Applications in Various Fields – Data Security Issues, thinking in a structured way to solve data science problem statements.	**09**
V	**Pre-processing & collection of data** Need of Data Pre-processing,Pre-processing of data and data collection, Data Pre-Processing Overview – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization, Data Storage, and management, Data preparation with Sandbox for analytics.	**09**

Text books:

1. Saroj Kaushik, Artificial Intelligence, Cengage Learning, 1st Edition 2011.
2. Anindita Das Bhattacharjee, "Practical Workbook Artificial Intelligence and Soft Computing for beginners, Shroff Publisher-X team Publisher.
3. Cathy O'Neil and Rachel Schutt . Doing Data Science, O'Reilly Media, 2013.
4. Annalyn Ng, Kenneth Soo, Numsense! Data Science for the Layman, Shroff Publisher Publisher
5. David Dietrich, Barry Heller, Beibei Yang, "Data Science and Big data Analytics", EMC 2013

Reference Books:

6. T. Hastie, R. Tibshirani, J. Friedman. The Elements of Statistical Learning, 2e, 2011.

SDGI GLOBAL UNIVERSITY
School of Engineering & Technology
WEF: Session (2024-25)

Experiential Learning for Cyber Security
(Course Code: B010423404)

	L	T	P	C
Year: 2nd				
Semester: III	**3**	**0**	**0**	**3**

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able :		
CO 1	Understand the basic concepts of cyber security and cybercrimes.	K1, K2
CO 2	Understand the security policies and cyber laws.	K1, K2
CO 3	Understand the tools and methods used in cyber crime	K2
CO 4	Understand the concepts of cyber forensics	K1, K2
CO 5	Understand the cyber security policies and cyber laws	K2

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	**Introduction To Cyber Crime** Cybercrime- Definition and Origins of the word Cybercrime and Information Security, Who are Cybercriminals? Classifications of Cybercrimes, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens. Cyber offenses: How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cybercafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector.	**09**
II	**Cyber Crime** 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, Mobile Devices: Security Implications for organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era.	**09**
III	**Tools and Methods Used in Cybercrime** Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan-horses and Backdoors, Steganography, DoS and DDoS At-tacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks. Phishing and Identity Theft: Introduction to Phishing, Identity Theft (ID Theft).	**09**
IV	**Understanding Computer Forensics** Introduction, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation. Forensics and Social Networking Sites: The Security/Privacy Threats, Challenges in Computer Forensics.	**09**

V	**Introduction to Security Policies and Cyber Laws** Need for An Information Security Policy, Introduction to Indian Cyber Law, Objective and Scope of the Digital Personal Data Protection Act 2023, Intellectual Property Issues, Overview of Intellectual Property Related 04 Legislation in India, Patent, Copyright, Trademarks.	**09**

Text Books

1. Sunit Belapure and Nina Godbole, "Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives", Wiley India Pvt Ltd, ISBN: 978-81- 265-21791, Publish Date 2013.
2. Basta, Basta, Brown, Kumar, Cyber Security and Cyber Laws, 1st edition , Cengage Learning publication.
3. Dr. Surya PrakashTripathi, RitendraGoyal, Praveen Kumar Shukla, KLSI. "Introduction to information security and cyber laws". Dreamtech Press. ISBN: 9789351194736, 2015.
4. Cyber Security and Date Privacy by Krishan Kumar Goyal , Amit Garg , Saurabh Singhal , HP HAMILTON LIMITED Publication, ISBN-13-978-1913936020
5. Thomas J. Mowbray, "Cybersecurity: Managing Systems, Conducting Testing

Reference Books

6. Investigating Intrusions", Copyright © 2014 by John Wiley & Sons, Inc, ISBN: 978 - 1-118 -84965 -1.
7. James Graham, Ryan Olson, Rick Howard, "Cyber Security Essentials", CRC Press, 15-Dec 2010.
8. Anti- Hacker Tool Kit (Indian Edition) by Mike Shema, McGraw-Hill Publication.

Research Writing Skills
(Course Code: BSGUAE2406)

	L	T	P	C
Year: 2nd				
Semester: IVth	**3**	**1**	**0**	**3**

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Course Outcome (CO)		
At the end of course , the student will be able to understand		
CO 1	To provide an insight into research writing.	K_1, K_3
CO 2	To introduce the importance and applications Literature Review and Research Methodologies.	K_2, K_3
CO 3	To learn how Structuring and Writing Research Papers.	K_2, K_1
CO 4	To know Ethical Considerations and Citations while writing research papers.	K_2, K_1
CO 5	To make Effective Research Presentations.	K_1, K_2

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	**Introduction to Research Writing:** The importance and Purpose of Research Writing, Types of Research Papers, Understanding the Research Process, Identifying Research Problems and Formulating Research Questions, Developing Testable Hypotheses.	**09**
II	**Literature Review and Research Methodologies:** Techniques for Conducting Literature Searches, Evaluating Sources for Credibility, Qualitative, Quantitative and Rhetorical Research Methods, Experimental and Non-Experimental Research Designs, Data Collection and Data-Analysis Techniques, Thesis, Synopsis Writing-Structure and Importance	**09**
III	**Structuring and Writing Research Papers:** Components of Research Paper: Title Page, Abstract, Introduction, Literature Review, Methodology, Results, Discussion, Conclusion, Citing Sources etc., Writing the Methodology Section: Detailing Research Methods and Procedures, Presenting Results: Using tables, Figures and Descriptive Statistics, Writing the Discussion: Interpreting Findings and Discussing Implications.	**09**
IV	**Ethical Considerations and Citations:** Avoiding Plagiarism and Academic Dishonesty, Ethical Issues in Research and Publications, Various Citation Styles: APA, MLA, Chicago etc., Proper Formatting and Referencing.	**09**
V	**Effective Research Presentations:** Introduction, Purpose, Personal Skills, Language Skills, Content Development, Gathering Supporting Evidence, Techniques for Effective Revision and Editing, Incorporating Feedback and Final Proofreading, Preparing and Delivering a Research Paper Presentation.	**09**

Text books:

1. "The Craft of Research" by Wayne C. Booth, Gregory G. Colomb, and Joseph M. Williams.
2. "How to Write a Lot: A Practical Guide to Productive Academic Writing" by Paul J. Silvia.

Reference Books:

3. "A Manual for Writers of Research Papers, Theses, and Dissertations" by Kate L. Turabian.

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Java Programming Lab
(Course Code: B010123451)

	L	T	P	C
Year: 2nd				
Semester: IVth	**0**	**0**	**2**	**1**

List of Experiments (Indicative & not limited to)

1. Use Java compiler and eclipse platform to write and execute java program.
2. Creating simple java programs using command line arguments
3. Understand OOP concepts and basics of Java programming.
4. Create Java programs using inheritance and polymorphism.
5. Implement error-handling techniques using exception handling and multithreading.
6. Create java program with the use of java packages.
7. Construct java program using Java I/O package.
8. Create industry oriented application using Spring Framework.
9. Test RESTful web services using Spring Boot.
10. Test Frontend web application with Spring Boot

Operating System Lab using Unix

(Course Code: **B010123453**)

	L	T	P	C
Year: 2nd				
Semester: IVth	**0**	**0**	**2**	**1**

List of Experiments (Indicative & not limited to)

1. Study of hardware and software requirements of different operating systems

(UNIX,LINUX,WINDOWS XP, WINDOWS7/8

2. Execute various UNIX system calls for
    i. Process management
    ii. File management
    iii. Input/output Systems calls
3. Implement CPU Scheduling Policies:
    i. SJF
    ii. Priority
    iii. FCFS
    iv. Multi-level Queue
4. Implement file storage allocation technique:
    i. Contiguous(using array)
    ii. Linked –list(using linked-list)
    iii. Indirect allocation (indexing)
5. Implementation of contiguous allocation techniques:
    i. Worst-Fit
    ii. Best- Fit
    iii. First- Fit
6. Calculation of external and internal fragmentation
    i. Free space list of blocks from system
    ii. List process file from the system
7. Implementation of compaction for the continually changing memory layout and calculate total movement of data
8. Implementation of resource allocation graph RAG)
9. Implementation of Banker‟s algorithm
10. Conversion of resource allocation graph (RAG) to wait for graph (WFG) for each type of method used for storing graph.
11. Implement the solution for Bounded Buffer (producer-consumer)problem using inter process communication techniques-Semaphores
12. Implement the solutions for Readers-Writers problem using inter process communication technique – Semaphore.

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AI & ML with Experiential Learning Lab/ AI & DS with Experiential Learning Lab
(Course Code: **B010224455 / B010323454**)

Year: 2nd	**L**	**T**	**P**	**C**
Semester: IVth	**0**	**0**	**2**	**1**

List of Experiments (Indicative & not limited to)

1. Implementation of logical rules in Python.

2. Using any data apply the concept of:

    a. Liner regression

    b. Gradient decent

    c. Logistic regression

3. To add the missing value in any data set.

4. Perform and plot under fitting and over fitting in a data set.

5. Implementation of clustering and classification algorithms.

6. Python Environment setup and Essentials.

7. Mathematical computing with Python (NumPy).

8. Scientific Computing with Python (SciPy).

9. Data Manipulation with Pandas.

10. Prediction using Scikit-Learn

11. Data Visualization in python using matplotlib

12. Introduction to Kaggle and how it can be used to enhance visibility.

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Experiential Learning for Cyber Security Lab
(Course Code: **B010423454**)

	L	T	P	C
Year: 2nd				
Semester: IVth	**0**	**0**	**2**	**1**

List of Experiments (Indicative & not limited to)

1. Learn and practice creating forensic images of hard drives and digital storage media.
2. Use tools like **FTK Imager**, **dd**, or **dc3dd** to create bit-by-bit copies of disks.
3. Analyze file systems (e.g., NTFS, FAT, ext4) to understand file allocation, metadata, and recovery.
4. Use tools like **Autopsy**, **Sleuth Kit**, or **Forensic Explorer** to examine file system structures.
5. Capture and analyze network traffic using tools like **Wireshark** or **tcpdump**.
6. Identify and investigate suspicious network activity, such as unauthorized access or data exfiltration
7. Practice acquiring and analyzing volatile memory (RAM) dumps.
8. Use tools like **Volatility** to extract and analyze processes, network connections, and artifacts from m
9. Analyze malware samples to understand their behavior, capabilities, and impact.
10. Use tools like **Cuckoo Sandbox**, **IDA Pro**, or **Ghidra** for static and dynamic analysis.
11. Perform forensic analysis on mobile devices (iOS, Android).
12. Use tools like **Cellebrite UFED**, **XRY**, or **Oxygen Forensic Detective** for mobile data extraction and analysis.

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Mini Project

(Course Code: B010123450)

	L	T	P	C
Year: 2nd				
Semester: IVth	**0**	**0**	**2**	**2**

Mini Project or Internship Assessment		
Course Outcome (CO)		**Bloom's Knowledge Level (KL)**
At the end of course , the student will be able to understand		
CO 1	Developing a technical artifact requiring new technical skills and effectively utilizing a new software tool to complete a task	K_4 , K_5
CO 2	Writing requirements documentation, Selecting appropriate technologies, identifying and creating appropriate test cases for systems.	K_5 , K_6
CO 3	Demonstrating understanding of professional customs & practices and working with professional standards.	K_4 , K_5
CO 4	Improving problem-solving, critical thinking skills and report writing.	K_4 , K_5
CO 5	Learning professional skills like exercising leadership, behaving professionally, behaving ethically, listening effectively, participating as a member of a team, developing appropriate workplace attitudes.	K_2, K_4