(AUTONOMOUS)
NAAC 'A' GRADE

SYLLABUS FOR B.E. AIML & Cyber Security

Batch 2024 onwards

Semester 1

S. No.	Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
								Sessional	Final Exam	Total
1	BSC-101	Engineering Mathematics-I	BSC	5	4	1	0	50	100	150
2	ESC-101	Basic Electrical and Electronics Engineering	ESC	4	3	1	0	50	100	150
3	COM-101	Introduction to C Programming	ESC	5	4	1	0	50	100	150
4	HSMC-101	Technical Communication	HSMC	4	4	0	0	50	100	150
5	ESC-111	Basic Electrical and Electronics Engineering Lab	ESC	1	0	0	2	50	0	50
6	COM-111	C Programming Lab	ESC	2	0	0	4	50	0	50
7	NCC-101	Induction Training	NCC	0	0	0	4	-	-	S/NS*
8	MCC-102	Indian Constitution	MCC	1	1	0	0	50	-	50
			Total	22	29					750

*Note: S=Satisfactory, NS=Not Satisfactory

Semester 2

S. No.	Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
								Sessional	Final Exam	Total
1	BSC-201	Engineering Mathematics-II	BSC	5	3	2	0	50	100	150
2	COM-201	Data Structures using C	PCC	4	3	1	0	50	100	150
3	BSC-202	Engineering Physics	BSC	5	4	1	0	50	100	150
4	HSMC-201	Design Thinking	HSMC	3	2	1	0	50	100	150
5	COM-211	Data Structures using C Lab	PCC	2	0	0	4	50	0	50
6	BSC-212	Engineering Physics Lab	BSC	1	0	0	2	50	0	50
7	COM-212	Business Process Automation with RPA Lab	ESC	2	0	0	4	50	0	50
8	NCC-201	Environment and Sustainability	NCC	0	2	0	0	-	-	S/NS*
			Total	22	29					750

*Note: S=Satisfactory, NS=Not Satisfactory.

Semester 1

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
BSC-101	Engineering Mathematics-I	BSC	5	4	1	0	50	100	150

Course Outcomes

At the end of the course the student will be able to	
CO1	Apply the knowledge of calculus to plot graphs of functions and solve the problem of maxima and minima.
CO2	Determine the convergence/divergence of infinite series, approximation of functions using power and Taylor's series expansion and error estimation.
CO3	Apply the concept of definite integrals to calculate area under the curves.
CO4	Understand and apply the concepts of matrices
CO5	Demonstrate knowledge of vector space by solving associated problems

Detailed Syllabus

Section-A

Unit 1: Differential Calculus I: Leibnitz theorem (without proof), Partial differentiation, Euler's theorem on homogeneous functions, Asymptotes, Double points, curvature, Curve tracing in Cartesian, polar and parametric forms. **(11 Hrs)**

Unit 2: Differential Calculus II: Rolle's Theorem, Mean value Theorem, Taylor's and Maclaurin's series with remainder, indeterminate forms, Taylor series in two variables, Maxima and Minima of functions of two variables, method of Lagrange's multipliers.

(11 Hrs)

Unit 3: Integral Calculus: Definite integrals with important properties, differentiation under the integral sign, Gamma, Beta and error functions with simple problems, applications of definite integrals to find length, area, volume and surface area of revolutions, transformation of coordinates, double and triple integrals with simple problems.

(10 Hrs)

Section-B

Unit 4: Matrices- Matrices, vectors: addition and scalar multiplication, matrix multiplication, Linear systems of equations, linear Independence, rank of a matrix, determinants, Cramer's Rule, inverse of a matrix, Gauss elimination and Gauss-Jordan elimination.

(15 Hrs)

Unit 5: Vector Space, linear dependence of vectors, basis, dimension, Linear transformations, range and kernel of a linear map, rank and nullity, Inverse of a linear transformation, rank nullity theorem, composition of linear maps, Eigen values, eigenvectors, symmetric, skew-symmetric, and orthogonal matrices, Eigen bases. **(10 Hrs)**

Text Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Engineering Mathematics	B.S. Grewal	Khanna Publications, New Delhi	44th (2018)
2	Calculus and Analytic Geometry	Thomas and Finney	Addison Wesley, Narosa.	1st (2010)

Reference Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Advanced Engineering Mathematics	V. P. Mishra, Jyoti Sharma, Pratibha Mishra	Bhavya Books	2nd (2019)
2	Integral Calculus	S. Narayan	S. Chand, New Delhi	35th (2005)
3	Engineering Mathematics	N.P Bali	Laxmi Publications	13th (2016)

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
ESC-101	Basic Electrical and Electronics Engineering	ESC	4	3	1	0	50	100	150

Course Outcomes

At the end of the course the student will be able to	
CO1	Learn about applications of network laws and theorems to design electric circuits.
CO2	Examine Sinusoidal waveforms and classify measuring instruments
CO3	Explain the construction and principle of operation of single-phase transformers and DC Machines.
CO4	Understand the characteristics of semiconductor devices and rectifier circuits
CO5	Interpret the principle of various transistor configurations and characteristics.

Detailed Syllabus

Section-A

Unit 1: Elementary Concepts of DC and AC Circuits: Recent advancements in Electrical Engineering, DC Circuit elements (R, L and C), Voltage and Current sources, Kirchhoff's Current and Voltage laws, mesh and nodal analysis. Superposition, Maximum power transfer, Thevenin and Norton theorems.

(8 Hrs)

Unit 2: Representation of Sinusoidal Waveforms: Peak and RMS values, Phasor representation, Real power, Reactive power, apparent power, power factor. Analysis of single-phase AC circuits. Classification of Instruments: Operating principle of Measuring Instruments. **(8 Hrs)**

Unit 3: Single phase Transformers and Machines: Principle of operation, ideal and practical transformer, equivalent circuit, losses in transformers, transformer testing, regulation and efficiency, Principle of operation of DC and AC machines.

(6 Hrs)

Section-B

Unit 4: Semiconductor Devices and Applications: Evolution in Electronics (vacuum tubes to nano-electronics), Types and specifications of Resistor, Inductor, Capacitor and Color coding, PN junction and Zener diode characteristics, Types of diodes (Tunnel diode, Schottky diode, LED, photodiode, Varactor diode), Voltage Regulators, Wave Shaping Circuits (rectifiers, filters, clippers and clampers). **(8 Hrs)**

Unit 5: Transistors and Biasing Circuits: BJT: Principle and operation of NPN transistor, configuration and characteristics (CB, CE, and CC), types of biasing circuit. Hybrid Parameters Introduction. Two port networks, hybrid model for CE, CC, CB configuration and their analysis using h-parameters, Miller theorem. FET: Principle of Operation and characteristics of JFET, biasing of FET, MOSFET and CMOS. **(10 Hrs)**

Text Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Basic Electrical Engineering	D. P. Kothari and l. J. Nagrath	Tata McGrawHill	4th (2019)
2	Integrated Electronics	Millman and Halkias	Tata McGraw Hill	4th (2015)

Reference Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Basic Electrical Engineering	A. E. Fitzgerald, David E Higginbotham and Arvin Grabel	Tata McGraw Hill	5th (2009)
2	Electronic Devices and Circuit Theory	Boylstead	Pearson	11th (2015)

3	Electronic Principles	Malvino Leach	Tata McGraw Hill	7th (2017)

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
COM-101	Introduction to C Programming	ESC	5	4	1	0	50	100	150

Course Outcomes

At the end of the course the student will be able to	
CO1	Design flowcharts, algorithms and pseudocode for solving problems.
CO2	Understand the syntax and semantics of C programs and use them to translate the algorithms into programs.
CO3	Decompose a problem into functions and synthesize a complete program using divide and conquer approach.
CO4	Debug and test programs to evaluate program correctness.
CO5	Implement derived and user-defined data types and files in C programming for a given application.

Detailed Syllabus

Section-A

Unit 1: Introduction to Programming: Evolution of programming languages, Structured Programming, Compilation process, object code, source code, executable code, Operating systems, Fundamentals of algorithms, flow charts and pseudocodes. **(6 Hrs)**

Unit 2: Introduction to C: Introduction, Importance of C, Sample C programs, Basic structure of C programs, Executing a C program, Character set, Keywords, Identifiers, Constant and Variables, Data types, Operators, Precedence of operators, Statements, Expressions, Input-output functions.

(8 Hrs)

Unit 3: Control Statements, Storage Classes, Library Functions: Control Structures: Decision making and Branching, Control Structures: Decision making and looping, Storage Classes: Types of storage class, Scoping rules, Standard Library Functions, advantages and their use (I/O functions, String, Character, Mathematics, Time and Date functions).

(12 Hrs)

Section-B

Unit 4: User-Defined Functions, Arrays, Recursion, Handling of character strings, Structures, Unions, User defined and standard functions, Formal and Actual arguments, Functions category, function prototypes, parameter passing, Call-by-value, Call-by-reference, Nested Functions, Recursion, One dimensional Array, Multidimensional Array declaration and their applications, Passing array to a function, String Manipulation, Declaration of structures, declaration of unions, pointer to structure and unions.

(12 Hrs)

Unit 5: Pointers, Dynamic memory allocation, File management in C, Pointer variable and its importance, Pointer Arithmetic, passing parameters by reference, pointer to pointer, pointer to functions, Dangling pointer, Dynamic memory allocation, Console input output functions, Disk input output functions, opening closing and creating Data files.

(10 Hrs)

Text Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Programming with C	E. Balaguruswamy	McGraw Hill Education	7th (2017)
2	Programming with C	Byron Gottfried	McGraw Hill Education	4th (2018)
3	C Programming Language	Brian W. Kernighan, Dennis M. Ritchie	Pearson	2nd (2015)

Reference Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	C The Complete Reference	Herbert Schildt	McGraw Hill Education	4th (2017)

2	C How to Program	Paul J. Deitel	Pearson	8th (2015)

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
HSMC-101	Technical Communication	HSMC	4	4	0	0	50	100	150

COURSE OUTCOME

At the end of the course the student will be able to	
CO1	Understand the constructs of written communication.
CO2	Develop competence in writing technical papers, research articles, proposals and reports.
CO3	Understand different aspects of verbal and non-verbal communication.
CO4	Gain effective communication skills and professional etiquettes for the workplace.
CO5	Demonstrate linguistic competence for public speaking and group discussion.

Detailed Syllabus

Section-A

UNIT 1: Basic Writing Skills: Sentence, Creating Coherence, Use of Phrases and Clauses in Sentences, Organizing Principles of Paragraphs in Documents, Techniques for Writing Precisely. Identifying Common Errors in Writing: Subject–Verb Agreement, Noun–Pronoun Agreement, Misplaced Modifiers, Redundancies, Clichés. The e-English: E-Mail Communication, Internet Abbreviations, Blogging, Challenges of English Language Online.

(7 Hrs)

UNIT 2: Technical Writing Skills: Letter Writing, Letter of Application Content, Format, Report Writing – Types, Structures, Data Collection, Content, Form, Writing a Proposal, Recommendations, Instructions, Business Communication. Creative Writing Skills: Free Writing, Biographical Writing, Autobiographical Writing, Process Description, Bar Charts and Flowcharts, Descriptive Writing, Argumentative Writing, Essay Writing, Précis Writing, Paraphrasing, Poster Making.

(7 Hrs)

UNIT 3: Reading and Listening: Improving Reading Skills: Skimming and Scanning, Reading and Note-Making, Intensive Reading and Predicting Content, Reading and Interpretation, Reading – Critical Reading, Hints Development. Listening Skills: Listening Comprehension, Difference between Listening and Hearing, Types of Listening, Types of Listening Intensity, Effective Listening, Ways to Improve Listening Skills, Listening and Note-Taking, Barriers to Effective Listening.

(7 Hrs)

Section-B

UNIT 4: Verbal Communication

Process of Communication and Effective Speaking: Communication Process, Barriers to Effective Communication, Flow of Organizational Communication, Language as a Tool of Communication, Pronunciation, Intonation, Stress and Rhythm, Introduction to Phonetics,

(5 Hrs)

UNIT 5: Non-Verbal Communication: Oral Communication, Communication at Workplace, Public Speaking, Persuasive Speaking, Impromptu Speaking - Extempore, Just a Minute, Debate, Conversations and Dialogues, Conversation over Telephone. Professional Etiquettes Meaning and Type, Seminar on a given topic.

(4 Hrs)

Text Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Technical Communication	Wiley Editorial	Wiley	1st (2019)
2	Technical Communication: Principles and Practice	Meenakshi Raman, Sangeeta Sharma	Oxford	2nd (2011)

3	Technical Communication: A Reader-Centered Approach	Anderson	Cengage Learning	6th (2007)

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
ESC-111	Basic Electrical and Electronics Engineering Lab	ESC	1	0	0	2	50	0	50

Course Outcomes

At the end of the course the student will be able to	
CO1	Apply fundamental concepts to solve simple DC and AC electric circuits.
CO2	Verify the basic characteristics of transformers and electrical machines.
CO3	Design diode and rectifier circuits and analyze their characteristics.
CO4	Design and evaluate various transistor biasing configurations and circuits.
CO5	Design different voltage regulators

List of Activities for Electrical and Electronics Lab

S. No.	Activities
1	Verify Characteristics of passive circuit elements (R, L, C).
2	Examine Time and frequency responses of RC, RL and RLC circuits.
3	Verify and analyze of network theorems.
4	Analyze single-phase transformers.
5	Perform the polarity test of the single phase transformer.
6	To perform open and short circuit tests on single phase transformers.
7	Measure three phase power using two Wattmeter methods.
8	Verify and Plot V-I characteristics of p-n junction and Zener diodes.
9	Verify and Plot Input and Output characteristics of BJT (CE).
10	Implement half wave and full wave rectifiers.
11	Design voltage regulator using series pass transistor.

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
COM-111	C Programming Lab	ESC	2	0	0	4	50	0	50

Course Outcomes

At the end of the course the student will be able to	
CO1	Demonstrate an understanding of the overall syntax and semantics of C programs.
CO2	Break problems into smaller solvable problem statements and integrate to create a complete solution.
CO3	Develop readable, modular and reusable C programs using built-in and user-defined functions.
CO4	Debug and test programs to determine that the program performs as expected.
CO5	Develop programs that perform operations using derived data types and files.

List of Activities for C Programming Lab

S. No.	Activities
1	Familiarization with the Lab Environment. Program to print "Hello World".
2	Program for arithmetic operations like addition, subtraction, multiplication and remainder. Program to calculate area and perimeter of circle, square and rectangle. Program to find the Euclidean distance between two points in a plane.
3	Program to check if a number is even or odd. Program to check whether the alphabet is a vowel or consonant. Program to calculate area and perimeter of circle, square and rectangle based on user's choice.
4	Program to calculate factorial of a number using a for loop. Program to print the Fibonacci sequence using for loop. Program to find maximum of n numbers using for loop.
5	Program to check if a number is prime or not using a while loop. Program to calculate sum of digits of a number using a while loop. Program to check if a number is Armstrong or not using a while loop.
6	Program to find the maximum element and index in the array. Program to sort an array using bubble sort. Program to search an element in an array using linear search.
7	Program to read and print elements in two dimensional arrays. Program to perform matrix multiplication.
8	Program to demonstrate the use of various string operations. Program to check whether a given string is a palindrome.
9	Program to create Simple Calculator using switch case and function for every operation. Program to print the Fibonacci sequence using recursion. Program to calculate factorial of a number using recursion.
11	Program to differentiate pass by value and pass by reference by swapping two numbers using function.
12	Program to demonstrate the use of malloc(), calloc(), realloc() and free() functions.
13	Program to store the information of student marks using structures and find total marks of individual student. Program to store information of a student using union. Program to implement an array of structures for student marks for each student and pass it to function for various operations.
14	Program to read and write in a file. Program for reading and writing the student marks data to files.
15	Mini Project: Student Information System.

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
NCC-101	Induction Training	NCC	0	0	0	4	-	-	S/NS*

Course Outcomes

At the end of the course the student will be able to	
CO1	Understand the key initiatives undertaken by the Institute and perceive the benefits of enrolling into the program.
CO2	Develop ICT skills through modern tool usage.
CO3	Develop understanding regarding different career paths and options.
CO4	Explore self-learning opportunities through MOOCs, Digital Library and online digital resources.
CO5	Leverage self-development opportunities available on campus.

List of Activities for Induction Training

S. No.	Activities
1	Orientation Session on Institution.
2	Address by the Director of the Institution.
3	Mantra to Success using ICT Tools at MIET: Deep Dive into Official Email Id, Google Drive, Google Classroom and Google Meeting.
4	Introduction to Google CS First.
5	Personality Development workshop.
6	Hands-On session on ERP system.
7	Project Showcasing Session: AI, Computer Vision and RPA.
8	E-Learning Resources at MIET (MOOC Platforms).
9	PI 360 Training session.
10	Student Clubs at MIET (Ureka, Literary).
11	Orientation session on the Library.
12	Extra-Curricular Activities in College.
13	Orientation session on Other Committees (NSS and Cultural).
14	Familiarization to Dept./Branch.
15	Orientation on Mentor Mentee Program.

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
MCC-102	Indian Constitution	MCC	1	1	0	1	50	-	50

Course Outcomes

At the end of the course the student will be able to	
CO1	Understand the emergence, evolution, structure and composition of Indian Constitution.
CO2	Understand and analyze federalism in the Indian context.
CO3	Understand and analyze Panchayati Raj institutions as a medium of decentralization and the three organs of the state in the contemporary scenario.
CO4	Understand and analyze the Indian Political scenario amidst the emerging challenges.
CO5	Evaluate Indian foreign relations under the cold war and post cold war era.

Detailed Syllabus

Section-A

Unit 1: Introduction to Indian Constitution: Historical Background of the Constituent Assembly, Government of India Act of 1935 and Indian Independence Act of 1947, Composition of the Constituent Assembly, Functions of the Constituent Assembly, Various Committees of the Constituent Assembly, Enforcement of the Constitution, Indian Constitution and its Salient Features.

(5 Hrs)

Unit 2: The role of B R Ambedkar in the making of the Indian Constitution, The Preamble of the Constitution, Fundamental Rights, Fundamental Duties, Directive Principles of State Policy, Gandhian Principles, Liberal Principles, Socialistic Principles.

(5 Hrs)

Unit 3: Indian Federalism: Meaning and Definition of Federalism, Structure and Features of Indian Federalism, Difference between Indian and Federation of other states, Difference between federal and unitary features, Critical Evaluation of the Indian Federal System, Decentralisation of Powers, Centre-State Relations, 73rd Amendment, Panchayath Raj Institutions.

(5 Hrs)

Unit 4: Union Government: Powers of Indian Parliament, Functions of Rajya Sabha, Functions of Lok Sabha, Powers and Functions of the President, Comparison of powers of Indian President with the United States, Powers and Functions of the Prime Minister.

(5 Hrs)

Unit 5: India's External Relations - Cold War and Post-Cold War era: What is Foreign Policy? Basic Determinants of Foreign Policy, Indian and its Neighbours, India's Extended Neighbourhood in West Asia and South-East Asia, India's relations with the United States and Russia, India and the World Organisations, India in the 21st century.

(5 Hrs)

Text Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Working of a Democratic Constitution of India	G. Austin	New Delhi: Oxford University Press	1st (2003)
2	Introduction to the Constitution of India	D. D. Basu	Lexis Nexis	24th (2019)

Reference Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Contemporary India: Economy, Society, Politics	N. Chandhoke and Priyadarshini	Pearson Education India	1st (2009)
2	Understanding Contemporary India: Critical Perspectives	A. Vanaik and R. Bharghava	Orient Blackswan	1st (2010)

SEMESTER 2

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
BSC-201	Engineering Mathematics-II	BSC	5	3	2	0	50	100	150

Course Outcomes

At the end of the course the student will be able to	
CO1	To understand probability and random variables and various discrete and continuous probability distributions and their properties
CO2	Calculate probabilities, and derive the marginal and conditional distributions of bivariate random variables
CO3	Analyse statistical data using measures of central tendency, dispersion and location
CO4	Understand and discuss the issues surrounding sampling and significance
CO5	Develop analytical skills in structuring and interpreting the business problems statistically

Detailed Syllabus

Section-A

Unit 1: Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Correlation coefficient, Chebyshev's Inequality. **(9 Hrs)**

Unit 2: Continuous random variables and their properties, distribution functions and densities, normal, exponential and gamma densities. Bivariate distributions and their properties, distribution of sums and quotients, conditional densities, Bayes' rule.

(12 Hrs)

Unit 3: Measures of Central tendency: Moments, skewness and Kurtosis - Probability distributions. Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation **(10 Hrs)**

Section-B

Unit 4: Hypothesis – Introduction, Format and Types; Procedure of Hypothesis Testing; Errors in Hypothesis; Two-tail and One-tail Test of Hypothesis; Tests of Significance for Attributes; Tests of Significance for Variables; Tests of Significance for Small Samples; t-distribution and its application

(11 Hrs)

Unit 5: Difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes

(10 Hrs)

Text Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Advanced Engineering Mathematics	Erwin Kreyszig	Wiley	10th (2015)
2	A First Course in Probability	S. Ross	Pearson Education India	6th (2002)
3	"Introduction to Probability and Statistics for Engineers and Scientists	Sheldon M. Ross	Academic Press	5th (2009)

Reference Books

S.No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Advanced Engineering Mathematics	R.K. Jain, S. R. K. Iyenger	Narosa Publishing House Pvt. Ltd.	5th (2016)
2	Higher Engineering Mathematics	Dr. B. S. Grewal	Khanna Publications	43rd (2017)
3	Engineering Mathematics	N.P Bali	Laxmi publications	13th (2009)

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
COM-201	Data Structures using C	PCC	4	3	1	0	50	100	150

Course Outcomes

At the end of the course the student will be able to	
CO1	Understand the basics of data types and data structures.
CO2	Compare different data structures in context of their properties.
CO3	Identify the use of appropriate data structures to solve a given problem.
CO4	Apply different data structures to solve different sorting and searching problems.
CO5	Appreciate applicability of advanced data structures to model and solve real world problems.

Detailed Syllabus

Section-A

Unit 1: Introduction to data structures: Binary and Decimal Integers, Real Numbers, Character Strings, Abstract Data Types, Sequences as Value Definitions, Data Types in C, Pointers in C, Data Structures and C, Representation of Arrays, Structures in C.

(3 Hrs)

Unit 2: Stacks: Concept of Stacks, Operation on Stacks, Representing Stacks in C, Implementing the pop Operation, Testing for Exceptional Conditions, Implementing the Push Operation, Multiple stacks, Application of stacks in Infix, Postfix, and Prefix, Recursion.
Queues: Concept of Queues, Operation on Queues, Representing Stacks in C, Multiple Queues, Priority Queues, Circular Queues.

(10 Hrs)

Unit 3: Linked Lists: Concept of Linked Lists, Representing Linked Lists in C, Insertion, Deletion and Traversal on Linear Linked Lists, Doubly Linked List, Circular Linked List, Linked List as Data Structure, Header nodes, Implementation of Stacks and Queues using linked list, Dynamic memory management, Garbage Collection.

(10 Hrs)

Section-B

Unit 4: Trees: Binary trees and its representation using Linked list, Operations on Binary Trees, Traversal Algorithms, Applications, Threaded Binary Trees and its Traversal algorithms, Heterogeneous Binary Trees, List representation using Binary Trees, Optimum Search Trees, AVL trees.
Graphs: Representation of Graphs, Traversal methods, Applications Undirected Graphs, Directed Graph and Traversal, Depth First Search, Breadth First Search

(18 Hrs)

Unit 5: Sorting and Searching: Exchange Sort (Bubble, Quicksort) Selection and Tree Sorting Insertion sort, Shell Sort, Address Calculation Sort, Merge and Radix Sort, Sequential Searching, searching an Ordered Table, Index sequential search, Binary search, Interpolation search, Tree searching.

(5 Hrs)

Text Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Data Structure using C	Langsam, Yedidyah, Moshe J. Augenstein, and Aaron M. Tenenbaum	Pearson Education	1st (2019)
2	Data Structures and Program Design in C	Robert L. Kruse and Bruce P. Leung	Pearson Education	2nd (2006)

Reference Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Fundamentals of Data Structures	Horowiz E. and Sahni S.	Universities Press	2nd (2008)

2	An Introduction to Data Structures with Application	Jean-Paul Tremblay and Paul Sorenson	McGraw Hill Education	2nd (2017)

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
BSC-202	Engineering Physics	BSC	5	4	1	0	50	100	150

Course Outcomes

At the end of the course the student will be able to	
CO1	Apply the concept of gradient, divergence, and curl to understand advance physics.
CO2	Use Maxwell's equations to describe propagation of electromagnetic waves in a medium.
CO3	Apply the concept of wave function to solve problems related to particle confined in a box.
CO4	Understand the concept of interference, diffraction, and polarization of light.
CO5	Understand and articulate the working principle of lasers and optical fibres

Detailed Syllabus

Section A

Unit 1: Mathematical Physics: Concepts of Del Operator; Gradient of scalar, divergence and Curl of vector, Gauss divergence theorem and Stokes theorem **(10 Hrs)**

Unit 2: Electromagnetic Theory: Displacement Current, Maxwell's equations in vacuum and non-conducting medium, Electromagnetic wave propagation in free space (EM wave equations for electric and magnetic fields for free space) and their solutions (plane wave solution), Velocity of electromagnetic waves. **(10 Hrs)**

Unit 3: Quantum Mechanics: Inadequacies of Classical Mechanics, de-Broglie's concept of matter waves, Wave-packet (Wave-group), Phase and Group velocity, Heisenberg's uncertainty Principle, Experimental illustration of Uncertainty principle using single slit. Wave function: Definition, Interpretation and its significance, Schrodinger's Wave equation (Steady state and time dependent) for one dimension case, Concept of Operators and expectation Values, Applications of Schrodinger's equation (Time Independent) to: a) Particle in a One-Dimensional Box of infinite height, b) Single Step Potential Barrier. **(16 Hrs)**

Section B

Unit 4: Applied Optics: Interference in thin films (by reflection and transmission of light), Theory of Newton's rings by reflected light, Determination of wavelength and refractive index of monochromatic light by Newton's rings theory, Fraunhofer and Fresnel's diffractions, Fraunhofer diffraction due to a single slit, Plane diffraction grating and its theory for secondary maxima and minima, Unpolarised and polarized light, Double refraction phenomenon, Nicol Prism, Mathematical representation of elliptically and circularly polarized light, Quarter and Half wave plates, Numerical problems. **(15 Hrs)**

Unit 5: Principal of Laser action, Einstein's coefficients, Ruby Lasers, Propagation of Light in Optical fibres, Acceptance angle and acceptance cone, Numerical Aperture, Single mode and Multimode fibres, Characteristics and General applications of Lasers and Optical fibres, Numerical problems. **(5 Hrs)**

Text Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Vector Analysis	Murray R. Spiegel	McGraw Hill Education	2nd (2017)
2	Fundamentals of Physics	Robert Resnick Jearl Walker, David Halliday	Wiley	10th (2015)
3	Concepts of Modern Physics	Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury	McGraw Hill Education	7th (2017)

Reference Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Engineering Physics	H. K. Malik and A. K. Singh	McGraw Hill Education	2nd (2017)

2	Engineering Physics	S. Sharma and J. Sharma	Pearson India	1st (2018)

*Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
HSMC-201	Design Thinking	HSMC	3	2	0	0	50	100	150

Course Outcomes

At the end of the course the student will be able to	
CO1	Articulate the fundamentals of the Design Thinking Framework for problem solving.
CO2	Understand the needs and challenges of different stakeholders in the given problem domain.
CO3	Apply design thinking framework and strategies to develop innovative solutions for complex business problems.
CO4	Evaluate the financial viability of the proposed solution (product/service).
CO5	Work in a team to develop, validate and test the solution.

Detailed Syllabus

Section-A

Unit 1: Design Thinking: Introduction of Design Thinking; Framework: 5 Phase Design i.e. Empathize, Define, Ideate, Prototype, and Test; Case Study, Design Thinking in the organization.

(6 Hrs)

Unit 2: Empathize Phase: Discover design problems; Overview of the empathize phase; Define project stakeholders; Methods within empathize phase. Define Phase: Frame the design problems, Overview of the define phase, Methods within Define phase.

(8 Hrs)

Unit 3: Ideate Phase: Come up with multiple solutions, Overview of the Ideate phase, Methods within the Ideate phase.

(5 Hrs)

Section-B

Unit 4: Project Proposa**l**: Project Identification - Developing Business Idea, Preparing Feasibility Report; Project Formulation - Feasibility Analysis Techno - Economic Analysis, Financial Analysis, Profitability Analysis; Significance of a business plan, components of a business plan.

(8 Hrs)

Unit 5: Prototype phase: Design the solutions, Overview of the Prototype phase, Methods within Prototype phase. Test phase: Validate the solutions, overview of the Test phase, methods within test phase.

(8 Hrs)

Text Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Designing for growth: A design thinking tool kit for managers	Jeanne Liedtka and Tim Ogilvie	Columbia University Press	1st (2011)
2	The design thinking playbook: Mindful digital transformation of teams, products, services, businesses and ecosystems	Michael Lewrick, Patrick Link, Larry Leifer	Wiley	1st (2018)

Reference Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Presumptive design: Design provocations for innovation	Leo Frishberg and Charles Lambdin	Morgan Kaufmann	1st (2016)

2	Systems thinking: Managing chaos and complexity: A platform for designing business architecture., Chapter Seven: Design Thinking	Jamshid Gharajedaghi	Morgan Kaufmann	3rd (2011)

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
COM-211	Data Structures using C Lab	PCC	2	0	0	4	50	0	50

COURSE OUTCOMES

At the end of the course the student will be able to: -	
CO1	Implement lists, stacks, queues and trees using arrays in C.
CO2	Create the different types of linked lists and perform its operations using C.
CO3	Create tree data structure and perform its operations using C.
CO4	Identify the data structure to develop programs for real world applications.
CO5	Assess the applicability of given data structure for a particular use-case scenario.

List of Activities for Data Structures Using C Lab

S. No.	Activities
1	Implement a List using Array and develop functions to perform insertion, deletion and linear search operations.
2	Implement a Stack using Array and develop functions to perform push and pop operations.
3	Write a program to check if a given expression is correctly parenthesized using Stacks.
4	Write a program to evaluate postfix, prefix and infix expressions using Stacks.
5	Write a program to convert an infix expression to its corresponding postfix and prefix expressions and vice-versa.
6	Implement a Queue using Array and develop functions to perform enqueue and dequeue operations.
7	Implement a Singly Linked List and develop functions to perform insertion, deletion and linear search operations.
8	Implement a Doubly Linked List and develop functions to perform insertion, deletion and linear search operations.
9	Implement a Circular Linked List and develop functions to perform insertion, deletion and linear search operations.
10	Implement a Stack using Linked List and develop functions to perform push and pop operations.
11	Implement a Queue using Linked List and develop functions to perform enqueue and dequeue operations.
12	Implement a Priority Queue using Linked List and develop functions to perform enqueue and dequeue operations.
13	Implement a Binary Tree using Array and develop functions to perform traversal, searching, insertion and deletion operations.
14	Implement a Binary Search Tree using Array and develop functions to perform traversal, searching, insertion and deletion operations.
15	Implement a Binary Tree using Linked List and develop functions to perform traversal, searching, insertion and deletion operations.
16	Implement a Binary Search Tree using Linked List and develop functions to perform traversal, searching, insertion and deletion operations.

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
BSC-212	Engineering Physics Lab	BSC	1	0	0	2	50	0	50

Course Outcomes

At the end of the course the student will be able to	
CO1	Apply the concept of magnetic field to understand the working of electric vibrators and Faraday's laws.
CO2	Relate the phase variation between current and voltage through inductor, capacitor and resistor in LCR series and parallel circuits.
CO3	Measure and analyze the working of diodes and transistors in different configurations.
CO4	Measure and analyze the intensity variation of light due to interference, diffraction and polarization.
CO5	Examine the basic operation of laser, solar cell and its application i.e Planck's constant.

List of Activities for Engineering Physics Lab

S. No.	Activities
1	To measure the frequency of A.C. mains using an electrical vibrator.
2	To analyze the variation of EMF with respect to velocity of magnet to verify Faraday's laws.
3	To measure the impedance of LCR circuit
4	To verify and plot the V-I characteristics of a PN junction diode.
5	To observe the common base/ common emitter characteristics of PNP/NPN transistors.
6	To verify Zener diode characteristics
7	To determine the dispersive power of a given prism using a spectrometer.
8	To compute the wavelength of monochromatic light using Newton's rings apparatus.
9	To determine the wavelength of sodium light using a plane transmission grating
10	To determine the specific rotation of sugar/glucose using Laurent's Half shade polarimeter.
11	To evaluate the value of Planck's constant using a photo-cell.
12	To examine the characteristics of a Solar cell.
13	To determine the wavelength of a He-Ne laser.

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
COM-212	Business Process Automation with RPA Lab	ESC	2	0	0	4	50	0	50

Course Outcomes

At the end of the course the student will be able to	
CO1	Develop RPA bots for performing simple business processes using UiPath Studio.
CO2	Design RPA bots to automate data collection from multiple web sources.
CO3	Develop competencies in designing RPA bots for manipulating data across documents.
CO4	Manage the developed UiPath RPA robots using UiPath Orchestrator.
CO5	Troubleshoot problems in existing RPA bots.

List of Activities for Business Process Automation Lab

S. No.	Activity Name
1	Familiarity with UiPath Studio Academic Alliance Edition: Configure UiPath Academic Alliance Edition. Design a bot that prints “Hello World” on the screen. Design a bot to generate mathematical tables.
2	Designing basic RPA bots: Design a bot to display messages using Sequence and Flowchart activities. Design a bot to display the sum of two variables by taking two variables as input and produce the output.
3	Working with Microsoft Excel: Design a bot to open a Microsoft Excel sheet and read data into a datatable. Design a bot to compare two columns in an excel sheet. The output should display 'Match/Not Match' against the corresponding cell in the sheet.
4	Working with Desktop Automation: Design a bot to create a text file, write “Hello World” into it and save it at the desired location using the 'Recorder' feature. Design a bot for automating disk clean-up processes.
5	Working with Websites: Design a bot to scrape data from a website and store it in a Microsoft Excel sheet. Design a bot to fill a webform from the data stored in a Microsoft Excel sheet.
6	Working with Documents: Design a bot to read a true PDF file and fill the webform. Design a bot to read a word file and then create a list of unique words in an excel sheet.
7	Working with Images: Design a bot to read a scanned image of an invoice and store the extracted data in a .CSV file. Design a bot to perform Optical Character Recognition (OCR) on a saved image using OCR activities.
8	Working with Emails: Design a bot to read unread emails from inbox. Design a bot to send email with attachments to multiple receivers.
9	Handling Exceptions: Apply exception handling to previously developed automations.
10	Working with Orchestrator: Configure UiPath Orchestrator and setup tenant, machine, environment and robots. Design a bot to create a Queue in Orchestrator and store the subject of the email in .CSV. Configure Orchestrator to run a process as per a given schedule.
11	Mini Project (choose one): RPA bot to send notifications to students when their attendance falls below 75%. RPA bot to extract and collate job openings from multiple job portals. RPA bot to extract and display news from Google News.
12	Deploy Mini Project using Orchestrator.

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
NCC-201	Environment and Sustainability	NCC	0	2	0	0	-	-	S/NS*

*Note: S=Satisfactory, NS=Not Satisfactory

Course Outcomes

At the end of the course the student will be able to :	
CO1	Describe the relationship between Humans, Environment and Sustainability.
CO2	Articulate different environmental risks and issues and potential interventions to tackle them.
CO3	Appraise sustainable energy systems through case-studies and real-world examples.
CO4	Articulate Sustainable Infrastructure Development plan.
CO5	Appreciate global sustainability best practices in diverse domains.

Detailed Syllabus

Section-A

Unit 1: Introduction to Sustainability: Humanity and the Environment: What is Sustainability? The IPAT Equation, Human Consumption Patterns and the "Rebound" Effect, Challenges for Sustainability.
Climate and Global Change: Climate Processes; External and Internal Controls, Milankovitch Cycles and the Climate of the Quaternary, Modern Climate Change, Climate Projections.

(3 Hrs)

Unit 2: Biosphere: Introduction, Biogeochemical Cycles and the Flow of Energy in the Earth System. Biodiversity, Species Loss, and Ecosystem Function. Soil and Sustainability.
Physical Resources: Water, Pollution, and Minerals. Water Cycle and Fresh Water Supply. Water Pollution. Mineral Resources: Formation, Mining, Environmental Impact.

(4 Hrs)

Unit 3: Environmental and Resource Economics: Tragedy of the Commons. Environmental Valuation. Evaluating Projects and Policies. Solutions: Property Rights, Regulations, and Incentive Policies.
Modern Environmental Management: Systems of Waste Management. Case Study: Electronic Waste and Extended Producer Responsibility. Government and Laws on the Environment. Risk Assessment Methodology for Conventional and Alternative Sustainability Options.

(4 Hrs)

Section-B

Unit 4: Sustainable Energy Systems: Environmental Challenges in Energy, Carbon Dioxide, Air, Water and Land Use. Energy Sources and Carriers. Electricity. Energy Uses. Applications of Phase Change Materials for Sustainable Energy. Problem-Solving, Metrics, and Tools for Sustainability.

(6 Hrs)

Unit 5: Sustainable Infrastructure: The Sustainable City. Sustainability and Buildings. Sustainable Energy Practices: Climate Action Planning. Sustainable Transportation: Accessibility, Mobility, and Derived Demand. Sustainable Stormwater Management.

(4 Hrs)

Text Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Sustainability: A Comprehensive Foundation	Tom Theis and Jonathan Tomkin	Open Textbook Library	1st (2015)
2	Energy, Environment, and Sustainability with MindTap	Saeed Moaveni	Cengage India Private Limited	1st (2012)
3	Improving the Sustainable Development Goals: Strategies and the Governance Challenge (Routledge Focus on Environment and Sustainability)	Lars Niklasson	Routledge	1st (2019)

Reference Book

S. No.	Name of the Book	Author	Publisher	Edition (Pub. Yr.)
1	Global Challenges to CSR and Sustainable Development: Root Causes and Evidence from Case Studies (CSR, Sustainability, Ethics and Governance)	Stephen Vertigans, Samuel O. Idowu	Springer	1st (2021)