

Bachelor of Science with Electronics, Computer Sc. & Mathematics

Objectives:

- Graduates should be employed in industry, academia or government
- Have the necessary knowledge and leadership skills for a successful professional career.
- Learn and to adapt in a world of constantly evolving and innovative technology.
- Collaborate with others to solve problems with creative thinking and effective communication.

Programme Outcomes:

Bachelor of Science (or B.Sc.) with Electronics, Computer Science and Mathematics, is an undergraduate course which introduces students to the fundamentals of electronic components and circuits such as transistors, diodes and integrated circuits. It is a 3 year course and is divided in 6 semesters. Following are the programme outcomes: An ability to apply knowledge of computing and mathematics in Electronics

1. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.
2. An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.

Objectives:

1. Graduates should be employed in industry, academia or government
2. Have the necessary knowledge and leadership skills for a successful professional career.
3. Learn to adapt in a world of constantly evolving innovative technology.
4. Collaborate with others to solve problems with creative thinking and effective communication.

SCHOOL OF ELECTRONICS

Bachelor of Science with Electronics, Comp. Sc. & Mathematics

Curriculum:

Semester I

24 Credits

Sr. No.	Course Code	Course Name	Lecture (L) Hr	Tutorial (T) Hr	Practical (P) Hr	Credit
1	EL11101	Programming and problem solving through C Programming	3	1	--	4
2	EL11102	Mathematics I: Differential Calculus & Equations, Trigonometry, Algebra	3	1	--	4
3	EL11103	Basic circuit Theory & Network Analysis	3	1	--	4
4	EL11104	English Language (Spoken)	4	0	--	4
5	EL11105	Computer Laboratory	0	0	2	2
6	EL11106	Electronics Laboratory	0	0	2	2
7	EL11401	Comprehensive Viva	--	--	--	4

Semester II

24 Credits

Sr. No.	Course Code	Course Name	Lecture (L) Hr	Tutorial (T) Hr	Practical (P) Hr	Credit
1	EL12105	Data Structures	3	1	--	4
2	EL12102	Mathematics II: Set theory, Matrix theory, Integral Calculus	3	1	--	4
3	EL12103	Semiconductor Device Physics & Applications	3	1	--	4
4	EL12104	Communication English and Technical writing	4	0	--	4
5	EL12205	Computer Laboratory	0	0	2	2
6	EL12106	Electronics Laboratory	0	0	2	2
7	EL12401	Comprehensive Viva	--	--	--	4

Semester III

24 Credits

Sr. No.	Course Code	Course Name	Lecture (L) Hr	Tutorial (T) Hr	Practical (P) Hr	Credit
1	EL13106	Problem solving using Python	3	1	--	4
2	EL13102	Probability & Statistics	2	1	--	3
3	EL13104	Digital Electronics with VHDL/Verilog	3	1	--	4
4	EL13206	Computer Laboratory	0	0	2	2
5	EL13204	Digital Electronics Laboratory	0	0	2	2
6	EL13105	(a) Engineering Economics (b) Dance Drama/Human Values/MOOC Course/Performing Arts/ Yoga	3	0	0	3
7	EL13301	Student Seminar	0	0	2	2
8	EL13401	Comprehensive Viva	--	--	--	4

Semester IV

25 Credits

Sr. No.	Course Code	Course Name	Lecture (L) Hr	Tutorial (T) Hr	Practical (P) Hr	Credit
1	EL14101	Computer Architecture & Organization	3	1	--	4
2	EL14103	Mathematics of Signal Processing	3	1	--	4
3	EL14102	Data Communications & Computer Networks	3	1	--	4
4	EL14104	Java Programming	0	0	2	2
5	EL14202	MATLAB Programming Laboratory	0	0	2	2
6	EL14106	MOOC	3	0	--	3/4
7	EL14206	Java Programming Laboratory				2
8	EL14301	Comprehensive Viva	--	--	--	4

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Semester V

24 Credits

Sr. No.	Course Code	Course Name	Lecture (L) Hr	Tutorial (T) Hr	Practical (P) Hr	Credit
1	EL15101	Database Management Systems	3	1	--	4
2	EL15102	(a) Computer Networks (b) Analog & Digital Communication	3	1	--	4
3	EL15103	Microprocessor and Interfacing	3	1	--	4
4	EL15104	Operating Systems	3	1	--	4
5	EL15105	DBMS Laboratory	0	0	2	2
6	EL15106	Microprocessor Laboratory	0	0	2	2
7	EL15401	Comprehensive Viva	--	--	--	4

Semester VI

24 Credits

Sr. No.	Course Code	Course Name	Lecture (L) Hr	Tutorial (T) Hr	Practical (P) Hr	Credit
1	EL16101	MOOC 1/ PHP Programming	3	1	--	4
2	EL16102	MOOC 2/ Android Programming	3	1	--	4
9	EL16501	Internship (Project)			12	12
10	EL16401	Comprehensive Viva	--	--	--	4

Total Credits

144 Credits

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Scheme and Syllabus

Note: The Scheme/Syllabus of the programme/courses as detailed below, can be modified/updated keeping pace with technological advancement, feedback from industry etc, from time to time in accordance with University Ordinance No. 14.

Scheme

First Semester:

Code	Title	Credits (L T P)
CORE COURSES		
EL11102	Mathematics - I: Differential Calculus & Equation, Trigonometry & Algebra	4 (3-1-0)
EL11105	C Programming	4 (3-1-0)
EL11205	C Programming Laboratory	2 (0-0-2)
ELECTIVE COURSES-DISCIPLINE CENTRIC		
EL11103	Basic circuit Theory & Network Analysis	4 (3-1-0)
EL11203	Electronics Laboratory	2 (0-0-2)
ELECTIVE GENERIC: The students can choose following course or any other UG level generic course being run in this campus.		
EL11104	English Language (Spoken)	4 (3-1-0)
Comprehensive Viva-Voce		
	Comprehensive Viva-Voce	4
VALUE ADDED (ADD-ON COURSE): It is an additional course. Its credits shall not be counted in calculating SGPA/ CGPA.		
	Students can opt for MOOC Courses as per their interest	
TOTAL CREDITS		24

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EL11102	Mathematics – I: Differential Calculus & Equation, Trigonometry & Algebra	4 (3-1-0)
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COURSE OBJECTIVES

1. To understand continuity of function, to find successive differentiation.
2. To understand important theorems.
3. To find the maximum and minimum value of function of one variable.
4. To construct linear, homogeneous and exact differential equation.
5. To construct partial differential equations and solve by Charpit's method.

COURSE OUTCOMES

After successful completion of the course student will develop competency in the following area:

CO1: Understand application of Rolle's Theorem

CO2: Mean value theorem, Lagrange's theorem.

CO3: Student will be able to construct PDE and understand the application of it.

COURSE CONTENT

Unit I: Limit (ϵ and δ definition), Iterated Limits, Continuity of a Function, Differentiability of functions, Successive Differentiation, Calculation of nth derivative, Leibnitz's theorem, Partial differentiation, Euler's theorem on homogeneous functions.

Unit II: Rolle's theorem, Lagrange's Mean Value theorem, Cauchy's Mean Value theorem, Taylor's theorem with Lagrange's and Cauchy's forms of remainder, Maclaurin's Theorem, Maclaurin's series of $\sin x$, $\cos x$, e^x , $\log(1+x)$, $(1+x)^m$.

Unit III: Maxima and Minima, Necessary Condition and Sufficient Condition for Extreme Values, Greatest & Least Values, Application Based Problems. Indeterminate forms, L'Hospital Theorem.

Unit IV: Differential Equation, Linear Differential Equation, Homogeneous Differential Equation, Exact Differential Equation, Differential Equation of first order and higher degrees [Equations Solvable for p, y, x and Clairaut's Form], Linear Differentiation Equation with constant coefficients. [To find Auxiliary Equation, Complementary Function and particular Integral] Homogeneous linear ordinary Differential Equations.

UNIT V: Ordinary simultaneous differential equations of first order (with constant coefficient and form $dx/P = dy/Q = dz/R$). Partial Differential equations of first order and Lagrange's solution. Charpit's general method of solution. Linear partial D.E. of second order.

RECOMMENDED BOOKS

1. Dr. Frank Ayres & Elliot Mendelson, Schaum's outlines Calculus (Sixth Edition), Mc Graw Hill.
2. E. A. Codington, An Introduction to Ordinary Differential Equations, Prentice Hall of India.
3. Dr. Shanti Narayan, Differential Calculus, S.Chand and co.

EL11105	C Programming	4 (3-1-0)
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COURSE OBJECTIVES

This hands on C programming course provides a comprehensive introduction to the ANSI C language, emphasising portability and structured design. Students are introduced to all major language elements including fundamental data types, flow control, and standard function libraries. Thorough treatment is given to the topics of string and character manipulation, dynamic memory allocation, standard I/O, macro definition, and the C runtime library. The course explains the use of aggregate structures, unions, and pointers early on so the students can practice extensively in the hands on labs. Comprehensive hands on exercises are integrated throughout to reinforce learning and develop real competency. Course also include project implementation at the end.

COURSE OUTCOMES

After successful completion of the course, students will develop competency in the following areas:

- CO1: Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems.
- CO2: Demonstrate an understanding of computer programming language concepts.
- CO3: Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage.
- CO4: Able to define data types and use them in simple data processing applications also he/she must be able to use the concept of array of structures.
- CO5: Student must be able to define union and enumeration user defined data types.
- CO6: Develop confidence for self education and ability for life-long learning needed for Computer language.

COURSE CONTENT

Unit - I : C Language Fundamentals. Character set, Identifiers, keyword, data types, Constants and variables, statements, expression, operators, precedence of operators, Input-output, Assignments, control structures decision making and branching.

Unit - II : Arrays, Functions and Strings: Declaration, manipulation and String – handling functions, monolithic vs. Modular programs, user defined vs. standard functions, formal vs. actual arguments, function – category, function prototypes, parameter passing, recursion, and storage classes: auto, extern, global, static.

Unit - III: Pointers, Structures, Unions, File handling: Pointer variable and its importance, pointer arithmetic, passing parameters, Declaration of structures, pointer to pointer, pointer to structure, pointer to function, union, dynamic memory allocation, file managements, file read, write, update and delete.

Unit - IV : Searching and Sorting : Introduction to searching and sorting algorithms.

RECOMMENDED BOOKS

1. Yashwant Kanetkar, Let Us C, Publisher of Book - BPB Publications
2. Herbert Schildt, C - The Complete Reference, Publisher of Book - McGraw Hill Education

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EL11103	Basic circuit Theory & Network Analysis	4 (3-1-0)
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COURSE OBJECTIVES

- To introduce and impart problem solving techniques, through linear passive electrical circuits, useful for other core and elective courses.
- To make the students capable of analyzing any given electrical network.

COURSE OUTCOMES

After successful completion of the course, students will develop competency in the following areas:

CO1: The student is motivated to study circuits in a systematic manner suitable for engineering analysis and design.

CO2: The student understands to formulate circuit analysis problems in a mathematically tractable way with an emphasis on solving linear systems of equations.

CO3: Analyze the electric circuit using network theorems.

CO4: Determine Sinusoidal steady state response; understand the real time applications of maximum power transfer theorem.

COURSE CONTENT

Unit 1: Basic Components: Charge, Current, Voltage, Power, Resistance, Capacitor and Inductor.

Network Source: Independent Voltage and Current Sources, Dependent Voltage and Current sources.

Unit 2: Networks' Law: Ohms' law, Kirchhoff current law, Kirchhoff voltage law, Single-Loop circuit, Single-Node-Pair circuit, Series and Parallel connected Sources, Voltage and Current division

Unit 3: Basic Solution Methods: Nodal and Mesh analysis, Source Conversion

Unit 4: Network Theorems: Superposition, Thevenin, Norton and Maximum Power transfer, Reciprocity theorem, Tellegen's theorem, Wye-Delta transformation

Unit 5: Transient Response: Time domain analysis of simpler RL, RC and RLC circuits, Steady-State Sinusoidal Analysis

Two Port Networks: Impedance (Z) Parameters, Admittance (Y) Parameters, Transmission (ABCD) Parameters.

Referred Books:

1. W. H. Hayt, J. E. Kemmerly & S. M. Durban, *Engineering Circuit Analysis*, Tata McGraw-Hill Pub., 7e, 2010.
2. J.A. Edminister, Schaum Series, *Electric Circuits*, McGraw Hill Pub., 6e, 2017.
3. V. Valkenburg, *Network Analysis*, PHI Pub., 3e, 2007.
4. D. Roy Choudhury, *Network and Systems*, New Age International, 2015.
5. Alexander and M. Sadiku, *Fundamentals of Electric Circuits*, McGraw Hill Pub., 2008

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EL11104	English Language (Spoken)	4 (3-1-0)
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COURSE OBJECTIVES

The objective of this course is to enable the students to recognize the relationship of effective communication skills to succeed in academic, work and social environments and to develop both written and oral communication skills to produce clear, complete and accurate messages. This course also intends to impart business correspondence and improve English phonetics enabling the students to speak and write English correctly and with confidence.

COURSE OUTCOMES

After successful completion of the course, students will develop competency in the following areas:

- CO1: Understand how to apply technical information and knowledge in practical documents.
- CO2: Collect, analyze, document, and report information clearly, concisely and logically.
- CO3: Comprehend a particular piece of information effectively.
- CO4: Possess sound language skills with correct pronunciation.

COURSE CONTENT

Unit 1 Developing Listening Competence: Active Listening- an Effective Listening Skill, Listening to Conversation, Academic Listening, Advanced Listening Sessions e.g. Seminars, Paper Presentation, Mock Interviews etc.

Unit 2 Developing Speaking Competence: Manipulating paralinguistic features of speaking (voice modulation, pitch, tone stress, effective pauses), kinesics (use of body language), Group discussion, Public speaking & Group presentation, informal and semiformal conversation, Concept of word formation and technical Vocabulary, Etymology, Prefixes and suffixes to form derivatives used in science and technology, Synonyms/ Homophones/ Homonyms/ Homographs / One word substitution, Proper Usage of a Dictionary (Spelling/ Meaning / Pronunciation & correct usage of the word)

Unit 3 Developing Reading Competences: Effective reading strategies - Skimming and Scanning, Levels of Reading, Reading Comprehension - Comprehension of Unseen Passage - literary works (poems/ short story/ novel) and a scientific article, Interpretation of Non Verbal Data.

Unit 4 Developing Writing Competence: Elements of Effective writing, The Sentence, Phrases and Clauses, Main Forms of Written Communication, Paragraph Writing, Letter Writing (formal and informal), Essay writing, Notices, Précis Writing, Preparing Agenda and Minutes for Meetings, Writing Notices and Memos, Drafting an E-mail, Press Release, Common Errors in writing.

RECOMMENDED BOOKS

1. Sharma, R.C. and Krishna Mohan, Business Correspondence and Report Writing, New Delhi: Tata McGraw-Hill.
2. Raman, Meenakshi and Sangeeta Sharma, Technical Communication, New Delhi: Oxford Univ. Press.
3. Kapoor A.N., Business Letters for Different Occasions, New Delhi: S. Chand & Co. Pvt. Ltd.
4. Thomson, A.J. and A.V. Martinent, A Practical English Grammar, New Delhi: Oxford University Press.

Second Semester:

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Code	Title	Credits (L T P)
CORE COURSES		
EL12102	Mathematics II: Set theory, Matrix theory, Integral Calculus	4 (3-1-0)
EL12105	Data Structures	4 (3-1-0)
EL12205	Computer Laboratory	2 (0-0-2)
ELECTIVE COURSES-DISCIPLINE CENTRIC		
EL12103	Semiconductor Device Physics & Applications	4 (3-1-0)
EL12203	Electronics Laboratory	2 (0-0-2)
ELECTIVE GENERIC: The students can choose following course or any other UG level generic course being run in this campus.		
EL12104	Communication English and Technical writing	4 (3-1-0)
Comprehensive Viva-Voce		
EL12401	Comprehensive Viva-Voce	4
VALUE ADDED (ADD-ON COURSE): It is an additional course. Its credits shall not be counted in calculating SGPA/ CGPA.		
	Students can opt for MOOC Courses as per their interest	
TOTAL CREDITS		24

COURSE TITLE	COURSE CODE	CREDIT-4			THEORY PAPER
		L	P	T	
DATA STRUCTURES (THEORY)	EL 12105	L	P	T	MAX.MARKS-100
		3	--	1	

Course Learning Objectives

- To be familiar with writing linear and non-linear data structures using efficient algorithms
- To be familiar with space and time complexity
- Master the implementation of Stack, Queue, linked data, Tree structures
- To be familiar with several sorting techniques
- Trace and code recursive functions
- To be capable of identifying right data structures for a specified problem

Unit-1: Chapter 1: Overview of C Language

This course deals with the study of data structures through C. So, before going into a detailed analysis of data structures, it would be useful to familiarize with the basic knowledge of programming in C. Therefore, this chapter will cover various constructs of C such as identifiers and keywords, data types, constants, variables, input and output functions, operators, control statements, functions, and pointers.

Unit-1: Chapter 2: Introduction and Basic of Data structure

What is data? What is information? Definition of Data Structures, Usage, Types of Data Structures and an overview of each type of Data Structures, Abstract Data type

Unit-1: Chapter 3: Algorithm and its performance analysis

Definition and Properties of an Algorithm, Representation of an Algorithm, Example of Flow Chart and Pseudo Code, Advantages and Limitations of Flow Chart and Pseudo Code, Performance Analysis, Time Complexity, Space Complexity

Unit 2: Chapter 1: Linear data structures: Array

Introduction of Array: Declaration and accessing of elements, Operation in Array: Insertion, Deletion, Traversing and Merging, Arrays and Pointers, Sparse Matrices, Polynomials, Representation of Arrays: Row Major Representation, Column Major Representation, Applications of Array.

Unit 2: Chapter 2: Linear data structures: List

Introduction to list, Array Implementation of Lists, Linked Lists-implementation, Operation on List, Types of Link-List:Doubly Linked Lists-Implementation, Circularly Linked Lists-Implementation, Application of List

Unit 2: Chapter 3: Linear data structure: Stack

Introduction to Stack, Implementation of Stack: Using Arrays and Linked Lists, Operation on Stack: Push and Pop, Algorithmic implementation of Multiple Stacks, Application of Stack.

Unit 2: Chapter 4: Linear data structure: Queue

Introduction to Queue, Implementation of Queue: Using Arrays and Linked Lists, Implementation of Multiple Queues, Types of Queue: Circular Queue and Dequeue, Applications of Queues

Unit 3: Non-linear data structures - Trees

Trees: Types of Trees: General, Forest, Binary Tree, Binary Search Tree, Operations on Trees, Tree Traversal: Pre-order, In-order, Post-order, Binary Search Tree: Operation on Binary Search Tree: Search, Insertion, Deletion of node, determining height of Binary search tree and number of nodes in tree, finding Smallest and largest node in binary search tree, Threaded Binary Tree, Height balanced tree, Application of Tree.

Unit 4: Linear data structures: Graph

Introduction of Graph, Graph Terminology, Directed Graph, Representation of Graphs: Adjacency Matrix Representation, Adjacency List Representation, Graph Traversal algorithm: Breadth First Search, Depth First Search, Shortest Path Algorithms: Dijkstra's Algorithm, Minimum Spanning Trees, Kruskal's Algorithm and Prims's Algorithm.

Unit 5: Chapter 1 - Searching

Introduction, Objectives of searching, Linear Search, Binary Search, Applications

Unit 5:Chapter 2- Sorting Algorithms

What is sorting, Importance of sorting and its applications, insertion-sort, bubble-sort, selection-sort, quicksort, merge sort.

Text Books

1. Data Structures Using C and C++, by Langsam, Tanenbaum , Prentice Hall India Learning Private Limited; 2 edition.
2. Data Structures, Schaum's Outlines Series, by Seymour Lipschutz:
3. Fundamentals of Data Structures in C ,by Sahni Horowitz, Publisher: Universities Press; Second edition.

Reference Books

1. Data Structures and Algorithms Made Easy, CareerMonk Publications; Second edition
2. D. E. Knuth: The Art of Computer Programming. Vol. 1, 2nd ed. Narosa/Addison-Wesley, New Delhi/London, 1973.
3. Y. Kannelkar: Data Structures in C.
4. T. Coreman, C. Leiserson and R. Rivest: Introduction to Algorithms, McGraw Hill, New York, 1994.
5. D. Wood: Data Structure, Algorithms and Performance, Addison-Wesley, Reading, Mass., 1993.

Course outcomes

After completing this course satisfactorily, a student will be able to:

- Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms.
- Describe common applications for arrays, records, linked structures, stacks, queues and trees.
- Write programs that use arrays, records, linked structures, stacks, queues and trees.
- Demonstrate different methods for traversing trees.

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- Compare alternative implementations of data structures with respect to performance.
- Compare and contrast the benefits of dynamic and static data structures implementations.
- Describe the concept of recursion, give examples of its use, describe how it can be implemented using a stack.
- Discuss the computational efficiency of the principal algorithms for sorting and searching,

COURSE TITLE	COURSE CODE	CREDIT-4			THEORY PAPER
Data Structures (Lab)	EL 12205	L	P	T	Max.Marks-50
			4		

Practical shall be based on contents (techniques) covered in class with respect to following points:

1. Method implementation using programming language C
2. Suggested topics are:
 - i. Various operations on Stack (Array + linked list-based implementation)
 - ii. Various operations of Queue (Array + linked list based implementation)
 - iii. Implementation of linked list and practice on various problem statements (node deletion, node insertion, sorting, searching etc)
 - iv. Circular Queue
 - v. Doubly linked list
 - vi. Various kind of Tree (Heap/BST with its variations) implementation
 - vii. Graph traversing and other implementation
 - viii. Searching (Linear and binary)
- ix. Implementation of sorting algorithms

COURSE TITLE	COURSE CODE	CREDIT-4			THEORY PAPER
Communication English and Technical Writing	EL12104	L	P	T	Max.Marks-100
		3	--	1	

Course Learning Objectives

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To provide an overview of Prerequisites to Business Communication.
To put in use the basic mechanics of Grammar.
To impart the correct practices of the strategies of Effective Business writing.
To create awareness about soft skills in professional and inter-personal communications and facilitate an all-round development of personality.

Unit 1: Basic Grammar And Grammar In Context :

Basic Grammar - Noun, Pronouns, Verbs, Adjectives, Adverbs, Other Part Of Speech, Sentences, Punctuation.

Unit 2: Effective Writing Skills

Art Of Writing – Three Step Processes Of Writing, Essential Qualities Of A Business Writing, Different Types Of Business Letters – Cover Letter, Thank You Letters, Message Through Email, Acceptance Letters, Rejection Letters, And Withdrawal Letters, Drafting Press Release, Correspondence With Govt./Authorities, Office Orders, Enquiries And Replies)

Unit 3 : Effective Communication Strategies:

Styles Of Communication – Passive, Passive – Aggressive, Paraverbal Communication Skills, On-Verbal Communication, Art Of Persuasion And Influence.

Unit 4: Presentation Skills

Preparing A PowerPoint Presentation, Greeting And Introducing, Presentation Skill Practice, Preparing A Presentation, Delivery Of Presentation: - → Plan Your, Presentation/Communication → Select Proper Channel/Medium, Overcoming Fear, The Role Of Body Language, Using Visuals

Unit 5 : Video Conferencing And Telephone Skills

Rules And Guidelines For Videoconferencing, Video Conferencing Etiquette, Video Conferencing Do's And Don'ts, Basics Of Telephone Communication, How To Handle Calls-Telephone Manners, Leaving A Message, Greeting And Leave Taking Over Phone (Etiquette).

Unit 6 : Self Analysis

Understanding Your Strength And Weakness, SWOT Analysis, Who Am I, Attributes, Importance Of Self Confidence, Self Esteem. Manifestations Of Low And High Self-Esteem – Techniques For Enhancing Self-Esteem – Nurturance

Unit 7 : Interview Skill :

Meaning Of Interview, Types Of Interview, Approach For Facing An Interview, Interview Procedure, Do's And Don'ts, Important Questions Generally Asked In A Job Interview, Interview Skills-Common Errors, Interview Stimulation

Unit 8 : Networking And Personal Branding

Use Technology Appropriately, Digital Foot Prints, Networking And Personal Branding, Job Search In Digital World, Digital Security And Safety, Digital Etiquette.

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BOOKS RECOMMENDED:

1. Sharma, R.C. and Krishna Mohan, Business Correspondence and Report Writing, New Delhi: Tata McGraw-Hill.
2. Raman, Meenakshi and Sangeeta Sharma, Technical Communication, New Delhi: Oxford Univ. Press.
3. Thomson, A.J. and A.V.Martinent, A Practical English Grammar, New Delhi: Oxford University Press.
4. Managing Soft Skills for Personality Development – edited by B.N.Ghosh,
5. McGraw Hill India, 2012. b. English and Soft Skills – S.P.Dhanavel, Orient Blackswan India, 2010.

Course outcomes

At the end of the course student will be able

CO1. To develop student's ability to write error free while making an optimum use of correct Business Vocabulary & Grammar.

CO2. To draft effective business correspondence with brevity and clarity.

CO3. To stimulate their Critical thinking by designing and developing clean and lucid writing skills.

CO4. To demonstrate his verbal and non-verbal communication ability through presentations.

COURSE TITLE	COURSE CODE	CREDIT-4			THEORY PAPER
		L	P	T	
MATHEMATICS-II : Set theory, Matrix theory, Integral Calculus	EL12102				Max.Marks-100
		3	--	1	

Course Objectives:

- To learn about Set, its properties, identities and operations.
- To study Matrices and its properties and calculate its Rank.
- To learn the concept of Integration, Reduction formula, Double and Triple Integrals.

Course Outcome:

After successful completion of the course student will develop competency in the following area

- Understand the basic concept of sets and their types, and attempt the questions of set theory in various competitive exams.
- Properties of matrices and application of these in other fields of study.
- Understand basic concepts of integration and find the area, volume using integration.

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Unit-1.

Set theory- Set, Subsets, Null set, Singleton set, Universal set, Proper and Improper subsets, Operations on sets- Union, Intersection, Complement of a set, Difference of two sets, Symmetric difference, Algebra of Sets-De Morgan's law, Cardinality of sets, Equal and Equivalent sets, Power set, Bounded and Unbounded sets, Supremum and Infimum, Cartesian Product, Relation, Inverse and Composite Relations, Equivalence Relations, Function, Types of Functions, Inverse and Composite Functions, Real number system, Intervals, Neighborhood of a point, Limit point.

Unit-2.

Matrix Theory- Matrix, Types of Matrices, Algebra of a matrix, Inverse of a matrix, Elementary row and column operations, Linear dependence and Linear independence, Rank of a matrix, Invariance of rank under elementary operation, Echelon form, Normal form, Eigen values, Eigen vectors and Characteristic equation of a matrix, Cayley Hamilton Theorem, Application of Matrices to Solutions of system of linear equations.

Unit-3.

Integral Calculus- Definite integrals, Properties of Definite Integrals, Fundamental theorem of Integral calculus, Reduction Formulae, Double and Triple Integrals, Dirichlet's Integral, Beta and Gamma functions, Application of Integral to area under curve, Calculating surface area and volume .

BOOKS RECOMMENDED-

1. Nave Set Theory, Paul R. Halmos, the University Series in Undergraduate Mathematics.
2. Linear Algebra, Schaum's Outline, Seymour Lipschitz, Marc Lipson.
3. Calculus, George B. Thomas, Pearson
4. Integral Calculus by Shanti Narayan, S.Chand and co.

COURSE TITLE	COURSE CODE	CREDIT-4		THEORY PAPER
Semiconductor Device Physics & Application	EL12103	L	P	Max.Marks-100
		4	--	

Unit 1: Semiconductor Physics: Conductors, Insulators, Semiconductor, Bonds in Semiconductors, Energy bands, Effect of temperatures on Semiconductor, Hole currents,

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Intrinsic & extrinsic semiconductor, carrier transportation , diffusion current , drift current , mobility, resistivity , generation and recombination of carriers ,Hall effect, majority and minority carriers, p-n junction.

Unit 2: Semiconductor Diode: P-N junction Diode, Potential Barrier, Depletion Layer, Forward Bias, Reverse Bias, Flow of Minority and Majority Current, (VI)Volt-Ampere Characteristics of p-n junction. Load Line Analysis of Diode, Numerical on Diodes. LED, Tunnel, Varactor, Schottkey diodes. Zener diode, Zener diode as Voltage Stabilizer/Regulator.

Unit 3: Semiconductor Devices: Half Wave Rectifiers, Efficiency of half wave rectifier, Full wave rectifier:- Centre tapped full wave rectifier, Bridge Rectifier, Efficiency, Ripple factor, Filter Circuits, Transformers. Clipper and Clamper theory and circuit design.

Unit 4: Transistors: Bipolar Junction Transistor (BJT) characteristics, its Operating Regions, Transistors connections: [Common base connection, Common emitter connection, common collector connection], Comparison of transistor connections, Early Effect, **Biasing:** Fixed/Base biasing, Emitter biasing, Collector Feedback biasing and Voltage Divider Biasing and Numerical on Biasing.

Unit 5: Transistor as a Switch, Transistor as an Amplifier, Faithful Amplification, Amplifier Gains, Transistor load line analysis, Operating point, Cut off and saturation points, Stability. Introduction to Field Effect Transistor.

Text books:

1. Electronic Devices & Circuit Theory: R. Boylestad & L Nashelsky.
2. Electronic Principles: A.P. Malvino

References:

3. Integrated Electronics: Millman & Halkias.