DEVI AHILYA VISHWAVIDYALAYA, INDORE

FACULTY OF ENGINEERING

SCHEME OF EXAMINATION

I B.Tech. Programme in Computer Science and Business Systems
(As Per AICTE Guideline and NEP 2020)

INSTITUTE OF ENGINEERING & TECHNOLOGY
(www.iet.dauniv.ac.in)

DEVI AHILYA VISHWAVIDYALAYA, INDORE
INSTITUTE OF ENGINEERING & TECHNOLOGY

SCHEMES OF EXAMINATION FOR I B. Tech. PROGRAMME

B.Tech. CSBS 4 YEAR UG DEGREE PROGRAMME (As per AICTE guideline and NEP 2020)
L -Lecture, T – Tutorial, P – Practical,
BS-Basic Science, ES-Engineering Science, HS-Humanities and Social Science including Management

Semester-I

S.No	Subject code	Subject Name	Type	L-T-P	Credits
1	1RBBS1	Discrete Mathematics	BS	3-1-0	4
2	1RBBS2	Introductory Topics in Statistics, Probability and Calculus	BS	3-0-0	3
3	1RBES3	Fundamentals of Computer Science	ES	3-0-1	3+1(P)
4	1RBES4	Principles of Electrical Engineering	ES	3-0-1	3+1(P)
5	1RBBS5	Physics for Computing Science	BS	3-0-1	3+1(P)
6	1RBHS6	Business Communication and Value	HS	3-0-0	3
TOTAL CREDITS					**22**

Semester-II

S.No	Subject code	Subject Name	Type	L-T-P	Credits
1.	2RBBS1	Linear Algebra	BS	3-1-0	4
2.	2RBBS2	Statistical Methods	BS	3-0-0	3
3.	2RBES3	Data Structures & Algorithms	ES	3-0-1	3+1(P)
4.	2RBES4	Principles of Electronics	ES	3-0-1	3+1(P)
5.	2RBBS5	Fundamentals of Economics	BS	3-0-0	3
6.	2RBBS6	Business Communication and Value Science-II	BS	3-0-0	3
7.	2RBHS7	Environmental Sciences	HS	1-0-0	1
TOTAL CREDITS					**22**

Devi Ahilya University, Indore, India Institute of Engineering & Technology				**I Year B.Tech. (Computer Science & Business Systems) (Full Time)**			
Subject Code & Name	**Instructions Hours per Week**			**Credits**			
1RBBS1: DISCRETE MATHEMATICS	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
	3	**1**	**0**	**3**	**1**	**0**	**4**
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. To introduce students to ideas and techniques from discrete mathematics that are widely used in Computer Science.
2. Provide the fundamentals of formal techniques for solving the problems in mathematical reasoning, combinatorial analysis, discrete structures, algorithmic thinking, and applications and modelling.

Prerequisites: Nil

Course Contents

Unit-I

Sets: Algebra of sets, computer representation, principle of inclusion- exclusion.

Functions: Characteristic function of a set, floor and ceiling functions**,** hashing function.

Relations: Binary Relation, properties, closure of a relation, equivalence and partial order relations, partially ordered set, Hasse Diagram, greatest lower bound and least upper bound, lattice, properties of lattices, distributive lattices, complemented lattices.

Unit-II

Propositional Logic: Propositional calculus - propositions and connectives, syntax; Semantics - truth assignments and truth tables, validity and satisfiability, tautology; Adequate set of connectives; Equivalence and normal forms; logic in proof, predicates and quantifiers, rules of inferences, Compactness and resolution; Formal reducibility - natural deduction system and axiom system; Soundness and completeness.

Unit-III

Mathematical Induction: Strong induction, well-ordering, Recursive definitions.

Combinatorics: : Basic counting, balls and bins problems, Pigeon-hole principle, sequences and summations, generating functions.

Recurrence relations:-Formation, methods of solution and application.

Unit-IV

Graph Theory: Terminology, graph representation-incidence and adjacency matrices, graph isomorphism, connectedness, Euler & Hamiltonian graphs, planar graph, graph coloring, shortest paths algorithms.

Trees: Terminology, spanning trees, minimum spanning trees, tree traversals; prefix codes.

Unit-V

Abstract algebra: Binary operation, groupoid, semi group, monoid, group, subgroup, cyclic group, permutation group, definition and examples of Rings, Integral domain and Fields.

Boolean Algebra-Definition, laws of Boolean algebra, Boolean functions, sum of products and product of sum form, normal form, Boolean expression for logic and switching network, Karnaugh Map.

Course Outcome (CO):

CO.No.	CO	PO
CO1	Inclusion-exclusion principle helps to compute the number of elements that satisfy at least one of several properties when elements satisfying more than one property are not counted twice. Functions provides a relation between a set of inputs and a set of permissible outputs. Relations will help in establishing a connection between any two objects or things and in creating relational database management systems.	PO-1, PO-2, PO-3, PO-4, PO-5
CO2	Propositional Logic can be used in validating arguments and decision making.	PO-1, PO-2, PO-3, PO-4, PO-5
CO3	Mathematical induction is a technique to prove algorithm correctness, pigeon hole principle in counting, generating function to manipulate the sequence as a single entity, recurrence relation in analysing and solving problems related to algorithms, signal processing, control systems, and computational complexity.	PO-1, PO-2, PO-3, PO-4, PO-5
CO4	Graphs helps to model real problems, study and analysis. Application of trees is in data retrieval, data compression, representing hierarchical relationships, design of networks, etc.	PO-1, PO-2, PO-3, PO-4, PO-5
CO5	Algebraic structures provide a framework for constructing systems and analysing their properties. They provide rules, how elements interacts and create new elements. Boolean algebra has its applications in development of digital electronics, digital logic, computer programming, and mathematical logic.	PO-1, PO-2, PO-3, PO-4, PO-5

CO-PO Relationship:

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3	3	2	2	3	-	-	-	-	-	-	-
CO2	3	3	2	2	3	-	-	-	-	-	-	-
CO3	3	3	2	2	3	-	-	-	-	-	-	-
CO4	3	3	2	2	3	-	-	-	-	-	-	-
CO5	3	3	2	2	3	-	-	-	-	-	-	-

Books Recommended:

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, 7th ed., Tata McGraw-Hill Edition 2007.
2. Kolman, Busby & Ross, Discrete Mathematical Structures, 6th edition, Pearson Education, 2008.
3. C.L. Liu, Introduction to Discrete Mathematics, McGraw Hill, 1986.
4. I. N. Herstein, Topics in Algebra, John Wiley and Sons, 1991.
5. M. Morris Mano, Digital Logic & Computer Design, Pearson, 2017.
6. J.A. Bondy & U.S.R. Murty, Graph Theory with Applications, Macmillan Press, London, 1976.
7. L. Zhongwan, Mathematical Logic for Computer Science, World Scientific, Singapore, 1989.
8. R. A. Brualdi, Introductory Combinatorics, Pearson, 2019.
9. E. Mendelsohn, Introduction to Mathematical Logic, (6th Edition), CRC Press, 2015.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				**I Year B.Tech. (Computer Science & Business Systems) (Full Time)**			
Subject Code & Name	**Instructions Hours per**			**Credits**			
1RBBS2: Introductory Topics In Statistics, Probability and Calculus	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
	3	**0**	**0**	**3**	**0**	**0**	**3**
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To introduce students to ideas and techniques of Statistical models that are used to identify, analyze, and quantify potential risks through probability theory. It enables engineers to understand the risk associated with particular activities or situations, allowing them to take more effective steps to lessen them.
- To develop the concepts of calculus, useful to create mathematical models in order to arrive into an optimal solution in various disciplines like physics, engineering, economics, and statistics.

Prerequisites: Nil

COURSE CONTENTS

Unit-I

Introduction to Statistics: Basic objectives. Applications in various branches of science with examples. Collection of Data: Internal and external data, Primary and secondary Data. Descriptive Statistics: Classification and tabulation of univariate data, graphical representation, Frequency curves. Descriptive measures - central tendency and dispersion. Bivariate data. Summarization, marginal and conditional frequency distribution.

Unit-II

Probability: Concept of experiments, sample space, event. Definition of Combinatorial Probability. Conditional Probability, Bayes Theorem. Probability distributions: discrete & continuous distributions, Binomial, Poisson and Geometric distributions, Uniform, Exponential, Normal distributions.

Unit-III

Elements of Hypothesis Testing, Level of significance, Test of significance and goodness of fit-Chi-square, t, F distributions. Expected values and moments: mathematical expectation and its properties, Moments (including variance) and their properties.

Unit-IV

Basic concepts of Differential calculus: Review of Successive differentiation, Leibnitz theorem, Expansion of functions by Taylor's and Maclaurin's Theorem; Asymptotes; Curvature, Function of Several Variables-Partial Differentiation, Maxima and Minima of Function of Two and More Variables.

Unit-V

Basic concepts of Integral calculus: Beta and Gamma functions; Tracing of curves-Cartesian, polar and parametric curves; Area; Length of Curve; Double and Triple Integration; Change of order of Integration; Area; Volume.

Course Outcome (CO):

Students earned credits will develop ability to

CO.No.	CO	PO
CO1	Apply statistical techniques to analyze and interpret data effectively across different fields, develop skills to summarize and present data using appropriate graphical representations and statistical measures.	PO-1, PO-2, PO-3, PO-4, PO-5, PO-6
CO2	Learn and apply probability theory to model and analyze uncertain events. Ability to work with various probability distributions and understand their properties and applications in real-world situations.	PO-1, PO-2, PO-3, PO-4, PO-5, PO-6
CO3	Learn and apply hypothesis testing to determine if there is enough evidence in a sample data to draw conclusions about a population, goodness of fit test to determine whether the differences between the sample data and the distribution are statistically significant; Expectations to estimate conditions that may happen in the future; Moments to describe how the probability mass of a random variable is distributed.	PO-1, PO-2, PO-3, PO-4, PO-5, PO-6
CO4	Apply Taylor series in approximating a function, or data, as a series of function in data analysis, cell phones, differential equations, etc., Asymptotes to understand the limits of mathematical models in real-world situations, Curvature in graphic design, to find the normal curvature and ideal level for manufacturing car tire tubes, for designing road curves etc.; Partial Differentiation can be used to study stress, strain, electric and magnetic fields, fluid dynamics, heat conduction, in optimization algorithms like gradient descent, Maxima-Minima is used in a variety of situations to determine the maximum or minimum value of a quantity in economics, business, and engineering.	PO-1, PO-2, PO-3, PO-4, PO-5
CO5	Apply Beta and Gamma functions to provide an analytical solution to various integrals, Curve sketching in expressing and understanding complex mathematical functions and by sketching the graph of any function, one can find out its area, length of curve, volume etc; Multiple integrals used in calculating areas under curves (useful in physics for distance and velocity), determining the volume of irregular shapes and so on.	PO-1, PO-2, PO-3, PO-4, PO-5

CO-PO Relationship:

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3	3	2	2	3	3	-	-	-	-	-	-
CO2	3	3	2	2	3	3	-	-	-	-	-	-
CO3	3	3	2	2	3	3	-	-	-	-	-	-
CO4	3	3	2	2	3	-	-	-	-	-	-	-
CO5	3	3	2	2	3	-	-	-	-	-	-	-

Books Recommended:

1. Introduction of Probability Models, S.M. Ross, Academic Press, N.Y., 11th ed., 2014.
2. Probability and Statistics for Engineers, I. R. Miller, J.E. Freund & R. Johnson, PHI, 8th Ed., 2011.
3. Introduction to the Theory of Statistics, A. M. Mood, F.A. Graybill & D.C. Boes, McGraw Hill Education, 3rd Ed., 2017.
4. Advanced Engineering Mathematics, Peter V. O'Neil, Thomson Learning7th Ed., 2012.
5. Advanced Engineering Mathematics, M. D. Greenberg, Pearson Education, 2nd Ed., 1998.
6. B.S. Grewal, Engineering Mathematics, 39/e, Khanna Publishers, 2006.
7. Erwin. Kreyszig, Advanced Engineering Mathematics, 8th edition, John Willy and sons Publications,1999.
8. Ramana B V, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd., NewDelhi, 2006.

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Subject Code & Name	**Instructions Hours per Week**			**Credits**			
1RBES3:	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
Fundamentals of Computer Science	**3**	**0**	**1**	**3**	**0**	**1**	**4**
Duration of Theory Paper: 3 Hours							

Learning Objectives:
To introduce the fundamental concepts of Computer Science by introducing and practicing the C programming language. To get students acquainted with programming language and using it for problem solving. To introduce imperative language; syntax and constructs of ANSI C.

COURSE OF CONTENTS

Unit-I General problem Solving concepts, Operators and Expressions: Algorithm, and Flowchart for problem solving with Sequential Logic Structure, Decisions and Loops. Variable Names, Data Type and Sizes (Little Endian Big Endian), Constants, Declarations, Arithmetic Operators, Relational Operators, Logical Operators, Type Conversion, Increment Decrement Operators, Bitwise Operators, Assignment Operators and Expressions, Precedence and Order of Evaluation, proper variable naming and Hungarian Notation.

Unit-II Control Flow with discussion on structured and unstructured programming: Statements and Blocks, If-Else-If, Switch, Loops – while, do, for, break and continue, goto labels, structured and un- structured programming.

Unit-III Functions and Program Structure with discussion on standard library: Basics of functions, parameter passing and returning type, C main return as integer, External, Auto, Local, Static, Register Variables, Scope Rules, Block structure, Initialisation, Recursion, Pre-processor, Standard Library Functions and return types.

Unit-IV Pointers, Arrays and Structures : Pointers and address, Pointers and Function Arguments, Pointers and Arrays, Address Arithmetic, character Pointers and Functions, Pointer Arrays, Pointer to Pointer, Multi-dimensional array and Row/column major formats, Initialisation of Pointer Arrays, Command line arguments, Pointer to functions, complicated declarations and how they are evaluated. Basic Structures, Structures and Functions, Array of structures, Pointer of structures, Self-referral structures, Table lookup, typedef, unions, Bit-fields

Unit-V Input and Output: Standard I/O, Formatted Output – printf, Formatted Input – scanf, Variable length argument list, file access including FILE structure, fopen, stdin, sdtout and stderr, Error Handling including exit, perror and error.h, Line I/O, related miscellaneous functions.Unix system Interface: File Descriptor, Low level I/O – read and write, open, create, close and unlink, Random access – lseek, Discussions on Listing Directory, Storage allocator. Debugging, Macro, User Defined Header, User Defined Library Function, makefile utility.

Learning Outcomes:

Upon completing the course, students will be able to:

1. The student will demonstrate the ability to use C language to write the elementary programs that establish the syntax of the language.

2. The course aims at developing the problem solving ability by writing programs to solve a variety of problems.

Students earned credits will develop ability to

CO. No.	CO	PO
CO1	To learn about algorithm and flowchart as the structured tool for writing or representing the solution of a problem. Also learn about basic constructs of the programming language namely Data type , Variables, operators and expressions.	PO-1, PO-2 , PO-3
CO2	To learn about control flow statements and their use in writing code with required execution flow sequence.	PO-1, PO-2 , PO-3
CO3	To learn about the declaration and usage of functions to write structured and modularized code. Also explore the standard template library for using the problem solving with available library support.	PO-1, PO-2 , PO-3, PO-4
CO4	To learn concepts and code usage of Array, Pointers and structures. Use these constructs to represent the problem entities into code constructs.	PO-1, PO-2 , PO-3, PO-4 , PO-5
CO5	To learn File Input and Output using the support of the language construct. To apply file handling for writing solutions to problems requiring the disk file handling like DAT file or like database concept.	PO-1, PO-2 , PO-3 , PO-4,PO-5, PO-11

CO-PO Relationship

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3	3	2									
CO2	3	3	2									
CO3	3	3	3	2								
CO4	3	3	3	2	2							
CO5	3	3	4	3	3						2	

Books Recommended

1. The C Programming Language, (Second Edition) B. W. Kernighan and D. M. Ritchi, PHI.

2. Programming in C, (Second Edition) B. Gottfried, Schaum Outline Series.

3. C: The Complete Reference, (Fourth Edition), Herbert Schildt, McGraw Hill.

4. Let Us C, Yashavant Kanetkar, BPB Publications.

List of Practical Assignments:

1. Algorithm and flowcharts of small problems like GCD

2. Structured code writing with:

i. Small but tricky codes

ii. Proper parameter passing

iii. Command line Arguments

iv. Variable parameter

v. Pointer to functions

vi. User defined header

vii. Make file utility

viii. Multi file program and user defined libraries

ix. Interesting substring matching / searching programs

x. Parsing related assignments

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Subject Code & Name	**Instructions Hours per Week**			**Credits**			
1RBES4 PRINCIPLES OF ELECTRICAL ENGINEERING	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
	3	**0**	**1**	**3**	**0**	**1**	**4**
Duration of Theory Paper: 3 Hours							

Course Learning Objective:

The course is designed

1. To develop an understanding of the underlying mathematics as a preparation for a specialist study of applications areas like operation of electrical networks in DC and AC (Single and three phase), electrostatics and its mechanism, electromechanical energy conversions, sensors and various measuring instruments etc.
2. Numerical approach enables solution of a complex problem with a great number of very simple operations. It is useful to find the solution with use of computers making calculation easy and fast.

Prerequisites:

Basic knowledge of algebra of complex numbers, determinants, matrices and basic physics.

COURSE CONTENTS

Unit-1

Concept of Potential difference, voltage, current, Fundamental linear passive and active elements to their functional current-voltage relation, Terminology and symbols in order to describe electric networks, voltage source and current sources, ideal and practical sources, concept of dependent and independent sources, Kirchhoff-s laws and applications to network solutions using mesh and nodal analysis.

DC Circuits: Current-voltage relations of the electric network by mathematical equations to analyze the network (Thevenin's theorem, Norton's Theorem, Maximum Power Transfer theorem) Simplifications of networks using series- parallel, Star/Delta transformation. Superposition theorem.

Unit-2

AC Circuits: Concept of work, power, energy, and conversion of energy, AC waveform definitions, form factor, peak factor, study of R-L, R-C, RLC series circuit, R-L-C parallel circuit, phasor representation in polar and rectangular form, concept of impedance, admittance, active, reactive, apparent and complex power, power factor, 3 phase Balanced AC Circuits (人-Δ & 人-人).

Unit-3

Electrostatics and Electro-Mechanics: Electrostatic field, electric field strength, concept of permittivity in dielectrics, capacitor composite, dielectric capacitors, capacitors in series and parallel, energy stored in capacitors, charging and discharging of capacitors, Electricity and Magnetism, magnetic field and Faraday's law, self and mutual inductance, Ampere's law, Magnetic circuit, Single phase transformer, principle of operation, EMF equation, voltage ratio, current ratio, KVA rating, efficiency and regulation, Electromechanical energy conversion.

Unit-4

Measurements and Sensors: Introduction to measuring devices/sensors and transducers (Piezoelectric and thermo- couple) related to electrical signals, Elementary methods for the measurement of electrical quantities in DC and AC systems (Current & Single-phase power). Electrical Wiring and Illumination system: Basic layout of the distribution system, Types of Wiring System &Wiring Accessories, Necessity of earthing, Types of earthing, Safety devices & system.

Unit-5

Principle of batteries, types, construction and application, Magnetic material and B-H Curve, Basic concept of indicating and integrating instruments.

Course Outcome:

Students earned credits will develop ability to

CO. No.	CO	PO
CO1	Analyze the basic components of electrical circuits and apply Kirchhoff's law in DC electrical circuits and networks.	PO-1, PO-2, PO-3
CO2	Analyze the AC circuits and apply in 1-phase and 3-phase electrical circuits.	PO-1, PO-3, PO-6
CO3	Analyze the magnetic circuits, transformers and electromagnetic devices.	PO-1, PO-7
CO4	Describe the measuring devices, electrical quantities, requirement of distribution system.	PO-1, PO-3
CO5	Describe the storing devices, integrating instruments	PO-1, PO-2, PO-3, PO-4

CO-PO Relationship

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3	2	1									
CO2	1		2			2						
CO3	2						1					
CO4	1		2									
CO5	1	2	3	3								

Laboratory

1. Familiarization of electrical Elements, sources, measuring devices and transducers related to electrical circuits
2. Verification of Superposition network theorem.
3. Verification of Thevenin and Norton network theorem.
4. Verification of Maximum power transfer theorem.
5. Determination of resistance temperature coefficient
6. Simulation of R-L-C series circuits for XL>XC, XL< XC
7. Verification of relation in between voltage and current in three phase balanced star and delta connected loads.
8. Demonstration of measurement of electrical quantities in DC and AC systems.

BOOKS RECOMMENDED:

[1]. Electric Machinery, (Sixth Edition) A. E. Fitzgerald, Kingsely Jr Charles, D. Umans Stephen, Tata McGraw Hill.
[2]. A Textbook of Electrical Technology, (vol. I), B. L. Theraja, Chand and Company Ltd., New Delhi.
[3]. Basic Electrical Engineering, V. K. Mehta, S. Chand and Company Ltd., New Delhi.
[4]. Theory and problems of Basic Electrical Engineering, (Second Edition), J. Nagrath and Kothari, Prentice Hall of India Pvt. Ltd.
[5]. Basic of Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press.
[6]. T. K. Nagsarkar and M. S. Sukhija, Basic of Electrical Engineering, Oxford University Press, 2011.
[7]. Introduction to Electrodynamics, D. J. Griffiths, (Fourth Edition), Cambridge University Press.
[8]. Engineering Circuit Analysis, William H. Hayt & Jack E. Kemmerly, McGraw-Hill Book Company Inc.
[9]. Fundamentals of Electrical and Electronics Engineering, Smarjith Ghosh, Prentice Hall (India) Pvt. Ltd.

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Subject Code & Name	**Instructions Hours per Week**			**Credits**			
1RBBS5:	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
Physics for Computing Science	**2**	**1**	**2**	**2**	**1**	**1**	**4**
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To introduce the basics concepts of physics and make a bridge between basics and their application.
- To introduce the concept of the modern science like Laser, Optical fire, X-rays and quantum physics.
- To introduce fundamental physics like wave optics, interference, diffraction polarization, and semiconductor physics.

Pre requisites: Basic knowledge of Optics, Crystal Structure and Semiconductors.

COURSE OF CONTENTS

UNIT-I

Interference-principle of superposition-Young's experiment: Theory of interference fringes-types of interference- Fresnel's prism-Newton's rings, **Diffraction**-Two kinds of diffraction-Difference between interference and diffraction - Fraunhofer diffraction at single slit-plane diffraction grating. Temporal and Spatial Coherence.

UNIT-II

Polarization of light: Polarization - Concept of production of polarized beam of light from two SHM acting at right angle; plane, elliptical and circularly polarized light, Brewster's law, double refraction**. Laser and Fiber optics**: Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: Ruby Laser, CO2 and Neodymium YAG (Neodymium-doped Yttrium Aluminum Garnet); Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in engineering. Fiber optics and Applications, Types of optical fibers.

UNIT-III

Crystallography: Basic terms-types of crystal systems, Bravais lattices, miller indices, d spacing, Atomic packing factor for SC, BCC, FCC and HCP structures, X-ray diffraction. **Semiconductor Physics:** Conductor, Semiconductor and Insulator; Origin of Band Theory, Basic concept of Band theory,

UNIT-IV

Thermodynamics: Zero-th law of thermodynamics, first law of thermodynamics, brief discussion on application of 1st law, second law of thermodynamics and concept of Engine, entropy, change in entropy in reversible and irreversible processes. **Basic Idea of Electromagnetisms:** Continuity equation for current densities, Maxwell's equation in vacuum and non- conducting medium.

UNIT-V

Introduction- Planck's quantum theory- Matter waves, de-Broglie wavelength, Heisenberg's Uncertainty principle, time independent and time dependent Schrödinger's wave equation, Physical significance of wave function, Particle in a one dimensional potential box, **Oscillation:** Periodic motion-simple harmonic motion-characteristics of simple harmonic motion-vibration of simple spring-mass system. Resonance-definition, damped harmonic oscillator – heavy, critical and light damping, energy decay in a damped harmonic oscillator, quality factor, forced mechanical and electrical oscillators.

Course Outcome:

Students earned credits will develop ability to

CO. No.	CO	PO
CO1	Apply and learn the basic concept of interference and diffraction to measure the wavelength, refractive index, film thickness etc different physical quantities of light as well as the materials.	PO-1, PO-2, PO-3
CO2	Learn the concept of polarization, laser and optical fibre and apply in the modern era applications.	PO-1, PO-2, PO-4
CO3	Understand the basic concept of material and its application in modern engineering.	PO-1,PO-2 PO-5
CO4	Understand the concept of thermodynamics and electromagnetism.	PO-1, PO-2, PO-3
CO5	Learn the concept of the quantised system of the materials and simple harmonic oscillations,	PO-1, PO-2, PO-3, PO-4, PO-5

CO-PO Relationship

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3	3	2									
CO2	3	3	2									
CO3	3	2	2									
CO4	3	1	1									
CO5	3	3	1	2	2							

BOOKS RECOMMENDED:

Text Books:

1. **Concepts of Modern Physics, (Fifth Edition) A Beiser, McGraw Hill International.**
2. **Fundamentals:**
   I. Optics, (Fifth Edition) Ajoy Ghatak, Tata McGraw Hill.
   II. Sears & Zemansky University Physics, Addison-Wesley.
   III. Fundamentals of Optics, (Third Edition) Jenkins and White, McGraw-Hill.
3. R K Gaur & S L Gupta, Engineering Physics, DhanpatRai& Sons, 2006
4. H.K. Malik &A.K.Singh, Engineering Physics, Tata McGraw Hill, 2011
5. W. T. Silfast, Laser FundamentalsCambr. Un. Press, 1996
6. H White, Modern Physics: Van Nostrand; 15/e

S. No.	List of Physics practical
1.	To Study the Characteristics of a Diode / Zener Diode.
2.	To determine the Planck's constant by LED.
3.	To Study the Charging & DisCharging of a Capacitor.
4.	To Study the Regulated Power Supply using Zener Diode.
5.	To Study the Energy Bend Gap of a semiconductor.
6.	To determine the Planck's constant by LED.
7.	To determine "R" by the Newton's Ring Method.
8.	To determine "**λ**" by the Plane Transmission Grating.
9.	To verify Mauls Law using He-Ne LASAR

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Subject Code & Name	**Instructions Hours per Week**			**Credits**			
1RBHS6: Business Communication and Value Sciences - I	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
Duration of Theory Paper: 3 Hours	**2**	**0**	**0**	**2**	**0**	**0**	**2**

Learning Objectives:
To equip students with a comprehensive understanding of business communication, its models, and processes, while enhancing their ability to overcome communication barriers, integrate value sciences, and apply ethical principles in professional contexts. The course also aims to foster critical thinking, empathy, and practical communication skills for addressing real-world challenges effectively and responsibly.

COURSE OF CONTENTS

Unit-I Introduction to Business Communication: Definition, Meaning, and Components, Importance of Business Communication in Organizational Success, Stages of Communication Process.
Types of Business Communication: One-way vs. Two-way Communication, Verbal and Non-verbal Communication, Formal, Informal, Upward, Downward, Lateral Communication, Intrapersonal, Interpersonal, Mass Communication, Grapevine Communication: Gossip Wheel and Other Forms.

Unit-II Transmission Models: Shannon and Weaver Model of communication, Berlo's SMCR Model, Transactional Models: Barlund Model of communication, Interactional Models: Schramm's Model of communication.

Unit-III Social Barriers: Cultural, Language, Gender, and Interpersonal Barriers, Medium-related Barriers, Physical Barriers: Design Barriers, Speaker Volume/Pitch Issues, Receiver's Physical Abilities, Psychological Barriers: Attitude, Perception, Emotion, and Personality-related Barriers

Unit-IV Introduction to Value Sciences: Definition, Importance, and Applications, Role of Value Sciences in Business Communication, Tools and Techniques in Value Sciences, Frameworks and Practical Applications, Components of Value Sciences, Significance in Ethical Communication.

Unit-V Introduction to Business Ethics: Definition, Key Aspects, and Importance, Core Principles of Business Ethics, Framework for Ethical Decision-Making, Steps and Approaches, Application of Business Ethics in Communication, Ethical Dilemmas and Case Studies.

Supplementary Module: Self-Work and Grammar Refresher
Self-Work through Immersion: Interview individuals like maids, watchmen, drivers, or labours. Reflect on their values and motivations.
Grammar Refresher: Parts of Speech, Tenses
Develop empathy and appreciation for diverse value systems.
Strengthen grammar skills to enhance professional communication.

Learning Outcomes:

Upon completing the course, students will be able to:

1. Demonstrate effective business communication skills by applying appropriate communication models and overcoming barriers in professional contexts.
2. Integrate value sciences and ethical principles into decision-making and communication practices to address real-world organizational challenges.
3. Enhance collaboration and critical thinking skills while fostering empathy and clarity in verbal and written communication.

CO. No.	CO	PO
CO1	To understand the significance of business communication, analyze its role in professional contexts, and differentiate between its various types and forms.	PO-1, PO-2, PO-10, PO-12
CO2	To explain key communication models, evaluate their relevance in modern business, and apply them to practical scenarios.	PO-1, PO-2, PO-3, PO-4, PO-10, PO-12
CO3	To identify barriers to communication in organizational settings and develop effective strategies to overcome them.	PO-2, PO-3, PO-4, PO-8, PO-10, PO-12
CO4	To articulate the role of values in business communication and apply value sciences frameworks to real-world situations.	PO-3, PO-6, PO-8, PO-9, PO-10, PO-12
CO5	To develop ethical decision-making frameworks and address ethical challenges in professional communication.	PO-3, PO-6, PO-8, PO-9, PO-10, PO-12

Course Articulation Matrix

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	2	1								3		2
CO 2	2	3	2	1						3		2
CO 3		3	2	2				2		2		1
CO 4			1			2		3	1	2		2
CO 5			2			1		3	2	3		3

Books Recommended:

1. Rizvi and Ashraf, "Effective Technical Communication", 1st edition, Mc Graw – Hill, India 2017.
2. Locker, Kitty O., and Stephen Kyo Kaczmarek. "Business Communication: Building Critical Skills", 6th edition, McGraw-Hill / Irwin Publishers, 2014.
3. Subroto Bagchi, "The Professional", 1st edition, Penguin Publishers,2009.
4. Alan Mc'Carthy and O'Dell, English vocabulary in use
5. APAART: Speak Well 1 (English language and communication)
6. APAART: Speak Well 2 (Soft Skills)

Semester-II

S.No	Subject code	Subject Name	Type	L-T-P	Credits
1.	2RBBS1	Linear Algebra	BS	3-1-0	4
2.	2RBBS2	Statistical Methods	BS	3-0-0	3
3.	2RBES3	Data Structures & Algorithms	ES	3-0-1	3+1(P)
4.	2RBES4	Principles of Electronics	ES	3-0-1	3+1(P)
5.	2RBBS5	Fundamentals of Economics	BS	3-0-0	3
6.	2RBBS6	Business Communication and Value Science-II	BS	3-0-0	3
7.	2RBHS7	Environmental Sciences	HS	1-0-0	1
TOTAL CREDITS					**22**

Devi Ahilya University, Indore, India Institute of Engineering & Technology				**I Year B.Tech. (Computer Science & Business Systems) (Full Time)**			
Subject Code & Name	**Instructions Hours per Week**			**Credits**			
2RBBS1: LINEAR ALGEBRA	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
	3	**1**	**0**	**3**	**1**	**0**	**4**
Duration of Theory Paper: 3 Hours							

Learning Objectives:

3. Understand the concepts of matrices and determinants, gain knowledge of methods of matrix rank to solve systems of linear equations.
4. Understand the concepts of vector spaces, linear span, basis of a vector space, linear transformations, orthogonal vectors and their applications.

Prerequisites: Nil

COURSE CONTENTS

Unit-I

Introduction to Matrices and Determinants; Solution of Linear Equations; Cramer's rule; Inverse of a Matrix.

Unit-II

Vectors and linear combinations; Rank of a matrix; Gaussian elimination; LU Decomposition; Solving Systems of Linear Equations using the tools of Matrices.

Unit-III

Vector space; Dimension; Basis; Orthogonality; Projections; Gram-Schmidt orthogonalization and QR decomposition.

Unit-IV

Eigenvalues and Eigenvectors; Positive definite matrices; Linear transformations; Hermitian and unitary matrices.

Unit-V

Singular value decomposition and Principal component analysis (Non-credit and optional); Introduction to their applications in Image Processing and Machine Learning (one or two classes).

Course Outcome (CO):

CO.No.	CO	PO
CO1	Ability to apply matrix operations and determinants to solve systems of linear equations effectively.	PO-1, PO-2, PO-3, PO-4, PO-5
CO2	Ability in finding the rank of matrices as well as LU decomposition to solve linear equations.	PO-1, PO-2, PO-3, PO-4, PO-5
CO3	Capability in analyzing vector spaces, determining linear independence and the basis of a vector space.	PO-1, PO-2, PO-3, PO-4, PO-5
CO4	Capability to apply linear transformations, and orthogonalization techniques to solve problems in vector spaces.	PO-1, PO-2, PO-3, PO-4, PO-5
CO5	Ability to understand and apply singular value decomposition and principal component analysis in image processing and machine learning.	PO-1, PO-2, PO-3, PO-4, PO-5

CO-PO Relationship:

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3	3	2	2	3	-	-	-	-	-	-	-
CO2	3	3	2	2	3	-	-	-	-	-	-	-
CO3	3	3	2	2	3	-	-	-	-	-	-	-
CO4	3	3	2	2	3	-	-	-	-	-	-	-
CO5	3	3	3	3	3	-	-	-	-	-	-	-

Books Recommended:

1. Linear Algebra and its Applications, (5th Edition, 2023) David C. Lay, Pearson India Education Services.
2. Advanced Engineering Mathematics, (7th Edition, 2012), Peter V. O'Neil, Cengage Learning.
3. Advanced Engineering Mathematics, (2nd Edition, 1998), Michael. D. Greenberg, Pearson.
4. Introduction to linear algebra, (5th Edition, 2016), Gilbert Strang, Wellesley-Cambridge Press.
5. Digital Image Processing, (4th Edition, 2018), R. C. Gonzalez, R E Woods, Pearson.
6. Machine Learning in Python, (2015) Michael Bowles, John Wiley & Sons, Inc.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				**I Year B.Tech. (Computer Science & Business Systems) (Full Time)**			
Subject Code & Name	**Instructions Hours per**			**Credits**			
2RBBS2: STATISTICAL METHODS	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
	3	**0**	**0**	**3**	**0**	**0**	**3**
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. Understand various sampling techniques and their applications to finite and infinite populations. Gain knowledge of linear statistical models, correlation and regression analysis.
2. Learn about estimation techniques, and criteria for good estimates. Attain ability in hypothesis testing and the formulation of test procedures.
3. Understand non-parametric inference methods and basics of identification, estimation and Forecasting.

Prerequisites: Nil

COURSE CONTENTS

Unit-I

Sampling Techniques: Random sampling. Sampling from finite and infinite populations. Estimates and standard error (sampling with replacement and sampling without replacement), Sampling distribution of sample mean, stratified random sampling.

Unit-II

Linear Statistical Models: Scatter diagram. Linear regression and correlation. Least squares method. Rank correlation. Standard multiple regression models with emphasis on detection of collinearity, outliers, non-normality and autocorrelation, Validation of model assumptions. Multiple correlation, Analysis of variance (one way, two way with as well as without interaction).

Unit-III

Estimation: Point estimation, criteria for good estimates (un-biasedness, consistency), Methods of estimation including maximum likelihood estimation.

Test of hypothesis: Concept & formulation, Type I and Type II errors, Neyman Pearson lemma, Procedures of testing.

Unit-IV

Non-parametric Inference: Comparison with parametric inference, Use of order statistics. Sign test, Wilcoxon signed rank test, Mann-Whitney test, Run test, Kolmogorov-Smirnov test. Spearman's and Kendall's test.

Unit-V

Basics of Time Series Analysis & Forecasting: Stationary, ARIMA Models: Identification, Estimation and Forecasting.

Course Outcome (CO):
Students earned credits will develop ability to:

CO.No.	CO	PO
CO1	Ability to select a suitable sampling techniques and analyze samples from finite and infinite populations.	PO-1, PO-2, PO-3, PO-4, PO-5, PO-6
CO2	Ability to interpret and apply linear statistical models, correlation, and regression for data analysis and curve fitting.	PO-1, PO-2, PO-3, PO-4, PO-5, PO-6
CO3	Ability to estimate population parameters and understanding the properties of good estimates. Capability to formulate and conduct hypothesis tests.	PO-1, PO-2, PO-3, PO-4, PO-5, PO-6
CO4	Ability to apply non-parametric inference techniques.	PO-1, PO-2, PO-3, PO-4, PO-5
CO5	Ability to perform time series analysis and forecasting using ARIMA models.	PO-1, PO-2, PO-3, PO-4, PO-5

CO-PO Relationship:

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3	3	3	3	3	2	-	-	-	-	-	-
CO2	3	3	2	3	3	2	-	-	-	-	-	-
CO3	3	3	3	3	3	2	-	-	-	-	-	-
CO4	3	3	2	3	3	-	-	-	-	-	-	-
CO5	3	3	3	3	3	-	-	-	-	-	-	-

Books Recommended:

1. Probability and Statistics for Engineers, I.R. Miller, J.E. Freund and R. Johnson, 9th Edition, Pearson Education Limited, 2018.
2. Fundamental of Mathematical Statistics, S.C. Gupta and V.K. Kapoor, 12th edition, Sultan Chand and Sons, 2020.
3. The Analysis of Time Series: An Introduction, Chris Chatfield, 6th edition, Chapman and Hall/CRC, 2003.
4. Introduction to Linear Regression Analysis, D.C. Montgomery, E. A. Peck and G. Geoffrey Vining, 3rd edition, Wiley India Pvt Ltd., 2006.
5. Introduction to the Theory of Statistics, A.M. Mood, F.A. Graybill and D.C. Boes, 3rd edition, McGraw Hill Education, 2017.
6. Applied Regression Analysis, N. Draper and H. Smith, 3rd edition, Wiley-Interscience, 1998.
7. Fundamentals of Statistics (Vol. I & Vol. II), A. Goon, M. Gupta and B. Dasgupta, Vol. 2, World Press Pvt. Ltd., Calcutta, 1933.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				**I Year B.Tech. (Computer Science & Business Systems) (Full Time)**			
Subject Code & Name	**Instructions Hours per Week**			**Credits**			
2RBBS3:DATA STRUCTURE AND ALGORITHM	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
	3	**0**	**1**	**3**	**0**	**1**	**4**
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- **Efficient Data Management:** Understand how to organize and store data using structures like arrays, linked lists, stacks, queues, trees, and graphs to enable efficient data access and modification.

- **Problem-Solving Skills**: Develop the ability to design and implement algorithms that solve computational problems effectively, utilizing techniques such as sorting, searching, recursion, and dynamic programming.

- **Performance Analysis**: Learn to evaluate the efficiency of algorithms and data structures in terms of time and space complexity, using Big O notation to make informed decisions in software development.

- **Application in Real-World Scenarios**: Apply DSA concepts to practical situations, such as optimizing routes in navigation systems, managing data in databases, and enhancing the performance of applications.

Prerequisites: Programming Language.

COURSE CONTENTS

UNIT 1

Basic Terminologies and Introduction to Algorithm & Data Organisation: Algorithm specification, Recursion,Performance analysis, Asymptotic Notation - The Big-O, Omega and Theta notation, Programming Style, Refinement of Coding - Time-Space Trade Off, Testing, Data Abstraction

UNIT 2

Linear Data Structure: Array, Stack, Queue, Linked-list and its types, Various Representations, Operations & Applications of Linear Data Structures

UNIT 3

Non-linear Data Structure: Trees (Binary Tree, Threaded Binary Tree, Binary Search Tree, B & B+ Tree, AVL Tree, Splay Tree) and Graphs (Directed, Undirected), Various Representations, Operations & Applications of Non-Linear Data Structures.

UNIT 4

Searching and Sorting on Various Data Structures: Sequential Search, Binary Search, Comparison Trees, Breadth First Search, Depth First Search Insertion Sort, Selection Sort, Shell Sort, Divide and Conquer Sort, Merge Sort, Quick Sort, Heapsort, Introduction to Hashing.

UNIT 5

File: Organisation (Sequential, Direct, Indexed Sequential, Hashed) and various types of accessing schemes.

Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.

Course Outcome (CO):

CO NO.	CO	PO
CO1	Understand basic algorithm design, performance analysis, and data organization principles.	PO-1,PO-2,PO-3
CO2	Apply appropriate linear data structures (array, stack, queue, linked list) to solve computational problems.	PO-1,PO-2,PO-3,PO-4,PO-5
CO3	Implement and utilize non-linear data structures like trees and graphs for efficient data management and retrieval.	PO-1,PO-2,PO-3,PO-4,PO-5
CO4	Analyze and apply various searching and sorting algorithms with respect to their time and space complexities.	PO-1,PO-2,PO-3,PO-4,PO-5
CO5	Demonstrate understanding of file organization techniques and apply appropriate data access methods in real-world scenarios. Design and develop efficient algorithms using suitable data structures and demonstrate their correctness through testing and complexity analysis.	PO-1,PO-2,PO-3,PO-4,PO-5

CO-PO Mapping:

CO/PO	PO-1	PO-2	PO-3	PO-4	PO-5
CO1	**3**	**2**	**2**		
CO2	**3**	**3**	**3**	**2**	**2**
CO3	**3**	**3**	**3**	**2**	**2**
CO4	**3**	**3**	**3**	**3**	**2**
CO5	**3**	**3**	**3**	**3**	**3**

List of Practical Assignments:

1. Towers of Hanoi using user defined stacks.

2. Reading, writing, and addition of polynomials.

3. Line editors with line count, word count showing on the screen.

4. Trees with all operations.

5. All graph algorithms.

6. Saving / retrieving non-linear data structure in/from a file.

BooksRecommended:

1. Fundamentals of Data Structures, E. Horowitz, S. Sahni, S. A-Freed, Universities Press.

2. Data Structures and Algorithms, A. V. Aho, J. E. Hopperoft, J. D. UIlman, Pearson.

3. The Art of Computer Programming: Volume 1: Fundamental Algorithms, Donald E. Knuth

4. Introduction to Algorithms, Thomas, H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, The MIT press.

5. Open Data Structures: An Introduction (Open Paths to Enriched Learning), (Thirty First Edition), Pat Morin, UBC press.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				**I Year B.Tech. (Computer Science & Business Systems) (Full Time)**			
Subject Code & Name	**Instructions Hours per Week**			**Credits**			
2RBES4	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
Principles of Electronics	**3**	**0**	**1**	**3**	**0**	**1**	**4**
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- Electronic Components: Identifying and understanding the function of resistors, capacitors, inductors, diodes, transistors (BJTs and MOSFETs), and operational amplifiers (op-amps).
- Circuit Analysis: Applying circuit laws (Kirchhoff's Voltage and Current Laws), network theorems (superposition, Thevenin, Norton), and techniques like voltage and current dividers.
- Signal Processing:Understanding basic signal types (analog and digital), representing signals in time and frequency domains, and basic signal manipulation (filtering, amplification).

Practical Skills and Applications:

- Circuit Design: Developing the ability to design simple electronic circuits, potentially using discrete components or integrated circuits (ICs).□
- Testing and Measurement: Familiarization with common electronic test equipment (multimeters, function generators, oscilloscopes) and the ability to use them for circuit testing and troubleshooting.
- Circuit Simulation: Using software tools to simulate and analyze electronic circuits before physical construction.
- Troubleshooting: Developing the ability to diagnose faults in electronic circuits and apply appropriate solutions.
- Project Development:Potentially designing and building a mini-project using electronic components and devices.

Beyond the Basics:

- Op-amp Applications: Understanding the use of operational amplifiers in various applications like inverting and non-inverting amplifiers, comparators, integrators, and differentiators.
- Digital Logic: Introduction to logic gates, Boolean algebra, and basic digital circuit design.
- Semiconductor Devices: Understanding the characteristics and behaviour of diodes and transistors in different operating modes

COURSE CONTENTS

UNIT 1

Semiconductors: Crystalline material: Mechanical properties, Energy band theory, Fermi levels; Conductors, Semiconductors & Insulators: electrical properties, band diagrams. Semiconductors: intrinsic & extrinsic, energy band diagram, P&N-type semiconductors, drift & diffusion carriers.

UNIT 2

Diodes and Diode Circuits: Formation of P-N junction, energy band diagram, built-in-potential, forward and reverse biased P-N junction, formation of depletion zone, V-I characteristics, Zener breakdown, Avalanche breakdown and its reverse characteristics; Junction capacitance and Varactor diode. Simple diode circuits, load line, linear piecewise model; Rectifier circuits: half wave, full wave, PIV, DC voltage and current, ripple factor, efficiency, idea of regulation.

UNIT 3

Bipolar Junction Transistors: Formation of PNP / NPN junctions, energy band diagram; transistor mechanism and principle of transistors, CE, CB, CC configuration, transistor characteristics: cut-off active and saturation mode, transistor action, injection efficiency, base transport factor and current amplification factors for CB and CE modes. Biasing and Bias stability: calculation of stability factor

UNIT 4

Field Effect Transistors: Concept of Field Effect Transistors (channel width modulation), Gate isolation types, JFET Structure and characteristics, MOSFET Structure and characteristics, depletion and enhancement type; CS, CG, CD configurations; CMOS: Basic Principles

UNIT 5

Feed Back Amplifier, Oscillators and Operational Amplifiers: Concept (Block diagram), properties, positive and negative feedback, loop gain, open loop gain, feedback factors; topologies of feedback amplifier; effect of feedback on gain, output impedance, input impedance, sensitivities (qualitative), bandwidth stability; effect of positive feedback: instability and oscillation, condition of oscillation, Barkhausen criteria. Introduction to integrated circuits, operational amplified and its terminal properties; Application of operational amplifier; inverting and non-inverting mode of operation, Adders, Subtractors, Constant-gain multiplier, Voltage follower, Comparator, Integrator, Differentiator.

UNIT 6

Digital Electronics Fundamentals: Difference between analog and digital signals, Logic ICs, half and full adder/subtractor, multiplexers, demultiplexers, flip-flops, shift registers, counters.

Course Outcome (CO):

CO NO.	CO	PO
CO1	Understanding the function of resistors, capacitors, inductors, diodes, transistors (BJTs and MOSFETs), and operational amplifiers (op-amps).	PO-1,PO-2,PO-3
CO2	Familiarization with common electronic test equipment (multimeters, function generators, oscilloscopes) and the ability to use them for circuit testing and troubleshooting.	PO-1,PO-2,PO-3,PO-4,
CO3	Using software tools to simulate and analyze electronic circuits before physical construction.	PO-1,PO-2,PO-3,PO-4,
CO4	Developing the ability to diagnose faults in electronic circuits and apply appropriate solutions.	PO-1,PO-2,PO-3,PO-4,PO-5
CO5	Designing and building a mini-project using electronic components and devices.	PO-1,PO-2,PO-3,PO-4,PO-5

CO-PO Mapping:

CO/PO	**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**
CO1	**3**	**2**	**2**		
CO2	**2**	**2**	**3**	**2**	**2**
CO3	**2**	**3**	**3**	**2**	**2**
CO4	**3**	**3**	**3**	**3**	**2**
CO5	**3**	**3**	**3**	**3**	**3**

List of Practical Assignments:

1. Semiconductor Diodes and application,
2. Transistor circuits,
3. JFET, oscillators and amplifiers.

BooksRecommended:

1. Integrated Electronics Analog And Digital & System Author – Jacob Millman. Christos C. Halkias

2. Electronics Circuits And Systems Author: Owen Bishop

3. Electronics and Communications for Scientists and Engineers Author: Martin Plonus

4. Intuitive Analog Circuit Design Author: Marc T. Thompson

5. Practical Design of Digital Circuits Author: Ian Kampel

Devi Ahilya University, Indore, India Institute of Engineering & Technology				**I Year B.Tech. (Computer Science & Business Systems) (Full Time)**			
Subject Code & Name	**Instructions Hours per Week**			**Credits**			
2RBBS5: FUNDAMENTALS OF ECONOMICS	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
	3	**0**	**0**	**3**	**0**	**0**	**3**
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. Understand the fundamental concepts and principles of microeconomics and macroeconomics**,** including demand, supply, production, market structures, national income, inflation, and business cycles.
2. Apply economic theories to real-world issues such as price control policies, taxation, subsidies, unemployment, and government stabilization measures through monetary and fiscal policies.

Prerequisites: Nil

COURSECONTENTS

Unit-I

Introduction to Economics: Definitions, Nature and Scope of Economics; Difference between Microeconomics and Macroeconomics; Production Possibility Frontier.

Principles of Demand: Demand Curves of Households - Elasticity of Demand; Consumer Behaviour - Axioms of Choice - Budget Constraints and Indifference Curves; Consumer's Equilibrium - Effects of a Price Change, Income and Substitution Effects -Derivation of a Demand Curve

Unit-II

Principles of Supply: Supply Curves of Firms; Determinants of Supply, and Fluctuation of supply; Elasticity of Supply and its measurement.

Equilibrium and Comparative Statics: Price Determination**;** Shift of a Curve and Movement along the Curve; Welfare Analysis - Consumers' and Producers' Surplus - Price Ceilings and Price Floors; Applications - Tax and Subsidies - Intertemporal Consumption - Suppliers' Income Effect;

Unit-III

Theory of Production: Production Function and Iso-quant, Factors of Production; Law of Variable Proportions; Law of returns to scale.

Cost Curves: Total, Average and Marginal Costs - Long Run and Short Run Costs.

Market structure: Revenue and Profit Analysis under different Market Structures; Equilibrium of a Firm under Perfect Competition; Monopoly and Monopolistic Competition

Unit-IV

National Income and its Components: GNP, NNP, GDP, NDP; Methods of Computing National Income -Production Method, Income Method, Expenditure Method.

Simple Keynesian Model of Income Determination and the Keynesian Multiplier: Government Sector - Taxes and Subsidies; External Sector - Exports and Imports;

Money: Definitions; Demand for Money and Supply of Money

Unit-V

Inflation: Types of Inflation, Causes, Effects, Inflation and Unemployment.

Business Cycles and Stabilization: Meaning, Objectives, Tools of Monetary and Fiscal Policy

Course Outcome (CO):

CO.No.	CO	PO
CO1	To introduce students to the fundamental concepts, definitions, and scope of economics, distinguishing between microeconomics and macroeconomics. The course aims to develop an understanding of the Production Possibility Frontier and core principles of demand. It also focuses on analyzing consumer behavior using tools like demand curves, elasticity, axioms of choice, budget constraints, and indifference curves, leading to the derivation of the demand curve.	PO-6, PO-7, PO-9, PO-10, PO-11
CO2	To explain the principles and determinants of supply, supply elasticity, and market equilibrium. The course covers price determination, shifts in demand and supply, welfare analysis through consumer and producer surplus, and the effects of taxes, subsidies, and price controls on market outcomes.	PO-6, PO-7, PO-9, PO-10, PO-11
CO3	To study production theory, cost analysis, and firm behavior under various market structures, focusing on production functions, cost curves, and equilibrium in different competitive settings..	PO-6, PO-7, PO-9, PO-10, PO-11
CO4	To familiarize students with national income aggregates and their calculation methods, analyze income determination through the Keynesian framework, and understand the functions, demand, and supply of money in an economy.	PO-6, PO-7, PO-9, PO-10, PO-11
CO5	To understand inflation, its forms, impacts, and link with unemployment, along with the concept of business cycles. The course also focuses on policy measures through monetary and fiscal tools to maintain economic stability.	PO-6, PO-7, PO-9, PO-10, PO-11

CO-PO Relationship:

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	-	-	-	-	-	2	3	-	2	2	3	-
CO2	-	-	-	-	-	2	3	-	2	2	3	-
CO3	-	-	-	-	-	2	3	-	1	2	3	-
CO4	-	-	-	-	-	2	3	-	2	2	3	-
CO5	-	-	-	-	-	3	3	-	1	2	3	-

BooksRecommended:

1. Microeconomics, Pindyck, Robert S., and Daniel L. Rubinfeld.
2. Macroeconomics, Dornbusch, Fischer and Startz.
3. Economics, Paul Anthony Samuelson, William D. Nordhaus.
4. Intermediate Microeconomics: A Modern Approach, Hal R, Varian.
5. Principles of Macroeconomics, N. Gregory Mankiw.
6. Principles of Microeconomics, H. L. Ahuja.
7. Managerial Economics, S Damodaran.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year B.Tech. (Computer Science & Business Systems) (Full Time)			
Subject Code & Name	**Instructions Hours per Week**			**Credits**			
2RBBS6: Business Communication and Value Science-II	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
Duration of Theory Paper: 3 Hours	**3**	**0**	**0**	**3**	**0**	**0**	**3**

Learning Objective:

1. To develop value-based communication skills for analyzing social issues, writing ethical reports, and fostering inclusive leadership.
2. To equip learners with practical knowledge of NGO formation, ethical advertising, resume writing, and skit-based storytelling.
3. To enhance professional competencies in group communication, interviews, meetings, and public relations for socially responsible engagement.

Prerequisites: Nil

Course Contents

Unit 1: Identification of Social Issues and Report Writing

Definition and characteristics of social issues, Analysis of key social issues: poverty, unemployment, education inequality, pollution, discrimination, mental health, Report writing: structure, format, and examples, Research on social causes: root cause analysis, global perspectives, proposing solutions, Elements of good vs. bad writing, Grammar, punctuation, and common writing errors, Use of words, tone, register, and the SATORI method of storytelling

Unit 2: Formation and Functioning of an NGO

Meaning, purpose, and scope of NGOs, Steps in forming an NGO: cause identification, research, legal registration, Vision, mission, value statement, tagline, and logo design, Policy creation, governance, and accountability, Fundraising, networking, and partnerships, Introduction to presentation skills: structure, content, delivery, and visuals
Introduction to speed reading: skimming, scanning, SQ3R

Unit 3: Diversity, Ethics, and Resume Writing

Diversity in society and organizations: cultural, gender, racial, cognitive, etc., Ethical concepts: consequentialism and utilitarianism, Ethical leadership in promoting diversity and inclusion, Group Discussion (GD) vs Debate: key skills and structure, Value-based resume writing

Unit 4: Ethical Advertisement and Value-Based Communication

Why Advertisement Matters (Business & Value Sciences Perspectives), Elements of Ethical & Effective Advertisements, Steps in Ethical Advertisement Making, Skit Design and Dialogue Writing for Ethical Engagement, Collaborative Roles in Ad-Making Teams: Belbin's 8 Team Roles, Personality and Communication: Lindgren's Big 5 Traits

Unit 5: Group Communication and Professional Practices

Concept, types, and importance of group communication, Interviews: selection, appraisal, grievance, exit, Meetings: notice, agenda, resolution drafting, dynamics, Conferences:

planning, execution, modern methods (video, teleconferencing), Public Relations: internal and external strategies

Course Outcomes (CO's)

CO. No.	CO	PO
CO1	Identify and report social issues using structured communication infused with ethical and empathetic reasoning.	PO-1, PO-2, PO-6, PO-8, PO-10, PO-12
CO2	Design and present an NGO framework with clarity, purpose, and values like integrity and sustainability.	PO-2, PO-6, PO-8, PO-9, PO-10, PO-12
CO3	Demonstrate inclusive, ethical communication through debates, discussions, and value-based resume writing.	PO-6, PO-8, PO-10, PO-12
CO4	Apply professional communication skills while upholding respect, responsibility, and ethical interaction.	PO-6, PO-8, PO-10, PO-12
CO5	Engage in group communication formats with transparency, collaboration, and a sense of social accountability.	PO-6, PO-8, PO-9, PO-10, PO-12

Course Articulation Matrix:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2				1		1		1		2
CO2		2				1		1	2	1		2
CO3						1		1		1		2
CO4						1		1		1		2
CO5						1		1	1	1		2

Books Recommended:

1. **Raman, Meenakshi & Sharma, Sangeeta.** ***Technical Communication: Principles and Practice*** (3rd Edition), Oxford University Press, 2015

2. **Ahuja, Ram.** ***Social Problems in India*** (3rd Edition), Rawat Publications, 2014

3. **Abraham, Anita.** ***Starting and Managing NGOs*** (2nd Edition), Centre for Civil Society, 2011

4. **Bovee, Courtland L. & Thill, John V.** ***Business Communication Today*** (14th Edition), Pearson Education, 2021

5. **Belch, George E. & Belch, Michael A.** ***Advertising and Promotion: An Integrated Marketing Communications Perspective*** (12th Edition), McGraw-Hill Education, 2023

Devi Ahilya University, Indore **Institute of Engineering & Technology**				**I Year B.Tech. (Computer Science & Business Systems) (Full Time)**			
Course Code & Name	**Instructions Hours per week**			**Credits**			
2RBHS7: Environmental Sciences	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
	1	**0**	**0**	**1**	**0**	**0**	**1**
Duration of Theory Paper: 3 Hours							

Course Objectives:

The course is designed to-

1. Understand structure and working of Environment and its impact on human life.
2. Understand the consequences of human actions on the web of life, global economy, and quality of human life.
3. To gain knowledge of natural resources and its impact on economy and human health.
4. Understand types, causes, and effects of Pollution and control measures.
5. Adopt sustainability as a practice in life, society, and industry.

COURSE OF CONTENTS

UNIT-I The Environment and Ecosystem
Structure and components of Environment and their interactions, Structure and functions of Ecosystem, Biodiversity, Food chains and food web, Ecotourism.

UNIT-II Natural Resources and their Conservation
Renewable and Non-renewable energy resources, Land, Minerals, Water and Food resources, Problems of Deforestation, impact on economy.

UNIT-III Environmental Pollution and Control measures
Environmental pollution, types (Air, Water, Land, Noise), pollutants, sources, harmful effects, control measures. Pollution case studies.

UNIT-IV Global Environmental Issues and Disaster Management
Environment and Human health, Adverse impacts of development of environment, Global warming, Ozone layer depletion, Eutrophication, water crisis, Climate change, Types and management of Natural Disasters.

UNIT-V Environmental Policies and Sustainable Development
Environmental treaties, Laws and Ethics, Environment Protection Act, Environment Impact Assessment, Environmental education and public awareness, Need and concept of Sustainable development, Smart cities.

Course Outcome:

Students earned credits will develop ability to

CO.No.	CO	PO
CO1	Understand and analyse the structure and components of Environment and its impact on Human life	PO-1,PO-2,PO-4
CO2	Relate role of Natural resources and their impact on economy and development	PO-1,PO-2,PO-6, PO-7
CO3	Understand the impact of environmental hazards on human health and economy	PO-1,PO-6,PO-7
CO4	Learn and practice Environmental Laws and Ethics	PO-1,PO-7,PO-8, PO-12
CO5	Analyse factors affecting, causes of Environmental Pollution and to apply possible control measures for Sustainable development.	PO-1,PO-2,PO-3, PO-6, PO-7

CO-PO Relationship

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3	1		1								
CO2	2	1				2	1					
CO3	3					1	2					
CO4	1						2	2				1
CO5	2	1	1			2	2					

BOOKS RECOMMENDED:

[1] Environmental Studies: Basic Concepts, V.K. Ahluwalia, The Energy and Resources Institute, New Delhi, 2015
[2] Environmental Studies, Benny Joseph, Tata McGraw Hill, 2017.
[3] Fundamental Concept in Environmental Studies, D.D. Mishra, S Chand Publications, 2008.
[4] Environmental Chemistry, A.K. De, 6th Edition, New Age International, New Delhi, 2006.