NOIDA INSTITUTE OF ENGG. & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR
(AN AUTONOMOUS INSTITUTE)

Affiliated to

DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY, LUCKNOW

Evaluation Scheme & Syllabus

For

Bachelor of Technology

Computer Science And Business System

First Year

(Effective from the Session: 2023-24)

NOIDA INSTITUTE OF ENGG. & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR
(AN AUTONOMOUS INSTITUTE)

Bachelor of Technology
Computer Science And Business System
EVALUATION SCHEME
SEMESTER – I

Sl. No.	Subject Codes	Subject	Periods			Evaluation Schemes				End Semester		Total	Credit
			L	T	P	CT	TA	TOTAL	PS	TE	PE		
3 WEEKS COMPULSORY INDUCTION PROGRAM													
1	BCSBS0106	Discrete Mathematics	3	1	0	30	20	50		100		150	**4**
2	BCSBS0105	Introductory Topics in Statistics, Probability and Calculus	3	0	0	30	20	50		100		150	**3**
3	BCSBS0103	Fundamentals of Computer Science	3	0	0	30	20	50		100		150	**3**
4	BCSBS0102	Principles of Electrical Engineering	2	0	0	30	20	50		50		100	**2**
5	BCSBS0101	Physics for Computing Science	2	0	0	30	20	50		50		100	**2**
6	BCSBS0104	Business Communication & Value Science – I	2	0	0	30	20	50		50		100	**2**
7	BCSBS0153	Fundamentals of Computer Science Lab	0	0	4				25		25	50	**2**
8	BCSBS0151	Physics for Computing Science Lab	0	0	2				25		25	50	**1**
9	BCSBS0152	Principles of Electrical Engineering Lab	0	0	2				25		25	50	**1**
		MOOCs (For B.Tech. Hons. Degree)											
		TOTAL										**900**	**20**

*** List of MOOCs Based Recommended Courses for first year (Semester-I) B. Tech Students**

S. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	BMC0002	Next Gen Technologies	Infosys Springboard	10h 14m	0.5
2	BMC0003	Programming Fundamentals using Python - Part 1	Infosys Springboard	43h 25m	3.5

Abbreviation Used:-

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam., PE: Practical End Semester Exam.

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Bachelor of Technology
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EVALUATION SCHEME
SEMESTER – II

Sl. No.	Subject Codes	Subject	Periods			Evaluation Schemes				End Semester		Total	Credit
			L	T	P	CT	TA	TOTAL	PS	TE	PE		
1	BCSBS0205	Linear Algebra	3	1	0	30	20	50		100		150	4
2	BCSBS0201	Statistical Methods	3	0	0	30	20	50		100		150	3
3	BCSBS0203	Data Structures & Algorithms	3	1	0	30	20	50		100		150	4
4	BCSBS0202	Principles of Electronics	2	0	0	30	20	50		50		100	2
5	BCSBS0206	Fundamentals of Economics	2	0	0	30	20	50		50		100	2
6	BCSBS0204	Business Communication & Value Science – II	2	0	0	30	20	50		50		100	2
7	BCSBS0251	Statistical Methods Lab	0	0	2				25		25	50	1
8	BCSBS0253	Data Structures & Algorithms Lab	0	0	4				25		25	50	2
9	BCSBS0252	Principles of Electronics Lab	0	0	2				25		25	50	1
10	BNC0201	Environmental Sciences	2	0	0	30	20	50		50		100	0
		MOOCs (For B.Tech. Hons. Degree)											
		TOTAL										**1000**	**21**

*** List of MOOCs Based Recommended Courses for first year (Semester-II) B. Tech Students**

S. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	BMC0001	Design Thinking for innovation	Infosys Springboard	6 hrs	0.5
2	BMC0004	Programming In C	Infosys Springboard	17h 7 m	1

PLEASE NOTE:-

- **Internship (3-4 weeks) shall be conducted during summer break after II semester and will be assessed during III semester**

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A student will be eligible to get Under Graduate degree with Honours only, if he/she completes the additional MOOCs courses such as Coursera certifications, or any other online courses recommended by the Institute (Equivalent to 20 credits). During Complete B.Tech. Program Guidelines for credit calculations are as follows.

1. For 6 to 12 Hours =0.5 Credit
2. For 13 to18 =1 Credit
3. For 19 to 24 =1.5 Credit
4. For 25 to 30 =2 Credit
5. For 31 to 35 =2.5 Credit
6. For 36 to 41 =3 Credit
7. For 42 to 47 =3.5 Credit
8. For 48 and above =4 Credit

For registration to MOOCs Courses, the students shall follow Coursera registration details as per the assigned login and password by the Institute these courses may be cleared during the B. Tech degree program (as per the list provided). After successful completion of these MOOCs courses, the students shall provide their successful completion status/certificates to the Controller of Examination (COE) of the Institute through their coordinators/Mentors only.

The students shall be awarded Honours Degree as per following criterion.

i. If he / she secures 7.50 as above CGPA.
ii. Passed each subject of that degree program in the single attempt without any grace.
iii. Successful completion of MOOCs based 20 credits

B. Tech.-First Semester **Branch- CSBS**	
Subject Code-BCSBS0106	**L - T - P** **3 – 1 - 0**
Subject Name-DISCRETE MATHEMATICS	**No. of hours-50**

- **Course Objective-The course covers basic logic, set theory and core ideas in combinatorial mathematics. The course aims to enhance one's ability to develop logical thinking and ability to problem solving.**

Course Outcome –

CO1 -Apply the basic principles of Boolean algebra and implementation of K Map.
CO2-Define the algebraic structure of a system.
CO3-To solve counting problem using recursive function theory.
CO4-To design and use of non-linear data structure like trees and graph for circuit and network designing.
CO5-Infer the validity of statements and construct proofs using predicate logic formulas.

Course Content

Unit	Module	Topics Covered	Pedagogy	Lecture Required (T=L+P)	Aligned Practical/Assignment /Lab	CO Mapping
Unit 1	Boolean algebra	Introduction of Boolean algebra, truth table, basic logic gate, basic postulates of Boolean algebra, principle of duality,	Chalk & Duster/PPT/Online Programs	4	Assignment-1 : Boolean expression and Logic Circuits	CO1
	K-map	canonical form, Boolean expression reduction using Karnaugh map	Chalk & Duster/PPT/Online Programs	4	Assignment-2: K-map	CO1
Unit 2	Abstract Algebra	Introduction to sets, types of sets, types of relations and functions.	Chalk & Duster/PPT/Online Programs	4	Assignment-3: Relation and functions	CO2
	Advanced algebra	Group, rings, field	Chalk & Duster/PPT/Online Programs	4	Assignment-4: advanced algebra	CO2
Unit 3	Combinatorics	Basic counting, balls and bins problems,	Chalk & Duster/PPT/Online Programs	4		CO3

		probability and combination				
	Recurrence relation	Solution of recurrences using generating function and characteristic equation	Chalk & Duster/PPT/Online Programs	4	Assignment-5: Generating functions	CO3
	Proof techniques	principle of mathematical induction, pigeonhole principle.	Chalk & Duster/PPT/Online Programs	4	Assignment-6: proof techniques	CO3
Unit 4	Graph Theory	Graphs and digraphs, complement, isomorphism, connectedness and reach-ability, adjacency matrix, Eulerian paths and circuits in graphs and digraphs, Hamiltonian paths and circuits in graphs and tournaments, Planar graphs, Euler's formula, dual of a planer graph, independence number and clique number, chromatic number, statement of Four-color theorem	Chalk & Duster/PPT/Online Programs	8	Assignment-7: Eular and Hamiltonian graph	CO4
	Trees	BFS,DFS, tree traversals	Chalk & Duster/PPT/Online Programs	3	Assignment-8: Traversal Methods	CO4
Unit 5	Logics	Propositional calculus - propositions and connectives, syntax, Semantics - truth assignments and truth tables, validity and satisfiability, tautology, Adequate set of	Chalk & Duster/PPT/Online Programs	7	Assignment-9: Propositional Calculas	CO5

		connectives, Equivalence and normal forms, Compactness and resolution				
	Predicates	Formal reducibility - natural deduction system and axiom system, Soundness and completeness.	Chalk & Duster/PPT/Online Programs	4		CO5

References-

Text Books:

1. Digital Logic & Computer Vision , M .Morris Mano , Pearson .
2. Elements of Discrete Mathematics, C.L LiuMcGraw Hill ,New Delhi.
3. Graphs Theory with Applications, J.A Bondy and U.S.R Murthy, Macmillan Press , Londan.
4. Mathematical Logic for Computer Science, L. Zhongwan, World Scientific, Singapore.

Reference Books:

1. Introduction to Linear algebra. Gilbert Strang.
2. Introductiory Combinatorics , R.A Brualdi, North –Holland New York .
3. Introduction to Mathematical Logic , E. Mendelsohn , Van – Nostrand, London.

Links:

- **https://nptel.ac.in/courses/106/106/106106183/#**
- **https://www.m-tutor.com/courses.php?selectedsubject=5699&univid=330&year=1&selectedcourse=396&branch=1203&**

B. Tech.- First Semester
Branch- CSBS

Subject Code- BCSBS0105	L - T - P 3 – 1 - 0
Subject Name- Introductory Topics in Statistics, Probability, and Calculus	**No. of hours- 40 hours**

Course Objective-The objective of this course is to familiarize the engineers with concepts of Statistics, probability distribution, differential and Integral calculus, and its application. • It aims to showcase the students with standard concepts and tools from B. Tech to deal with advanced levels of mathematics and applications that would be essential for their disciplines.

Course Outcome –After completion of this course students are able to

CO1 -Explain types of statistical data, population, and sample.

CO2-Apply the concept of measures of central tendency and dispersion to solve statistical problems.

CO3-Explain the concept of combinatorial and conditional probability and Baye's theorem.

CO4-Apply the concept of probability distribution and its properties to solve statistical problems.

CO5-Apply the concept of differential and integral calculus to evaluate the double and triple integral.

Course Content

Unit	Module	Topics Covered	Pedagogy	Lecture Required (T=L+P)	Aligned Practical/Assignment/Lab	CO Mapping
Unit 1	Introduction to Statistics	Definition of Statistics. Basic objectives. Applications in various branches of science with examples. Collection of Data: Internal and external data, Primary and Secondary Data. Population and sample, Representative sample.		8 hours		CO1

Unit 2	Descriptive Statistics	Classification and tabulation of univariate data, graphical representation, and Frequency curves. Descriptive measures - central tendency and dispersion. Bivariate data. Summarization, marginal and conditional frequency distribution.		8 hours		CO2
Unit 3	Probability	Concept of experiments, sample space, event. Definition of Combinatorial Probability. Conditional Probability, Bayes Theorem.		8 hours		CO3
Unit 4	Probability distributions	discrete & continuous distributions, Binomial, Poisson and Geometric distributions, Uniform, Exponential, Normal, Chi-square, t, F distributions.		8 hours		CO4

		Expected values and moments: mathematical expectation and its properties, Moments (including variance) and their properties, interpretation, Moment generating function.				
Unit 5	Calculus	Basic concepts of Differential and integral calculus, application of double and triple integral.		8 hours		CO5

Text Books:

1. Introduction of Probability Models, S. M. Ross, Academic Press, N.Y.
2. Fundamentals of Statistics, vol. I & II, A. Goon, M. Gupta and B. Dasgupta, World Press.
3. Higher Engineering Mathematics, B. S. Grewal, Khanna Publication, Delhi.

Reference Books:

1. A first course in Probability, S. M. Ross, Prentice Hall.
2. Probability and Statistics for Engineers, (Fourth Edition), I. R. Miller, J.E. Freund, and R. Johnson, PHI.
3. Introduction to the Theory of Statistics, A. M. Mood, F.A. Graybill, and D.C. Boes, McGraw Hill Education.
4. Advanced Engineering Mathematics, (Seventh Edition), Peter V. O'Neil, Thomson Learning.
5. Advanced Engineering Mathematics, (Second Edition) M. D. Greenberg, Pearson Education.
6. Applied Mathematics, Vol. I & II, P. N. Wartikar and J. N. Wartikar, VidyarthiPrakashan.
7. G.B Thomas, R L Finney, Calculus and Analytical Geometry, Ninth Edition Pearson.

B. Tech.- First Semester Branch- CSBS	
Subject Code- BCSBS0103	L - T - P 3 – 0 - 0

Subject Name- Fundamentals of computer science				No. of hours- 40		
Course Objective- The course covers various operations, conditional statements and looping constructs in C. The course aims to solve complex problems using functions and arrays in C.						
Course Outcome – **CO1 - Acquire a broad perspective about the uses of computers in engineering industry.** **CO2- Understand the concept of computers, algorithm and algorithmic thinking.** **CO3- Apply conditional statements and looping constructs.** **CO4- Implement array and perform operations on it.** **CO5- Understand the more advanced features of the C language.**						
Course Content						
Unit	**Module**	**Topics Covered**	**Pedagogy**	**Lecture Required (T=L+P)**	**Aligned Practical/Assignment/Lab**	**CO Mapping**
Unit 1	General problem Solving concepts	Algorithm, and Flowchart for problem solving with Sequential Logic Structure, Decisions and Loops. Programming using C: applications of C programming, Structure of C program, Overview of compilation and execution process in an IDE, transition from algorithm to program, Syntax, logical errors and Run time errors, object and executable code.	Theoretical and Practical	5		CO1

Unit 2	Imperative languages&Operators	Introduction to imperative language; syntax and constructs of a specific language (ANSI C) Types Operator and Expressions with discussion of variable naming and Hungarian Notation: 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.	Theoretical and Practical	7		CO2
Unit 3	Control Flow	Control Flow with discussion on	Theoretical and Practical	6		CO3

		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 4	Functions and Program Structure	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, Initialization, Recursion, Pre-processor, Standard Library Functions and return types.	Theoretical and Practical	8		CO4
Unit 5	Pointers and Arrays	Pointers and address, Pointers and Function Arguments,	Theoretical and Practical	8		CO5

		Pointers and Arrays, Address Arithmetic, character Pointers and Functions, Pointer Arrays, Pointer to Pointer, Multi-dimensional array and Row/column major formats, Initialization of Pointer Arrays, Command line arguments, Pointer to functions, complicated declarations and how they are evaluated. Structures: Basic Structures, Structures and Functions, Array of structures, Pointer of structures, Self-referral structures, Table look up, typedef, unions, Bit-fields.				
Unit 6	Input and Output:	Standard I/O, Formatted Output – printf, Formated Input – scanf, Variable	Theoretical and Practical	6		CO5

		length argument list, file access including FILE structure, fopen, stdin, stdout 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 – seek, Discussions on Listing Directory, Storage allocator. Programming Method: Debugging, Macro, User Defined Header, User Defined Library Function, makefile utility				

References-

Text Books:

1. B. W. Kernighan and D. M. Ritchi, The C Programming Language, 1988, 2nd Edition, PHI.

2. B. Gottfried, Programming in C, Schaum Outline Series, 1996, 2ndEdition, McGraw Hill Companies Inc.

Reference Books: **1. Herbert Schildt, C: The Complete Reference, 2000, 4th edition, McGraw Hill.** **2. YashavantKanetkar, Let Us C, 2017, 15th edition, BPB Publications.**
Links:

B.Tech.-Second Semester
Branch- CSBS

Subject Code-BCSBS0102	**L-T-P** **2 - 0 - 0**
Subject Name- Principles of Electrical Engineering	**No. of hours- 42**

Course Objective- The student will learn about the various electrical elements, laws and theorems used for analysis of electrical circuits along with steady state behaviour of single phase and three phase AC electrical circuits, Electrostatics, Magnetic Circuit and different types of safety devices, measuring instruments and sensors, earthing, wiring and working application of batteries.

Course Outcome–

CO1 - Describe the basics of electrical parameters and apply concept of KVL/KCL in solving DC circuits.
CO2- Apply the concepts of theorems in solving DC circuits.
CO3- Analyze the steady state behavior of single phase and three phase AC electrical circuits
CO4- Explain the concept of Electrostatics and Magnetic Circuit.
CO5- Describe concept of sensor/transducer, Components of distribution system, earthing and wiring.

Course Content

Unit	Module	Topics Covered	Pedagogy	Lecture Required (T=L+P)	Aligned Practical /Assignment/ Lab	CO Mapping
I	**Introduction**	Fundamental linear passive and active elements to their functional current-voltage relation, voltage source and current sources, ideal and practical sources, Kirchhoff-s laws and applications to network solutions using mesh and nodal analysis, Concept of work, power, energy, and conversion of energy.	Smart Digital board/ PPT/ White board/ Videos/M-Tutor	6+6	Assignment+Lab	CO1
II	**Basic network**	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.	Smart Digital board/ PPT/ White board/ Videos/M-Tutor	8+8	Assignment+Lab	CO2
III	**Concept of AC**	AC waveform definitions, form factor, peak factor,	Smart Digital	8+4	Assignment+Lab	CO3

		phasor representation in polar and rectangular form, concept of impedance, admittance, complex power, power factor, Study of R-L, R-C, RLC series circuit, R-L-C parallel circuit, single phase and three phase concept.	board/ PPT/ White board/ Videos/M-Tutor			
IV	**Electrostatics and Electro-Mechanics**	Electrostatic field, electric field strength, concept of permittivity in dielectrics, energy stored in capacitors, charging and discharging of capacitors. Electro Magnetism, magnetic field and Faraday's law, Magnetic materials and B-H curve, Self and mutual inductance, Ampere's law, Electromechanical energy conversion.	Smart Digital board/ PPT/ White board/ Videos/M-Tutor	10	Assignment	CO4
V	**Measurements and Sensors**	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). Concept of indicating and integrating instruments. **Practical considerations:** Electrical Wiring types and accessories, Illumination system, Basic layout of the distribution system, Types of earthing, Safety devices & systems. Battery principles and types.	Smart Digital board/ PPT/ White board/ Videos/M-Tutor	10	Assignment+Lab	CO5

References-

Text Books:

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*, (SecondEdition), J. Nagrath and Kothari, Prentice Hall of India Pvt. Ltd.

Reference Books:

1. *Basic of Electrical Engineering*, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press 2011.
2. *Introduction to Electrodynamics*, D. J. Griffiths, (Fourth Edition), Cambridge University Press.
3. *Engineering Circuit Analysis*, William H. Hayt& Jack E. Kemmerly, McGraw-Hill Book Company Inc.
4. *Fundamentals of Electrical and Electronics Engineering*, Smarjith Ghosh, Prentice Hall (India) Pvt. Ltd.

Links:

Unit 1

1.https://youtu.be/4LgSLToLSCU
2. https://youtu.be/q-i2URiDV1E
3.https://youtu.be/m4jzgqZu-4s
4.https://youtu.be/fHj2RdOnTqg

Unit 2

1.https://youtu.be/FjaJEo7knF4
2.https://youtu.be/jCchZkU7vY8
3.https://youtu.be/0FAktPLbXOA
4.https://youtu.be/wWihXHCOmUc
5.https://youtu.be/UsLbB5k9iuY
6.https://youtu.be/dpImV7d08_8
7.https://youtu.be/1QfNg965OyE
8.https://youtu.be/A0E_A0COZ8w
9.https://youtu.be/i_VHSlx-xO8
10.https://youtu.be/w4N9CBc_nkA
11.https://youtu.be/rwHgicnjJEE
12.https://www.youtube.com/watch?v=U85eA3-suiQ

Unit 3

1.https://www.youtube.com/watch?v=i1Nkn-Rniog
2.https://www.youtube.com/watch?v=hSvFELXK9hE
3. https://www.youtube.com/watch?v=U3CubKnkO4c&feature=youtu.be
4.https://www.youtube.com/watch?v=uj-HDHEXzx8&feature=youtu.be
5.https://www.youtube.com/watch?v=ZPhLi7OeRYs
6.https://www.youtube.com/watch?v=ZjwzpoCiF8A

Unit 4

1.https://www.youtube.com/watch?v=1Gi90JIvBGc
2.https://www.youtube.com/watch?v=3HyORmBip-w
3. https://www.youtube.com/watch?v=5x8kj02ar34
4. https://www.youtube.com/shorts/idzKsqKHXh0
5. https://www.youtube.com/watch?v=kc-SCAkOcO4
6. https://www.youtube.com/watch?v=vX_kd5XiEN8
7. https://www.youtube.com/watch?v=j_4jvMwIla0

Unit 5

1. https://youtu.be/zxYeJW9v6OU
2. https://youtu.be/gAhPQtLFvyU
3. https://youtu.be/s65MmFUfcrM
4. https://youtu.be/BIRS34UnsCo
5. https://youtu.be/gtfl-YTDSU4
6. https://youtu.be/SQOhgYq0UL4
7. https://youtu.be/RT5rkqufdWM
8. https://youtu.be/PMxlCyYs7S4

9. https://youtu.be/62lmfPki868
10. https://youtu.be/qxqGIGjyYTU

B. Tech.- First semester **Branch- CSBS**	
Subject Code- BCSBS0101	**L - T - P** **3 – 0 - 0**
Subject Name- PHYSICS FOR COMPUTING SCIENCE	**No. of hours-36**

Course Objective-

1.To provide the knowledge of different wave motions and their uses in engineering applications.
2. To provide the knowledge of law of optics.
3. To provide the knowledge of the basic concept of Electromagnetics and semiconductors.
4. To provide the knowledge of the basic concept of thermodynamics and its uses to engineering applications.
5. To provide the basic knowledge of Optical Fiber and Laser which is necessary to understand the working of modern engineering tools and techniques.

Course Outcome – After completion of this course students will be able to:

CO1 - Understand the different types of wave motions and their uses in engineering applications.

CO2- Apply the laws of optics.

CO3- Apply the concept of electromagnetics and semiconductors.

CO4- Define the phenomenon of thermodynamics & to apply the ideas in engineering applications.

CO5- Predict the working of modern engineering tools and techniques of optical fiber and laser.

Course Content

Unit	Module	Topics Covered	Pedagogy	Lecture Required (T=L+P)	Aligned Practical/Assignment/Lab	CO Mapping
Unit 1	**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	Smartboard, PPT	9	Assignment 1.1,1.2	CO1

		factor, forced mechanical and electrical oscillators.				
Unit 2	**Interference, Diffraction & Polarization**	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-Fresnel's half period zone and zone plate-Fraunhofer diffraction at single slit-plane diffraction grating. Temporal and Spatial Coherence. 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.	Smartboard, PPT	9	Assignment 2.1, 2.2, 2.3	CO2
Unit 3	**Basic Idea of Electromagnetis**	Continuity equation for	Smartboard, PPT	6	Assignment 3.1, 3.2	CO3

	ms and Semiconductor Physics	current densities, Maxwell's equation in vacuum and non-conducting medium. Conductor, Semiconductor and Insulator; Basic concept of Band theory.				
Unit 4	**Thermodynamics**	Zeroth 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.	Smartboard, PPT	6	Assignment 4.1, 4.2	CO4
Unit 5	**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 lasers; Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in engineering.	Smartboard, PPT	6	Assignment 5.1, 5.2	CO5

		Fiber optics and Applications, Types of optical fibers.				

References-

Text Books:

1. A. Beiser, Concepts of Modern Physics (McGraw Hill)

2. David Halliday, Robert Resnick and Jearl Walker, Fundamentals of Physics, Wileyplus.

Reference Books:

1. Ajoy Ghatak, Optics, (Fifth Edition), Tata McGraw Hill.

2. Sears & Zemansky, University Physics, Addison-Wesley.

3. Jenkins and White, Fundamentals of Optics, (Third Edition) McGraw-Hill.

Links:

UNIT1: https://www.youtube.com/watch?v=lzBKlY4f1XA&list=PL10WTjZXSIlHKMnU4UCxpPsH-yAf_n1O6&index=11

UNIT2: http://nptel.ac.in/ , http://www.mit.edu/

UNIT3: https://www.youtube.com/watch?v=bWTxf5dSUBE , http://ocw.mit.edu/, http://nptel.ac.in/

UNIT4: https://www.youtube.com/watch?v=6vyYRnLvnqI

UNIT5: https://www.youtube.com/watch?v=0GD-18Jqnro, https://www.youtube.com/watch?v=dQhhcgn8YZo

B. Tech.- First Semester
Branch- CSBS

Subject Code- BCSBS0104	**L - T - P** **2 – 0 - 0**
Subject Name- Business Communication & Value Science – I	**No. of hours- 24**

Course Objective:

1. Understand what life skills are and their importance in leading a happy and well-adjusted life.
2. Motivate students to look within and create a better version of self.
3. Introduce them to key concepts of values, life skills and business communication.

Course Outcome –

CO1 - Recognize the need for life skills and values.

CO2- Recognize own strengths and opportunities.

CO3- Apply the life skills to different situations.

CO4- Understand the basic tenets of communication.

CO5- Apply the basic communication practices in different types of communication.

Course Content

- Overview of the course with immersion activity
- Overview of biz communication
- Self-awareness, confidence, and communication
- Essentials of Business communication
- Application of communication skills
- Application of Life Skills
- Assignments

Unit	Module	Topics Covered	Pedagogy	Lecture Required (T=L+P)	Aligned Practical/Assignment/Lab	CO Mapping
Unit 1	Introduction and overview of the course	**Overview of LOL** (include activity on introducing self) **Overview of business communication** Lecture with videos **Self-awareness** – identity, body awareness, stress management	Workshop Based on community interaction	1L + 5P	**Activity:** Write a newspaper report on an IPL match **Activity:** Record a conversation between a celebrity **Class activity** – presentation on favourite cricket captain in IPL and the skills and values they demonstrate. **Self-work with immersion** – interviews with a maid, watchman, sweeper, cab driver, or beggar and narrate what you think are the values that drive them and an interviewer. **Quiz** **Activity**: Record a conversation between a celebrity and an interview **Activity**: Anubhaav Activities	CO 1 CO2

Unit 2	Application of communication skills, and Self-awareness	**Essential Grammar** – I: Refresher on Parts of Speech – Listen to an audio clip and note down the different parts of speech followed by discussion Tenses: Applications of tenses in Functional Grammar – Take a quiz and then discuss. **Sentence formation** (General & Technical), Common errors, Voices: Show sequence from film where a character uses wrong sentence structure (e.g., *Zindagi Na Milegi Dobara* where the characters use 'the' before every word) **Communication Skills**: Overview of Communication Skills Barriers of communication, Effective communication **Types of communication** - verbal and non – verbal – Role-	Textbook and interaction based	3L+3P	**Activity**: Skit based on communication skills **Evaluation on Listening skills** – listen to recording and answer questions based on them	CO4 CO5

		play based learning. **Importance of Questioning** **Listening Skills:** Law of nature, Importance of listening skills, Difference between listening and hearing, Types of listening. **Expressing self**, connecting with emotions, visualizing, and experiencing purpose				
Unit 3	Essentials of Business communication	**Email writing**: Formal and informal emails, activity **Verbal communication** : Pronunciation, clarity of speech **Vocabulary Enrichment**: Exposure to words from General Service List (GSL) by West, Academic word list (AWL) technical specific terms related to the field of technology, phrases, idioms, significant abbreviations formal business vocabulary – Read Economic	Textbook and written activity based	3L + 3P	**Practice**: Toastmaster style Table Topics speech with evaluation **Written Communication**: Summary writing, story writing **Build your CV** – start writing your comprehensive CV including every achievement in your life, no format, no page limit. **Project**: Create a podcast on a topic that will interest college students **Life skill**: Stress management, working with rhythm and balance, colours, and teamwork. **Project**: Create a musical using the learning from unit	CO4 CO5

		Times, Reader's Digest, National Geographic and take part in a GD, using the words you learnt/liked from the articles. Group discussion using words learnt				
Unit 4	**Application of Life Skills**	**Understanding Life Skills**: Movie based learning – **Pursuit of Happiness**. What are the skills and values you can identify, what can you relate to? **Introduction to life skills** what are the critical life skills.	Based on Community interaction	1L + 5P	**Multiple Intelligences Embracing diversity** – Activity on appreciation of diversity. **Life skill**: Community service – work with an NGO and make a presentation. **OR (complete any one of these two)** **Life skill**: Join a trek – Values to be learned: Leadership, teamwork, dealing with ambiguity, managing stress, motivating people, creativity, result orientation.	CO3

References- 1 Train your mind to perform under pressure- Simon Sinek https://curiosity.com/videos/simon-sinek-on-training-your-mind-to-perform-underpressure-capture-your-flag/
2 Brilliant way one CEO rallied his team in the middle of layoffs https://www.inc.com/video/simon-sinek-explains-why-you-should-put-people-beforenumbers.html.
3 Will Smith's Top Ten rules for success https://www.youtube.com/watch?v=bBsT9omTeh0

Textbooks:

1. There are no prescribed texts for Semester 1 – there will be handouts and reference links shared.

Reference Books:

1.English vocabulary in use – Alan McCarthy and O'Dell
2 APAART: Speak Well 1 (English language and communication)
3 APAART: Speak Well 2 (Soft Skills)
4 Business Communication – Dr Saroj Hiremath -Hill.

Links:

1 https://www.coursera.org/learn/learning-how-to-learn
2 https://www.coursera.org/specializations/effective-business-communication

Subject Code- BCSBS0153			L T P 0 0 4	
Subject Name- Fundamentals of Computer Science Lab			No. of Hours:	
Course Outcome- CO1- Read, understand and trace the execution of programs written in C language. CO2- Write the C code for a given algorithm. CO3- Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor. CO4- Write programs that perform operations using derived data types. CO5- Implement String Handling.				
Total No. of Practicals				
List of Practicals				
Lab No.	Unit	Topic	Program Logic Building	CO Mapping

1	I	1. Algorithm and flowcharts of small problems like GCD	1. Algorithm to find the sum of two numbers 2. Algorithm to find the smallest of two numbers 3. Algorithm to print multiplication Table of a number 4. Algorithm to find GCD of numbers.	1
2	II & III	Structured code writing with: i. Small but tricky codes	1. WAP in C to implement the use of all arithmetic operators. 2. WAP in C to find the Area and Circumference of a circle, where radius r is input by user. 3. WAP in C to swap the values of 2 variables without using third variable. 4. WAP in C to print the digit at ones place of a number. 5. WAP in C to calculate the total amount of money in the piggybank, given the coins of Rs 10, Rs 5, Rs 2 and Rs 1. 6. WAP in C to Enter the marks of 5 subjects (i.e. Physics, Chemistry, Maths, Hindi & English) of a student & display the Total_Marks and Percentage and grade achieved. Grading Critria: percentage >= 90 then Grade A percentage >=80 and <90 then Grade B percentage >=70 and <80 then Grade C percentage >=60 and <70 then Grade D else Grade E 7. WAP in C to check whether a year is Leap Year or not. 8. WAP in C to print day of week name using switch case. 9. WAP in C to print total number of days in a month using switch case. 10. WAP in C to calculate the sum of first 10 numbers. 11. WAP in C to print multiplication table of any number. 12. WAP in C to display a Fibonacci series. 13. WAP in C to find sum of digits of a number. 14. WAP in C to reverse a number. 15. Pattern Printing programs.	1
3	IV	ii. Proper parameter passing	1. WAP in C to demonstrate call by value and call by reference.	1
4	V	iii. Command line Arguments	1. WAP in C to demonstrate command line arguments.	1
5	IV	iv. Variable parameter	1. WAP in C to add two number using user defined function add(). 2. WAP in C to find the largest of three number using user defined function largest() . 3. WAP in C to calculate the factorial of a number using recursion. Program to calculate the exponent using recursion.	2
6	V	v. Pointer to functions	1. WAP in C that uses pointer to point address of a function.	2

			2. WAP in C that passes function as a parameter using pointer.	
7	IV	vi. User defined header	1. WAP in C to create a user defined header file and use it in to some other programs.	3
8	VI	vii. Make file utility	1. WAP in C to implement all make file utility commands.	3
9	IV	viii. Multi file program and user defined libraries	1. Program to demonstrate how to use multiple c files in one program.	4
10	V	ix. Interesting substring matching / searching programs	1. C Program to Implement Knuth-Morris-Pratt Algorithm for Pattern Searching. 2. C Program to Implement KMP Pattern Searching Algorithm. 3. C Program to Implement Rabin-Karp Method for Pattern Searching.	4
11	II	x. Parsing related assignments	1. Create a program that takes a user input string in the form of "operand1 operator operand2" (e.g., "5 + 3" or "10 * 2") and parses it to perform the corresponding mathematical operation. Display the result to the user.	4

Subject Code- BCSBS0151	**L T P** **0 0 2**
Subject Name- PHYSICS FOR COMPUTING SCIENCE LAB	**No. of Hours:2**
Course Objective- **1.** To provide the practical knowledge of the measurement techniques of magnetism. **2.** To provide the practical knowledge of the charge mobility, carrier concentration and Hall coefficient of semiconductor. **3.** To provide the practical knowledge of the phenomenon of interference, diffraction and modern optics. **4.** To provide the practical knowledge of Calculate Stefan's and Plank's constant.	
Course Outcome- After completion of this course students will be able to: **CO1-** Develop the measurement techniques of magnetism. **CO2-** Calculate the charge mobility, carrier concentration and Hall coefficient of semiconductor. **CO3-** Apply the practical knowledge of the phenomenon of interference, diffraction and modern optics. **CO4-** Calculate Stefan's and Plank's constant.	
Total No. of Practicals: 7	

List of Practicals				
Lab No.	**Unit**	**Topic**	**Program Logic Building**	**CO Mapping**
1		To study the magnetic field along the axis of current carrying coil by Stewart and Gee method		CO1
2		To determine the Hall coefficient of semi-conductor		CO2
3		To determine the Plank constant		CO4
4		To determine the wave length of light by Laser diffraction method		CO3
5		To determine the wave length of light by Newton's Ring method		CO3
6		To determine laser and optical fiber parameters		CO3
7		To determine the Stefan's Constant.		CO4

Subject Code- BCSBS0152	**L-T-P:** 0- 0 -2
Subject Name- Principles of Electrical Engineering Lab	**No. of Hours: 18**
Course Objective- The student will learn about the various electrical elements, measuring instruments and sensors, laws and theorems used for analysis of electrical circuits along with steady state behaviour of R-L-C series circuits.	
Course Outcome- After successful completion of this course, students will be able to **CO1-** Demonstrate the working of various electrical elements, measuring instruments and sensors. **CO2-** Conduct experiments illustrating the application of KVL/KCL and Network theorems to DC electrical circuits.	

CO3- Conduct experiments illustrating the steady state behaviour of R-L-C series circuits.

Total No. of Practical's- 5+4 = 9

List of Practical's

Lab No.	Unit	Topic	Program Logic Building	CO Mapping
1	**I**	1. Familiarization of electrical circuits: sources, measuring devices and transducers 2. Determination of resistance temperature coefficient		**CO1**
2	**II**	3. Verification of Network Theorem • Superposition, • Thevenin, • Norton, • Maximum Power Transfer theorem		**CO2**
3	**III**	4. Simulation of R-L-C series circuits for $X_L > X_C$, $X_L < X_C$ 5. Simulation of Time response of RC circuit		**CO3**
4	**IV**	6. Demonstration of measurement of electrical quantities in DC and AC systems.		**CO1**

B. Tech.-Second Semester
Branch- CSBS

Subject Code- BCSBS0205	**L-T-P** **3 – 1 – 0**
Subject Name- Linear Algebra	**No. of hours- 40**

Course Objective- The objective of this course is to familiarize the engineers with concept of Matrices, determinants, solution of system of linear equation, vector space, linear transformation, Singular value decomposition and Principal component analysis. It aims to show case the students with standard concepts and tools from B. Tech to deal with advanced level of mathematics and applications that would be essential for their disciplines.

Course Outcome –

CO1 - Apply the concept of matrices and determinants to solve linear system of equations.

CO2- Apply the concept of rank and LU decomposition to solve linear system of equation.

CO3- Explain the concept of vector space, orthogonalization and QR decomposition.

CO4- Explain the concept of Eigenvalues and Eigenvectors, linear transformation and complex matrices.

CO5- Apply the concept of singular value decomposition and principal component analysis in image processing and machine learning.

Course Content

Unit	Module	Topics Covered	Pedagogy	Lecture Required (T=L+P)	Aligned Practical/Assignment/ Lab	CO Mapping
Unit 1	Introduction	Introduction to Matrices and Determinants; Solution of Linear Equations; Cramer's rule; Inverse of a Matrix.	PPT, Smart Board, Video Lectures, Animations and M-Tutors.	08=06+02	Assignments No. 1 & 2	**CO1**
Unit 2	Vectors and linear combinations	Vectors and linear combinations; Rank of a matrix; Gaussian elimination; LU Decomposition; Solving Systems of Linear Equations using the tools of Matrices.	PPT, Smart Board, Video Lectures, Animations and M-Tutors.	08=06+02	Assignments No. 3 & 4	**CO2**
Unit 3	Vector Space	Vector space, Dimension, Basis, Orthogonality, Projections, Gram-Schmidt orthogonalization and QR decomposition.	PPT, Smart Board, Video Lectures, Animations and M-Tutors.	08=06+02	Assignments No. 5 & 6	**CO3**
Unit 4	Eigen Values and Eigen Vectors	Eigenvalues and Eigenvectors; Positive definite matrices; Linear transformations;	PPT, Smart Board, Video Lectures, Animations	08=06+02	Assignments No. 7 & 8	**CO4**

		Hermitian and unitary matrices	and M-Tutors.			
Unit 5	Principal Component Analysis	Singular value decomposition and Principal component analysis; Introduction to their applications in Image Processing and Machine Learning.	PPT, Smart Board, Video Lectures, Animations and M-Tutors.	08=06+02	Assignments No. 9 & 10	**CO5**

References-

Text Books:

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers.

2. Linear Algebra and Matrices , Hari Kishan and Manju Sharma, Ram Prasad Publication, Agra

Reference Books: 1. Advanced Engineering Mathematics, (Seventh Edition), Peter V. O'Neil, Cengage Learning.

2. Advanced Engineering Mathematics, (Second Edition), Michael. D. Greenberg, Pearson.

3. Introduction to linear algebra, (Fifth Edition), Gilbert Strang, Wellesley-Cambridge Press.

4. Applied Mathematics (Vol. I & II), P. N. Wartikar& J. N. Wartikar, Pune VidyarthiGriha Prakashan.

5. Digital Image Processing, R C Gonzalez and R E Woods, Pearson.

6. https://machinelearningmastery.com/introduction-matrices-machine-learning/

Links:

https://www.youtube.com/watch?v=p-OCvUJVxS8

https://www.youtube.com/watch?v=_6oRqxY6O5w&t=66s

https://www.youtube.com/watch?v=PZ0AvH5VKBk

https://www.youtube.com/watch?v=26IIMABe9MY

https://www.youtube.com/watch?v=G4N8vJpf7hM

https://www.youtube.com/watch?v=r5dIXpssvrA

https://youtu.be/ZX5YnDMzwbs

https://www.youtube.com/watch?v=cfn2ZUuWPd0

https://www.youtube.com/watch?v=vF7eyJ2g3kU

https://www.youtube.com/watch?v=1fLxcBJB_t8

https://www.youtube.com/watch?v=EL3fXu9FFII&t=1072s

https://www.youtube.com/watch?v=kw9R0nD69OU

https://yarpiz.com/622/yppca191211-principal-component-analysis-in

https://ocw.mit.edu/.../18-06-linear-algebra-spring-2010/video-lectures

B. Tech.- Second Semester **Branch- CSBS**	
Subject Code-BCSBS0201	**L - T - P** **3 – 0 - 2**
Subject Name- STATISTICAL METHODS	**No. of hours-42**

Course Objective- The objective of this course is to familiarize the engineers with basic concept of sampling techniques, linear correlation, regression, estimation theory, test of hypothesis testing, time series and forecasting. It aims to show case the students with standard concepts and tools from B. Tech to deal with advanced level of mathematics and applications that would be essential for their disciplines.

Course Outcome – After completion of this course students are able to:

CO1 -. Explain the concept of sampling and sampling distribution.

CO2- Apply the concept of correlation, regression and ANOVA to statistical data.

CO3- Apply the concept of estimation theory to evaluate statistical parameters.

CO4- Apply the concept of hypothesis testing to statistical problems.

CO5- Explain the concept of time series and forecasting.

Course Content

Unit	Module	Topics Covered	Pedagogy	Lecture Required (T=L+P)	Aligned Practical/Assignment/Lab	CO Mapping
Unit 1	**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.	Classroom,PPT, M.Tutor, Smart Board	10	1.1,1.2,1.3	**CO1**
Unit 2	**Linear Statistical Models**	Scatter diagram. Linear regression and correlation. Least squares method. Rank correlation. Multiple	Classroom,PPT, M.Tutor, Smart Board	8	2.1,2.2,2.3	**CO2**

		regression & multiple correlation, Analysis of variance (one way, two way with as well as without interaction).				
Unit 3	**Estimation**	Point estimation, criteria for good estimates (un-biasedness, consistency), Methods of estimation including maximum likelihood estimation Sufficient Statistic: Concept & examples, complete sufficiency, their application in estimation.	Classroom,PPT, M.Tutor, Smart Board	9	3.1,3.2,3.3	**CO3**
Unit 4	**Test of hypothesis**	Concept & formulation, Type I and Type II errors, Neyman Pearson lemma, Procedures of testing. Non-parametric Inference: Comparison with parametric inference, Use of order statistics. Sign test, Wilcoxon signed rank test, Mann-Whitney test, Run test,	Classroom,PPT, M.Tutor, Smart Board	10	4.1,4.2,4.3,4.4	**CO4**

		Kolmogorov-Smirnov test. Spearman's and Kendall's test. Tolerance region.				
Unit 5	**Basics of Time Series Analysis & Forecasting**	Stationary, ARIMA Models: Identification, Estimation and Forecasting	Classroom,PPT, M.Tutor, Smart Board	5	5.1,5.2	**CO5**

References-

Text Books:

1. Probability and Statistics for Engineers (Fourth Edition), I.R. Miller, J.E. Freund and R. Johnson, Prentice Hall India Learning Private Limited.

2. Fundamentals of Statistics (vol. I & vol. II), A. Goon, M. Gupta and B. Dasgupta, World Press.

3. The Analysis of Time Series: An Introduction, Chris Chatfield, Chapman & Hall/CRC

Reference Books:

1. Introduction to Linear Regression Analysis, D.C. Montgomery and E. Peck, WileyInterscience.
2. Introduction to the Theory of Statistics, A.M. Mood, F. A. Graybill and D.C. Boes, McGraw Hill.
3. Applied Regression Analysis, N. Draper and H. Smith, Wiley-Interscience.
4. Hands-on Programming with R, Garrett Grolemund, O′Reilly.
5. R for Everyone: Advanced Analytics and Graphics, Jared P. Lander, Addison-Wesley Professional.

B. Tech.-Second Semester
Branch- CSBS

Subject Code-BCSBS0203	**L - T – P** **3 – 1 - 0**
Subject Name-DATA STRUCTURES AND ALGORITHMS	**No. of hours-50**

- **Course Objective-The course covers basic data structure, algorithm, efficiency of algorithms, introduction to arrays, stack, queues, link list and their implementation. The course aims to give understanding of various searching and sorting algorithms and implementation of tree data structure.**

Course Outcome –

CO1 - Analyze and implement arrays, linked lists, stacks, queues to solve complex problems.

CO2- Compare the computational efficiency of the sorting and searching algorithms.

CO3- Assess the memory representation of tree and perform various operations on these data structure.

CO4- Apply the concept of recursion to solve the real-world problems.

CO5- Develop the algorithms using graph data structures.

Course Content

Unit	Module	Topics Covered	Pedagogy	Lecture Required (T=L+P)	Aligned Practical/Assignment/Lab	CO Mapping
Unit 1	Basic Terminologies and Introduction to Algorithm & Data Organization	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	Chalk & Duster/PPT/Online Programs	8+2	Fibonacci and Factorial using Recursion	CO1
Unit 2	Linear Data Structure: contiguous	Array, Stack, Queue, its types, Various Representations, Operations & Applications of Linear Data Structures	Chalk & Duster/PPT/Online Programs	5+3	Insertion and Deletion of element in arrays, stacks and Queues.	CO2
	Linear Data Structure: non-contiguous	Linked-list and its types, Various Representations, Operations & Applications of Linear Data Structures	Chalk & Duster/PPT/Online Programs	6+3	Insertion and Deletion of element in singly linklist, doubly linklist and circular linklist.	

Unit 3	Non-linear data structure: trees	e Binary Tree, Threaded Binary Tree, Binary Search Tree, B & B+ Tree, AVL Tree, Splay Tree	Chalk & Duster/PPT/Online Programs	7+2	Creation of Binary Tree	CO3
	Non-linear data structure: graphs	roduction of Graphs (Directed, Undirected), Various Representations, Operations & Applications of Trees	Chalk & Duster/PPT/Online Programs	6+2	Tree traversals	CO3
Unit 4	Searching	Sequential Search, Binary Search, Comparison Trees, Breadth First Search, Depth First Search	Chalk & Duster/PPT/Online Programs	4+2	Implementation of BFS and DFS	CO4
	Sorting	Insertion Sort, Selection Sort, Shell Sort, Divide and Conquer Sort, Merge Sort, Quick Sort, Heapsort, Introduction to Hashing	Chalk & Duster/PPT/Online Programs	6+6	Sorting techniques	CO4
Unit 5	File Organization	File: Organization (Sequential, Direct, Indexed Sequential, Hashed) and various types of accessing schemes. Graph	Chalk & Duster/PPT/Online Programs	4		CO5
	Graphs	Basic Terminologies, Representations, Operations and	Chalk & Duster/PPT/Online Programs	4	Graph traversals and shortest path algorithms	CO5

		Applications of Graphs, Graph search and traversal algorithms and complexity analysis.				

References-

Text Books:

1. E. Horowitz, S. Sahni, S. A-Freed, Fundamentals of Data Structures, 2008, Universities Press.
2. A. V. Aho, J. E. Hopperoft, J. D. UIlman,Data Structures and Algorithms, 1983, Pearson.

Reference Books:

1. Donald E. Knuth, The Art of Computer Programming: Volume 1: Fundamental Algorithms, 1968, Addison-Wesley.
2. Thomas, H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Introduction to Algorithms, 2009, 3rd Edition, The MIT Press.
3. Pat Morin,Open Data Structures: An Introduction (Open Paths to Enriched Learning), 2013, 31st Edition, UBC Press.

Links:

- https://nptel.ac.in/courses/106/106/106106127/
- **https://nptel.ac.in/courses/106/106/106106145/**
- https://www.m-tutor.com/courses.php?selectedsubject=5751&univid=330&year=1&selectedcourse=396&branch=1203&

B.Tech.-Second Semester **Branch- CSBS**	
Subject Code- BCSBS0202	**L-T-P** **2 - 0 - 0**
Subject Name- Principles of Electronics	**No. of hours- 42**

Course Objective-The student will learn about semiconductors diodes applications, analysis of BJT and FET including fundamentals of digital electronics with applications and operational amplifiers circuits.

Course Outcome–

CO1 - Explain and analyze the energy band theory, semiconductor, Formation of P-N junction with V-I characteristics.

CO2- Analyze the diodes and their applications.

CO3- Explain the characteristics of BJT.

CO4- Explain the operation and characteristics of FET and fundamental of digital electronics.

CO5- Explain and analyze the types op-amp circuits.

Course Content

Unit	Module	Topics Covered	Pedagogy	Lecture Required (T=L+P)	Aligned Practical /Assignment/ Lab	CO Mapping
I	**Introductory idea of semiconductors**	Energy band theory, classifications of solids with their electrical properties, types of semiconductors and concept of diffusion and drift, Formation of P-N junction, energy band diagram, built-in-potential, formation of depletion zone, forward and reverse biased P-N junction, V-I characteristics.	Smart Digital board/ PPT/ White board/ Videos/M-Tutor	8+2	Assignment+ Lab	CO1
II	**Diodes and Diode Circuits**	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.	Smart Digital board/ PPT/ White board/ Videos/M-Tutor	8+4	Assignment+ Lab	CO2
III	**Transistors and transistor circuits**	Transistor mechanism and principle of transistors, Formation of PNP / NPN junctions, energy band diagram, Transistor Action, CE, CB, CC configuration, transistor	Smart Digital board/ PPT/ White board/	8+4	Assignment+ Lab	CO3

		characteristics: cut-off active and saturation mode.	Videos/M-Tutor			
IV	**Field Effect Transistor and Digital electronics**	Concept of Field Effect Transistors (channel width modulation), Gate isolation types, JFET Structure and characteristics, MOSFET Structure and characteristics, depletion and enhancement type, CMOS: Basic Principles **Basic ideas of Digital electronics:** Basic idea of switching circuit, Realization of Logic gates, half and full adder/subtractor, multiplexers and demultiplexers and Counters.	Smart Digital board/ PPT/ White board/ Videos/M-Tutor	10+4	Assignment+ Lab	CO4
V	**Operational amplifier basics**	Introduction to integrated circuits, operational amplifier and its terminal properties; Application of operational amplifier; inverting and non-inverting mode of operation, Proportional, Adder, subtractor, Integral, Derivative circuits.	Smart Digital board/ PPT/ White board/ Videos/M-Tutor	8+4	Assignment+ Lab	CO5

References-

Text Books:

1. *Microelectronics Circuits*, Adel S. Sedra and Kenneth Carless Smith, Oxford University Press.
2. *Millman's Integrated Electronics*, Jacob Millman, Christos Halkias, Chetan Parikh, McGraw Hill Education.
3. *Digital Logic & Computer Design*, M. Morris Mano, Pearson

Reference Books:

1. *Electronic Devices and Circuit Theory*,Robert L. Boylestad, Louis Nashelsky.
2. *Solid State Electronic Devices*,6th Edition, Ben Streetman, Sanjay Banerjee
3. *Electronic Principle*, Albert Paul Malvino.
4. *Electronics Circuits:Discrete& Integrated*, D Schilling C Belove TApelewiczRSaccardi.
5. *Microelectronics*, Jacob Millman, Arvin Grabel.
6. *Electronics Devices &Circuits*,S. Salivahanan, N. Suresh Kumar,A. Vallavaraj
7. *Electronic Devices & Circuit Theory*, 11th Edition, Robert L. Boylestad,LouisNashelsky.

Links:

Unit 1

1.https://www.m-tutor.com/courses-detail.php?tid=859826&topicid=199075&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing

2.https://www.m-tutor.com/courses-detail.php?tid=859827&topicid=199076&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing 3.https://www.m-tutor.com/courses-detail.php?tid=859822&topicid=199071&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing

4.https://www.m-tutor.com/courses-detail.php?tid=859823&topicid=199072&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing
5.https://www.m-tutor.com/courses-detail.php?tid=859824&topicid=199073&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing
6.https://www.m-tutor.com/courses-detail.php?tid=859825&topicid=199074&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing

Unit 2

1.https://www.m-tutor.com/courses-detail.php?tid=859828&topicid=199077&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing
2.https://www.m-tutor.com/courses-detail.php?tid=859829&topicid=199078&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing
3.https://www.m-tutor.com/courses-detail.php?tid=859830&topicid=199080&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing
4.https://www.m-tutor.com/courses-detail.php?tid=859831&topicid=199082&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing
5.https://www.m-tutor.com/courses-detail.php?tid=859832&topicid=199083&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing

Unit 3

1.https://www.m-tutor.com/courses-detail.php?tid=859833&topicid=199084&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing
2.https://www.m-tutor.com/courses-detail.php?tid=859834&topicid=199085&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing
3.https://www.m-tutor.com/courses-detail.php?tid=859835&topicid=199086&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing
4.https://www.m-tutor.com/courses-detail.php?tid=859836&topicid=199087&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing
5.https://www.m-tutor.com/courses-detail.php?tid=859837&topicid=199088&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing
6.https://www.m-tutor.com/courses-detail.php?tid=859838&topicid=199089&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing
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Unit 4

1.https://www.m-tutor.com/courses-detail.php?tid=859842&topicid=199093&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing

2.https://www.m-tutor.com/courses-detail.php?tid=859843&topicid=199095&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing

3.https://www.m-tutor.com/courses-detail.php?tid=859844&topicid=199096&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing

4.https://www.m-tutor.com/courses-detail.php?tid=859845&topicid=199097&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing

5.https://www.m-tutor.com/courses-detail.php?tid=859846&topicid=199098&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing

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7.https://www.m-tutor.com/courses-detail.php?tid=859848&topicid=199100&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing

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9.https://www.m-tutor.com/courses-detail.php?tid=859850&topicid=199102&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing****

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13.https://www.m-tutor.com/courses-detail.php?tid=859854&topicid=199106&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing

14.https://www.m-tutor.com/courses-detail.php?tid=859855&topicid=199107&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing

15.https://www.m-tutor.com/courses-detail.php?tid=859856&topicid=199108&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing

Unit 5

1.https://www.m-tutor.com/courses-detail.php?tid=859862&topicid=199114&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing
2.https://www.m-tutor.com/courses-detail.php?tid=859863&topicid=199115&viewtype=&searchtopics=&selectedcourse=396&selectedsubject=5747&selectedunit=&filter=landing
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B. Tech.-Second Semester **Branch- CSBS**	
Subject Code-BCSBS0206	**L - T - P** **2 – 0 - 0**
Subject Name- Fundamentals of Economics	**No. of hours- 28**

Course Objective- This course will help the student in understand the relative importance of Economics. It also supports in knowing the application of the principles of managerial economics that can aid in achievement of business objectives. Student can understand the modern managerial decision rules and optimization techniques and can be equipped with the tools necessary in analysis of consumer behaviour as well as in forecasting product demand. It also helps in understanding, how to apply latest pricing strategies and analyse the macro environment affecting the business decision making

Course Outcome –

CO1 - Students will be able to remember the concepts of microeconomics and able to understand the various micro economic principles to make effective economic decisions under conditions of risk and uncertainty.

CO2- The students would be able to understand the law of demand & supply & their elasticities, evaluate & analyse these concepts and apply them in various changing situations in industry. Students would be able to apply various techniques to forecast.

demand for better utilization of resources.

CO3- The students would be able to understand the production concept and how the production output changes with the change in inputs and able to analyse the effect of cost to business and their relation to analyse the volatility in the business world.

CO4- The students would be able to understand & evaluate the different market structure and their different equilibriums for industry as well as for consumers for the survival in the industry by the application of various pricing strategic.

CO5- The students would be able to analyse the macroeconomic concepts & their relation to micro economic concept & how they affect the business & economy.

Course Content

Unit	Module	Topics Covered	Pedagogy	Lecture Required (T=L+P)	Aligned Practical/Assignment/Lab	CO Mapping
Unit 1	Microeconomics	Principles of Demand and Supply - Supply Curves of Firms - Elasticity of Supply; Demand Curves of Households - Elasticity of Demand; Equilibrium and Comparative Statics (Shift of a Curve and Movement along the Curve); Welfare Analysis - Consumers' and Producers' Surplus - Price Ceilings and Price Floors; Consumer Behaviour - Axioms of Choice - Budget Constraints and Indifference Curves	PPT, Lecture	6 hours	Take 5 household product and analyse its 5 year demand.	CO1
Unit 2	Consumer's Equilibrium	Consumer's Equilibrium - Effects of a Price Change, Income and Substitution	PPT, Lecture	8 hours	Identify a firm of your choice and find its production cost both in short run and long run.	CO2

		Effects - Derivation of a Demand Curve; Applications - Tax and Subsidies - Intertemporal Consumption - Suppliers' Income Effect; Theory of Production - Production Function and Iso-quants - Cost Minimization; Cost Curves - Total, Average and Marginal Costs - Long Run and Short Run Costs; Equilibrium of a Firm Under Perfect Competition; Monopoly and Monopolistic Competition				
Unit 3	Macroeconomics	National Income and its Components - GNP, NNP, GDP, NDP; Consumption Function; Investment; Simple Keynesian Model of Income Determination and the Keynesian Multiplier; Government Sector - Taxes and Subsidies; External Sector - Exports and	PPT, Lecture	8 hours	Discuss the methods of calculating national Income.	CO3

		Imports; Money – Definitions				
Unit 4	Demand for Money	Demand for Money - Transitionary and Speculative Demand; Supply of Money - Bank's Credit Creation Multiplier; Integrating Money and Commodity Markets - IS, LM Model; Business Cycles and Stabilization - Monetary and Fiscal Policy - Central Bank and the Government; The Classical Paradigm - Price and Wage Rigidities - Voluntary and Involuntary Unemployment	PPT, Lecture	6 hours	Discuss the working of monetary and fiscal policies.	CO4

References-

Text Books:

1. Microeconomics, Pindyck, Robert S., and Daniel L. Rubinfeld.
2. Macroeconomics, Dornbusch, Fischer and Startz.
3. Economics, Paul Anthony Samuelson, William D. Nordhaus

Reference Books:

1. Intermediate Microeconomics: A Modern Approach, Hal R, Varian.
2. Principles of Macroeconomics, N. Gregory Mankiw

Links:

https://nios.ac.in/media/documents/SrSec318NEW/318_Economics_Eng/318_Economics_Eng_Lesson12.pdf

https://www.mbacrystalball.com/blog/economics/

https://www.toppr.com/guides/fundamentals-of-economics-and-management/basic-concepts-of-economics/

B. Tech.-Second Semester **Branch- CSBS**	
Subject Code- BCSBS0204	**L-T-P** **2 – 0 - 0**
Subject Name- Business Communication & Value Science II	**No. of hours- 24**

Course Objective-

1 Develop effective writing, reading, presentation and group discussion skills.
2 Help students identify personality traits and evolve as a better team player.
3 Introduce them to key concepts of a) Morality b) Behavior and beliefs c) Diversity & Inclusion

Course Outcome –

CO1 - Understand tools of structured written communication
CO2- Apply effective techniques to make presentations.
CO3- Identify individual personality types and role in a team.
CO4- Understand the basic concepts of Morality and Diversity

Course Content

- Identification of common errors in written communication and ways of rectification
- Understanding speed reading techniques – Skimming and Scanning
- Application of reading and writing skills
- Analyzing personality traits and team player style
- Understanding the concepts of Morality, Diversity and Inclusion
- Application of these concepts
- Creation of communication material
- Experiencing diversity and organizing events to support inclusion
- Assignment – Assimilation of concepts and present them effectively

Unit	Module	Topics Covered	Pedagogy	Lecture Required (T=L+P)	Aligned Practical/Assignment/Lab	CO Mapping
Unit 1	Communication Skills and introduction to effective writing	• Satori • You are your own editor • Secrets of	Lecture + Workshop	4	Group Discussion E magazine	

		good writing • Share your Satori				
Unit 2	**Presentation techniques and Effective Re**	• We shall overcome • Branding • Presentation skills • Who are We • Revisiting the Video Recording • Speed Reading • Share your Satori	Workshop	6	Formation of NGO Prepare the presentation Publishing the E magazine	
Unit 3	**Team Work and Communication**	• Triple A • Design a Skit • Skit • Team Work • Big 5 personality traits • Team Falcon • Team	Team Work	7	Write a report based on the research Create E magazine 3rd edition and publishing	

		• Share my heart				
Unit 4	**Concepts of Morality, Diversity and Behavior**	• Touch the target • Every one has a story • Diversity and Inclusion • Ethics • Debate • TCS Values • Make yourself heard • Share your Satori	Lecture + Workshop	7	Blog Coffee with…… Create E magazine 4th edition and publishing	

References- 1 ETHICS FUNDAMENTALS AND APPROACHES TO ETHICS https://www.eolss.net/Sample-Chapters/C14/E1-37-01-00.pdf
2. A Framework for Making Ethical Decisions https://www.brown.edu/academics/science-and-technology-studies/framework-making-ethical-decisions
3. Five Basic Approaches to Ethical Decision- http://faculty.winthrop.edu/meelerd/docs/rolos/5_Ethical_Approaches.pdf

Text Books: There are no prescribed texts for Semester 2 – there will be handouts and reference links shared.

Reference Books: 1. Guiding Souls : Dialogues on the purpose of life; Dr. A.P.J Abdul Kalam ;Publishing Year-2005; Co-author--Arun Tiwari
2. The Family and the Nation; Dr. A.P.J Abdul Kalam; Publishing year: 2015; Co-author: Acharya Mahapragya
3. The Scientific India: A twenty First Century Guide to the World around Us; Dr. A.P.J Abdul Kalam; Publishing year: 2011; Co-author- Y.S.Rajan
4. Forge Your Future: Candid, Forthright, Inspiring ; Dr. A.P.J Abdul Kalam; Publishing year: 2014

Links: 1 https://youtu.be/CsaTslhSDI
2 https://m.youtube.com/watch?feature=youtu.be&v=IIKvV8_T95M
3 https://m.youtube.com/watch?feature=youtu.be&v=e80BbX05D7Y

4 https://m.youtube.com/watch?v=dT_D68RJ5T8&feature=youtube
5https://m.youtube.com/watch?v=7sLLEdBgYYY&feature=youtube

Subject Code-BCSBS0251	**L T P** **0 0 2**
Subject Name- Statistical Methods Lab	**No. of Hours: 26**

Course Objective- Implement statistical analysis techniques on variety of data for solving practical problems Using R.

Course Outcome-

CO1- Explain basic R programming concepts
CO2- Demonstrate how to install and configure RStudio
CO3- Explain the use of data structure and loop functions
CO4- Analyse data and generate reports based on the data
CO5-Apply various concepts to write programs in R

Total No. of Practicals-13

List of Practicals

Lab No.	Unit	Topic	Program Logic Building	CO Mapping
1	1	Introduction to R		**CO1**
2	2	To install and configure RStudio		**CO2**
3	3	Functions in R		**CO3**
4	3	Loops in R		**CO3**
5	3	Vectors in R		**CO3**
6	3	Matrices In R		**CO3**
7	4	Reading Data In R		**CO4**
8	4	Writing Data in R		**CO4**
9	4	Data Manupulation in R		**CO4**
10	5	Simulation In R		**CO5**
11	5	Linear Model in R		**CO5**

12	5	Data Frame in R		**CO5**
13	5	Graphics in R		**CO5**

Subject Code-BCSBS0253	**L T P** **0 0 4**
Subject Name- DATA STRUCTURES AND ALGORITHMS LAB	**No. of Hours: 30**

Course Objective- The objective of this course is to implement various data structures according to their applications to solve real world problems.

Course Outcome-

CO1-Write programs for solving mathematical problems using array and linked list.
CO2- Implement concept of recursion to solve complex problem.
CO3-Implement various operations of stack and queue data structure.
CO4- Write efficient sorting, searching programs.
CO5- Implement program to solve real world problem using tree and graph data structure.

Total No. of Practicals: 23

List of Practicals

Lab No.	Unit	Topic	Program Logic Building	CO Mapping
1	1	Recursion	1.Program to find factorial of a number.	CO1
2	1	Recursion	2.Program to print Fibonacci series	CO1
3	1	Arrays	1.Program to create and display linear array 2. Program to insert a data item at any location in a linear array 3. Program to delete a data item from a linear array	CO1
4	2	Stack	1.Program to implement Stack Operation using array.	CO2
5	2	Queue	1.Program to implement Queue Operations using array	CO2
6	2	Singly Link List	1.Program to implement the Single Linked List operations : a. Insertion b. Deletion c. Traversal d. Reversal e.	CO2

			Searching f. Updation g. Sorting h. Merging	
7	2	Double Link List	1.Program to implement the Double Linked List operations : a. Insertion b. Deletion c. Traversal d. Reversal e. Searching f. Updation g. Sorting h. Merging	CO2
8	2	Circular Link List	1.Program to implement the Circular Linked List operations : a. Insertion b. Deletion c. Traversal d. Reversal e. Searching f. Updation g. Sorting h. Merging	CO2
9	2	Stack Application	1.Program to implement Tower of Hanoi	CO2
10	3	Trees	1.Program to implement binary tree using linked list a. Insertion b. Deletion c. Traversal d. Searching	CO3
11	3	Graphs	1.Program to implement BFS algorithm 2. Program to implement DFS algorithm	CO3
12	4	Searching	1.Program to implement linear search in an Array. 2. Program to implement binary search in an Array	CO4
13	4	Sorting	1.Program to implement Bubble sort in an Array. 2. Program to implement Selection sort in an Array. 3. Program to implement Insertion sort in an Array.	CO4
14	4	Sorting	1.Program to implement Quick sort in an Array. 2. Program to implement Merge sort in an Array.	CO4
15	5	Graph Traversal	1. Program to implement the minimum cost spanning tree. 2. 2.Program to implement the shortest path algorithm	CO5

Subject Code- BCSBS0252	**L-T-P:** 0- 0 -2
Subject Name- Principles of Electronics Lab	**No. of Hours:** 18
Course Objective- Students will demonstrate the characteristics & use of different semiconductor devices.	
Course Outcome- After successful completion of this course, students will be able to **CO1-** Demonstrate the diode V-I characteristics and input/output waveforms of rectifier circuits. **CO2-** Demonstrate the input and output characteristics of BJT.	

CO3- Draw the transfer and drain characteristics of FET.
CO4- Explain the operational amplifier and demonstrate op-amp as adder and subtractor.

Total No. of Practical's- 09

List of Practical's

Lab No.	Unit	Topic	Program Logic Building	CO Mapping
1	II	**Semiconductor Diodes and application** 1.To study the data sheet to understand specifications of – Diodes. 2.To draw the V-I Characteristics of Diode. 3.To build half wave and Full wave rectifier circuits using diode.		CO1
2	III	**Transistor circuits** 4.To study the data sheet to understand specifications of – BJT. 5.To draw the V-I Characteristics of BJT in CE configuration.		CO2
3	IV	**FET** 6.To study the data sheet to understand specifications of – FET. 7.To draw the Drain and transfer Characteristics of FET in CS configuration.		CO3
4	V	**Operational Amplifier (Op-Amp)** 8.To study the data sheet to understand specifications of – OPAMP. 9.To build and test OPAMP as an Adder and Subtractor.		CO4

B. Tech.-Second Semester
Branch- CSBS

Subject Code- BNC0201	**L - T - P** **2 – 0 - 0**
Subject Name- Environmental Science	**No. of hours- 40**

Course Objective-To help the students in realizing the inter-relationship between man and environment and help the
students in acquiring basic knowledge about environment.
2 To develop the sense of awareness among the students about environment and its various problems.
3 To create positive attitude about environment among the student.

4 To develop proper skill required for the fulfillment of the aims of environmental education and
educational evaluations
5 To develop the capability of using skills to fulfill the required aims, to realize and solve environmental
problems through social, political, cultural and educational processes

Course Outcome –

CO1 -Understand the basic principles of ecology and environment. Ecosystem: Basic concepts, components of ecosystem, food chains and food webs. Ecological pyramids K1,K2
CO 2 Understand the different types of natural recourses like food, forest, Minerals and energy and their conservation K1.K2
CO 3 Understand the importance of biodiversity, Threats of biodiversity and different methods of biodiversity conservation. K1,K2
CO 4 Understand the different types of pollution, pollutants, their sources, effects and their control methods. K1,K2,K3
CO 5 Understand the basic concepts of sustainable development, Environmental Impact Assessment (EIA) and different acts related to environment K1,K2,K3

Course Content

Unit	Module	Topics Covered	Pedagogy	Lecture Required (T=L+P)	Aligned Practical/Assignment/Lab	CO Mapping
Unit 1	Nature Of Environment & Forest Resources, Food Resources & Associated Problems	Definition, Scope and basic principles of ecology and environment. Ecosystem: Basic concepts, components of ecosystem, food chains and food webs. Ecological pyramids, Energy flow in ecological systems, Characteristics of different ecosystems.	Smart Board, PPT,M tutor	8	NA	CO 1

		Biogeochemical Cycles: Importance, gaseous and sedimentary cycles. Carbon, Nitrogen, Phosphorus and Sulphur Cycles. Natural resources and associated problems. Forest resources: Use and over-exploitation, deforestation. Timber extraction, mining, dams and their effects on forest and tribal people. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources. Food resources: World food problems, changes caused by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.				
Unit 2	**Water Resources, Land Resources & Energy Resources & Associated Problems**	**Water resources: Introduction to surface and ground water; water table; vertical distribution of water; formation and**	**Smart Board, PPT,M tutor**	**8**	**NA**	**CO 2**

		properties of aquifers; techniques for ground water recharge; river structure and patterns; watershed and drainage basins; importance of watershed and watershed management; rain water harvesting in urban settings. Marine resources; commercial use of marine resources; threats to marine ecosystem. Land resources: Land as a resource, land degradation, man induced landslides. Equitable use of resources for sustainable lifestyles. Nonrenewable Energy Resources: Fossil fuels and their reserves, Nuclear energy, types, uses and effects, Renewable Energy Resources: hydropower, Solar energy, geothermal, tidal and wind energy, Biomass energy, biogas and its advantages.				

Unit 3	**Biodiversity**	**Biodiversity and their importance, Threats to biodiversity, major causes, extinction's, vulnerability of species to extinction, IUCN threat categories, Red data book. Strategies for biodiversity conservation, principles of biodiversity conservation in-situ and ex-situ conservation strategies Mega diversity zones and Hot spots, concepts, distribution and importance. Succession: Concepts of succession, Types of Succession. Trends in succession. Climax and stability.**	**Smart Board, PPT,M tutor**	**8**	**NA**	**CO 3**
Unit 4	**Environmental Changes and Human Health**	**Air pollution: sources of air pollution, Primary and secondary air pollutants. Origin and effects of SOX, NOX, COX, CFC, Hydrocarbon, control of air pollution. Water pollution: sources and types of water pollution, Effects of water**	**Smart Board, PPT,M tutor**	**8**	**NA**	**CO 4**

		pollution, Eutrophication, Soil pollution: Causes of soil pollution, Effects of soil pollution Major sources of and effects of noise pollution on health, Radioactive and thermal pollution sources and their effects on surrounding environment. Solid waste disposal and its effects on surrounding environment. Climate change, global warming, acid rain, ozone layer depletion, Chemical disasters : Bhopal gas tragedy				
Unit 5	**Environmental Protection Through Assessment and Education**	**Basic concepts of sustainable development, Women education, Role of NGOs regarding environmental protection, Bio indicators and their role, Natural disasters and disasters management, Environmental Impact Assessment (EIA), general guidelines for the preparation of environmental impact**	**Smart Board, PPT,M tutor**	**8**	**NA**	**CO 5**

		statement (EIS), important environmental protection Policy and legislations.				

References-

Text Books:

1. . Brady, N.C. 1990. The nature and properties of Soils, Tenth Edition. Mac Millan Publishing Co., New York.

2. Botkin, D.B and Kodler E.A., 2000, Environmental Studies: The earth as a living planet. John Wiley and Sons Inc.

3. Rao M.N. and H.V.N. Rao, 1989 : Air Pollution, Tata McGraw Hill Publishing Co. Ltd., New Delhi

4. Singh J.S., Singh S.P. and Gupta S.R., 2006, Ecology Environment and Resource Conservation, Anamaya Publishers, New Delhi.

5. Environmental Studies -Benny Joseph-Tata McgrawHill-2005

6. Environmental Studies- Dr. D.L. Manjunath, Pearson Education-2006.

7. Environmental studies- R, Rajagopalan -Oxford Pubtiotion2005.

Reference Books: 1. Sodhi G.S. 2005, Fundamentals of Environmental Chemistry: Narosa Publishing House, New Delhi.

2. Dash, M.C. (1994).Fundamentals of Ecology, Tata McGraw Hill, New Delhi.

3. Sharma P. D. (1996). Environmental Biology, Rastogi Publications, Meerut.

4. Verma P.S. and V.K. Agarwal. (1985). Principles of Ecology. S. Chand and Company (Pub.), New Delhi.

5. Principles of Environmental Sciences and Engineering -P. Venugoplan Rao, Prenitice Hall of India.

6. Environmental Science and Engineering Meenakshi, Prentice Hall India

Links: Unit 1 https://www.youtube.com/watch?v=T21OO0sBBfc, https://www.youtube.com/watch?v=qt8AMjKKPDo https://www.youtube.com/watch?v=yAK-m91Nxrshttps://www.youtube.com/watch?v=ha_O1uOWkk, https://www.youtube.com/watch?v=brF0RWJyx9w

Unit 2 https://www.youtube.com/watch?v=mOwyPENHhbc, https://www.youtube.com/watch?v=yqev1G2iy2

0, https://www.youtube.com/watch?v=_74S3z3IO_I,
https://www.youtube.com/watch?v=jXVw6M6m2
g0

Unit 3 https://www.youtube.com/watch?v=GK_vRtHJZu4,
https://www.youtube.com/watch?v=b6Ua_zWDH6
U, https://www.youtube.com/watch?v=7tgNamjTRkk,
https://www.youtube.com/watch?v=ErATB1aMiS
U, https://www.khanacademy.org/science/high-school-biology/hs-ecology/hs-human-impact-onecosystems/v/conservation-and-the-race-to-save-biodiversity

Unit 4 https://www.youtube.com/watch?v=7qkaz8ChelI,
https://www.youtube.com/watch?v=NuQE5fKmfME,
https://www.youtube.com/watch?v=9CpAjOVLHII,
https://www.youtube.com/watch?v=yEci6iDkXYw, h
ttps://www.youtube.com/watch?v=yEci6iDkXYw

Unit 5 https://www.youtube.com/watch?v=ad9KhgGw5iA,
https://www.youtube.com/watch?v=nW5g83NSH9
M, https://www.youtube.com/watch?v=xqSZL4Ka8xo,