Manav Rachna University

FACULTY OF ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE & TECHNOLOGY

Scheme & Syllabus

B.Tech (2021-25)

B.TECH-COMPUTER SCIENCE & ENGINEERING WITH SPECIALIZATION IN ARTIFICIAL INTELLIGENCE & MACHINE LEARNING IN ASSOCIATION WITH XEBIA (CSU02)

MANAV RACHNA UNIVERSITY
FACULTY OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE & TECHNOLOGY
SYLLABUS & SCHEME
B.TECH-COMPUTER SCIENCE & ENGINEERING WITH SPECIALIZATION IN ARTIFICIAL INTELLIGENCE & MACHINE LEARNING IN ASSOCIATION WITH XEBIA (CSU02) (2021-25)

Apart from the courses that have been picked from B.Tech CSE the specialization courses for **Artificial Intelligence & Machine Learning** are as follows:

CSU02- Semester-1

SEMESTER - 1												
SUBJECT CODES	SUBJECT NAME	PRE-REQUISITE	OVERLAPPING/EQUIVALENT COURSES	**OFFERING DEPARTMENT	*COURSE NATURE (Hard/Soft/Workshop/NTCC/Audit/Outcome)	COURSE TYPE (Core/Elective)	L	T	P	O	NO. OF CONTACT HOURS PER WEEK	NO. OF CREDITS
CHH144-T	CHEMISTRY-I						3	1	0	0	4	
CHH144-P	CHEMISTRY-I LAB	NIL	NA	PH	HARD	CORE	0	0	2	0	2	5
ECH103B-P	BASICS OF ELECTRONICS & ELECTRICAL ENGINEERING						3	1	0	0	4	
ECH103B-P	BASICS OF ELECTRONICS & ELECTRICAL ENGINEERING LAB	NIL	NA	MA	HARD	CORE	0	0	2	0	2	5
CSH101B-T	PROGRAMMING FOR PROBLEM SOLVING USING C						3	1	0	0	4	
CSH101B-P	PROGRAMMING FOR PROBLEM SOLVING USING C	NIL	NA	CS	HARD	CORE	0	0	2	0	2	5

	LAB										
CSH107B-T	OVERVIEW OF DATA SCIENCE & MACHINE LEARNING						3	1	0	0	4	
CSH107B-P	OVERVIEW OF DATA SCIENCE & MACHINE LEARNING LAB	NIL	NA	CS	HARD	CORE	0	0	2	0	2	5
MEW102B	ENGINEERING GRAPHICS & DRAWING	NIL	NA	ME	WORKS HOP	CORE	0	0	3	0	3	1.5
CDS101B	PROFESSIONAL COMMUNICATION-I	NIL	NA	CDC	SOFT	CORE	0	0	1	0	1	0.5
TOTAL (L-T-P-O/CONTACT HOURS/CREDITS)							**12**	**4**	**12**	**0**	**28**	**22**

Detailed Syllabus

CSU02- Semester-1

Course Title/ Code	**Chemistry-1 (CHH144) T & P**
Course Type	Core (Allied)
Course Nature	Soft
L-T-P-O Structure	(3-1-2)
Objectives	Student would be able to learn basic of atomic structure, intermolecular forces, and importance of pH, stereochemistry, learn basic of spectroscopic techniques and apply basic of these topics to industrial and domestic purpose.

Syllabus	Sections	Weightage
	A	28%
	B	28%
	C	28%
	D	16%
	TOTAL	**100%**

SECTION-A

(i)   **Atomic Structure**

Bohr's theory, its limitations and atomic spectrum of hydrogen atom. Wave mechanics: de Broglie equation, Heisenberg's Uncertainty Principle and its significance, Schrödinger's wave equation, significance of ψ and ψ^2. Quantum numbers and their significance. Normalized and orthogonal wave functions. Sign of wave functions. Radial and angular wave functions for hydrogen atom. Radial and angular distribution curves. Shapes of s, p, d and f orbitals. Contour boundary and probability diagrams. Pauli's Exclusion Principle, Hund's rule of maximum multiplicity, Aufbau's principle and its limitations, Variation of orbital energy with atomic number. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties.

(ii)   Periodic properties

Electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital, energies of atoms in the periodic table, polarizability and Polarization, Fajan's Rule, oxidation states and their stabilities.

SECTION-B

(iii)   Intermolecular forces and potential energy surfaces

Ionic, dipolar and van der waals interaction, equations of state of real and gases and critical phenomenon.

(iv)   Use of free energy in chemical equilibria

Thermodynamic functions: entropy and gibbs free energy;estimations of entropy and free energies.Relationship betweenFree energy and emf Cell potentials.Nernst equation and application.acid base,oxidation reduction and solubility equilibria,Water chemistry : Introduction - Use of water for Industrial and domestic purposes, sources of water supply,Hardness of water, degree of hardness and its estimation by EDTA methods). PH-value of water, disinfection of water Softening of hard water (Lime-Soda method, calgon methods.corrosion: introduction,cause and theories:Dry and wet theory and prevention methods,use of free energy consideration in metallurgy through Ellingham Diagram.

SECTION-C

(v)   Stereochemistry

Representations of three dimensional structures, introduction to the terms: achirality, chirality, enantiomers, diastereomers, optical activity, structural isomers and stereoisomers, relative and absolute configurations, conformational analysis of ethane and n-butane. Structural isomerism in transitional metal compounds.

(vi)   Organic reactions and synthesis using conventional and green approach

Introduction to Green Chemistry, its 12 principles, Synthesis of a commonly used molecules: Aspirin, Ibuprofen, bio-diesel and bio-ethanol.

SECTION-D

(vii)   Spectroscopic techniques and applications

Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging.

Text Books

1. University chemistry, by B. H. Mahan
2. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
3. (iii)Fundamentals of Molecular Spectroscopy, by C. N. Banwell
4. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
5. Physical Chemistry, by P. W. Atkins
6. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition http://bcs.whfreeman.com/vollhardtschore5e/default.asp

Laboratory
1. Estimation of Hardness of the water sample
2. Determination of alkalinity of water sample
3. Synthesis of a polymer (UF, Resol, PMMA).
4. Determination of the rate constant of a reaction
5. Determination of chloride content of water
6. Colligative properties using freezing point depression
7. Determination of surface tension and viscosity.
8. Determination of cell constant and conductance of solutions
9. Adsorption of acetic acid by charcoal.
10. Determination of the partition coefficient of a substance between two immiscible liquids.

Course Title/ Code	BASICS OF ELECTRICAL & ELECTRONICS (ECH103B-T/P)
Course Type:	Core (Allied)
Course Nature:	Hard
L-T-P-O Structure	(3-1-2-0)

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	**100%**

SECTION A

DC Circuits: Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff's current and voltage laws, analysis of simple circuits with dc excitation. Superposition Theorem, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits. AC Circuits: Representation of sinusoidal waveforms, peak and RMS values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel) resonance.

SECTION B

Diodes and Applications covering, Semiconductor Diode - Ideal versus Practical, Resistance Levels, Diode Equivalent Circuits, Load Line Analysis; Diode as a Switch, Diode as a Rectifier, Half Wave

and Full Wave Rectifiers with and without Filters; Breakdown Mechanisms, Zener Diode – Operation and Applications; Opto-Electronic Devices – LEDs, Photo Diode and Applications.

SECTION C

Transistor Characteristics covering, Bipolar Junction Transistor (BJT) – Construction, Operation, Amplifying Action, Common Base, Common Emitter and Common Collector Configurations. Transistor Amplifiers and Oscillators, Classification, Small Signal Amplifiers – Basic Features, Common Emitter Amplifier, Coupling and Bypass Capacitors. Feedback Amplifiers – Principle, Advantages of Negative Feedback, Topologies, Current Series and Voltage Series Feedback Amplifiers; Oscillators – Classification, RC Phase Shift, Wien BridgeOscillators.

SECTION D

Operational Amplifiers and Applications covering, Introduction to Op-Amp, Differential Amplifier Configurations, CMRR, PSRR, Slew Rate; Block Diagram, Pin Configuration of 741 Op-Amp, Characteristics of Ideal Op-Amp, Concept of Virtual Ground. IC 555 and its applications as Astable and mono-stable multi-vibrators.

List of Experiments:

1. Familiarization with the lab Equipment's.

2. To verify the Kirchhoff's Voltage Law and Kirchhoff's Current Law

3. To experimentally verify Thevenin Theorem

4. Introduction to CRO and measuring various parameters of Sine wave

5. Characteristics of PN junction diode in Forward and reverse bias configuration.

6. Truth table Verification of AND and OR gate using diode

7. Half wave and full wave rectifier circuit.

8. To plot the characteristics of Transistor in CE Configuration

9. RC Phase Shift Oscillator

10. Op Amp as Inverting and Non-Inverting Amplifier

11. Minor project on 555 Timer Application

Suggested Text / Reference Books

(i) D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.

(ii) D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.

(iii)L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.

(iv) David. A. Bell (2003), Laboratory Manual for Electronic Devices and Circuits, Prentice Hall, India.

(v) SantiramKal (2002), Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India 3. Thomas L. Floyd and R. P. Jain (2009), Digital Fundamentals by Pearson Education,

(vi) Paul B. Zbar, A.P. Malvino and M.A. Miller (2009), Basic Electronics – A Text-Lab. Manual, TMH 5

Course Title/ Code	Programming for Problem Solving Using C(CSH101B) T & P
Course Type	Core (Departmental)
Course Nature	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	Students are able to construct a program of moderate complexity from a specification

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

Section-A

Programming and UNIX

Students will learn the basics of programming using Scratch, they will learn to use statements, expressions, conditions, selection, iteration, variables, functions, arrays, threads and events. In addition, they will be introduced to basic UNIX commands under Bash.

Introduction to Programming, test driven development, Scratch: Introduction, statements, expressions, conditions, selection, iteration, variables, functions, arrays.UNIX: Basic commands- pwd, ls, cd, rm, cat, less, mkdir, rmdir; permissions, root. C language: statements, expressions, conditions, selection iteration, variables, functions, arrays.

Section-B

Applying programming constructs

Students will learn how to write programs that satisfy unit tests. The instructor will build the unit tests, demonstrating how to break a problem down into smaller components. In the labs and homework, students will construct programs that satisfy the unit tests. Students become familiar with the constructs of the C programming language.

Moving to C: Data Types, constants, and variables, Statements, Expressions, Conditions, Selection, iteration, Functions and recursion

Decision making within a program, Conditions, Relational Operators, Logical Connectives, if statement, if-else statement, Loops: while loop, do while, for loop, Nested loops, Infinite loops, Switch statement, structured Programming Arrays; One dimensional arrays: Array manipulation; Searching, Insertion, Deletion of an element from an array; Finding the largest/smallest element in an array; Null terminated strings as array of characters, Standard library string functions Introduction to Top-down approach of problem solving, Modular programming and functions, Standard Library of C functions, Prototype of a function: Formal parameter list, Return Type, Function call, Block structure, Passing arguments to a Function: call by reference, call by value, Recursive Functions, arrays as function arguments .

Section-C
Practical programming

During the third quarter of the class, students will begin building their own programs by decomposing problems into smaller tasks and writing unit tests that will check to see that the program accurately accomplishes the task using Test Driven Development. They will then write the program that satisfies their own unit tests. Students will learn to apply the constructs of the C programming language to create programs.

Students will learn to apply these programming techniques: Structure variables, initialization, structure assignment, nested structure, structures and functions, structures and arrays: arrays of structures, structures containing arrays, unions, Break, Continue and Goto, Type Conversion; Enumerations; Macros. Students will be able to use these techniques to develop programs

Section-D

Memory Management and Abstraction

During the final quarter, students will be introduced to dynamic memory allocation and dynamic data structures including: dynamic arrays. They will consolidate their ability to use the C programming techniques they have learned in the earlier sections.

Address operators, pointer type declaration, pointer assignment, pointer initialization, pointer arithmetic, functions and pointers, Arrays and Pointers, pointer arrays, pointers and structures, dynamic memory allocation,

Software Configuration Management, Modules, CUnit, GIT, SCRUM, MAKE. Dynamic Memory Allocation.

LIST OF EXPERIMENTS:

1. Scratch : Covering Concepts of
    I.   Sequential Statements
    II. Variables
    III. Blocks
2. Unix Commands: pwd, mkdir, cd, ls, less, touch, cp,move, cat, rm, rmdir –r etc.
3. Moving to C Using nano and gcc.
4. Project on Calculator Using Agile Methodology, Nano, Cunit, Git, Scrum , Agile Methodology,
  Nano, Gcc, Make. Covering Conepts :
    I.   Statements
    II. Functions
    III. Arrays
    IV. Structures
    V.   Pointers
    VI. File Handling.

Books
1. The C Programming Language, Brian Kernighan and Dennis Ritchie
2. The Unix Programming Environment
3. Pro Git

Help Pages
1. Eclipse C/C++ Development Guide

Wikipedia Pages
1. Test-driven development, http://en.wikipedia.org/wiki/Test-driven_development
2. Unit testing, http://en.wikipedia.org/wiki/Unit_testing

Tool Web Sites
1. Eclipse, https://eclipse.org/users/
2. Git, http://git-scm.com/

3. GCC, https://gcc.gnu.org/onlinedocs/gcc-4.9.3/gcc/
4. Make
5. Unix

Web tutorials
1. Harvard's CS50, https://courses.edx.org/courses/HarvardX/CS50x3/2015/info

Course Title/Code	Overview Of Data Science & Machine Learning **(CSH101B-T)**
Course Type:	Domain Core
Course Nature:	Hard
L-T-P-O Structure	3-1-2-0

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	**100%**

Section A: Overview of DS & ML:

Foundations of DSML: Data Basics, Data omnipresent, Sources of data, Introduction Data Science, History of Data Science, Types of data, Data explosion, Increase in Storage Capacities, Data Processing Abilities, Emerging Data Formats, Data Availability, Data Classification, Organization of structured data, Structured data, Semi-structured data, Comparison Types, Data essentials, Know the history, How Big is Data, Sources of Big Data, Characteristics of Big Data

Basic Statistical Concepts: Introduction to Statistics, Classification of Statistical Methods, Descriptive Statistics, Inferential Statistics, Scale of Measurements (Nominal, Ordinal, Ratio and Interval), Nominal Scales, Nominal Scales, Ratio Scales, Mean, Median, Mode, Measures of Variability/Spread, range, Quartiles and Interquartile Range, Standard Deviation (SD), Measures of Shape, Skewness, Kurtosis.

Section B: Probability Theory: Definitions of probability theory, independent events, mutually exclusive events, conditional probability, Baye's Theorem, Discrete probability distribution (Poisson Distribution, Bernoulli Distribution, and Binomial Distribution), Continuous probability distribution, normal distribution, Covariance and Correlation.

Section C Matrices: Elementary transformations, Elementary matrices, inverse using elementary transformations, Rank of a matrix, Normal form of a matrix, Linear dependence and independence of vectors, Consistency of linear system of equations, Eigen Values and Eigen vectors, Properties of Eigen values (without proof), Cayley Hamilton theorem, Diagonalization of a matrix.

Section D: Linear Algebra: Introduction to linear algebra, vector space, basis, dimension, Linear Transformation, Orthogonal transformation, Orthogonal Matrix, Singularity of Matrix, Matrix factorization and types like LU, QR and SVD.

Course Title/ Code	ENGINEERING DRAWING (MEW102B)
Course Type:	Core (Allied)
Course Nature:	WORKSHOP
L-T-P-O Structure	(0-0-3-0)

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	**100%**

Section A

Introduction to Engineering Drawing: Principles of Engineering Graphics and their significance, usage of Drawing instruments

Introduction to Computer Aided Drafting and Design, Instrument Drawing Techniques

Section B
Drawing Management/File Types, Design Processes and Methods, Sketching

Section C
Orthographic Projection/Multiview, Geometric Constructions, Dimensioning and Tolerancing

Section D

Three-dimensional Modeling, Section Views & Auxiliary Views

Text/Reference Books:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
4. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
5. Corresponding set of) CAD Software Theory and User Manuals

Professional Communication

Max. Marks	: 100
Internal	: 50
External (Written)	: 50

Course Outcome:

1 The employability of students will improve as they will be able to communicate effectively and become aware about the importance of the four pillars of Communication – listening, speaking, reading and writing.

2 The verbal and non- verbal communication skills of the students will improve.

3 They will be able to give presentations confidently and also speak fluently in various public speaking platforms like debate, declamation, and extempore. They will learn the effective use of body language.
4 They will be skilled in fluent reading
5 Students would be able to understand how they have to be professional in their grooming and attitude
6 They will be able to write effective letters/ application for professional purposes.

Unit 1: Listening Skills

    1.1 The art of listening
    1.2 Practicing listening skills
    1.3 Intensive listening Vs extensive listening
    1.4 Listening and note taking
    1.5 Exercises of active listening.

  Unit 2: Speaking Skills

    2.1 Speaking practice in various social situations
    2.2 Constructing small talks
    2.3 Delivering Presentations
    2.4 Body Language

Unit 3: Reading Skills

    3.1 The art of effective reading
    3.2 Overcoming common obstacles
    3.3 Types of reading – skimming, scanning, extensive reading, intensive reading
    3.4 Tips for effective reading.

Unit 4: Writing Skills

    4.1 Avoiding common errors in construction of sentences and language
    4.2 Practicing letter writing
    4.3 Email Etiquette

 Unit 5: Professional Grooming and Etiquette

    5.1 Professional grooming
    5.2 Personal Grooming
    5.3 Professional Etiquette
    5.4 Courtesy and communication discipline

Unit 6: Intercultural Communication

6.1 Cultural Sensitivity

6.2 Diversity in Inclusion

6.3 Avoiding Stereotype

6.4 Cross Cultural Communication

6.5 Racial Discrimination and factors constituting racial harassment

Text Books/Reference Books:

1. How to develop self- confidence and Influence people By Dale Carnegie; Edition 2018
2. Developing Writing Skills in English by J.K Gangal; Edition 2018
3. Everything about Corporate Etiquette by Vivek Bindra

CSU02- Semester-2

SEMESTER - 2												
SUBJECT CODES	SUBJECT NAME	PRE-REQUISITE	OVERLAPPING/EQUIVALENT COURSES	**OFFERING DEPARTMENT	*COURSE NATURE (Hard/Soft/ Workshop/ NTCC/Audit)	COURSE TYPE (Core/Elective)	L	T	P	O	NO. OF CONTACT HOURS PER WEEK	NO. OF CREDITS
MAH104B-T	DISCRETE MATHEMATICS	NIL	NA	MA	HARD	CORE	3	1	0	0	4	5
MAH104B-P	DISCRETE MATHEMATICS LAB						0	0	2	0	2	
PHH101B-T	QUANTUM MECHANICS FOR ENGINEER	NIL	NA	PH	HARD	CORE	3	1	0	0	4	5
PHH101B-P	QUANTUM MECHANICS FOR ENGINEER LAB						0	0	2	0	2	
CSH108B-T	PYTHON PROGRAMMING	NIL	NA	CS	HARD	CORE	3	1	0	0	4	5
CSH108B-P	PYTHON PROGRAMMING LAB						0	0	2	0	2	
CSW102B	USER INTERFACE-I (HTML5,CSS,JAVA SCRIPT,JQUERY)	NIL	NA	CS	WORKSHOP	CORE	0	0	3	0	3	1.5

HLS104B /HLS103 B	PROFESSIONAL ENGLISH BASIC/ PROFESSIONAL ENGLISH ADVANCE	NIL	NA	ED	SOFT	ELECTI VE	2	0	2	0	4	3
CHH137	ENVIRONMENTAL STUDIES	NIL	NA	CH	AUDIT	CORE	2	0	0	2	2	0
CDS102 B	PROFESSIONAL COMMUNICATION-I I	NIL	NA	CDC	SOFT	CORE	0	0	1	0	1	0.5
TOTAL (L-T-P-O/CONTACT HOURS/CREDITS)							**13**	**3**	**11**	**2**	**27**	**20**

Detailed Syllabus

CSU02- Semester-2

Course Title	**Discrete Mathematics** (MAH104B-T & P)
Course Type	Core (Allied)
Course Nature	Hard
L-T-P structure	3-1-2
Objective	. Throughout the course, students will be expected to demonstrate their understanding of Discrete Mathematics by being able to do each of the following: 1. Use mathematically correct terminology and notation. 2. Construct correct direct and indirect proofs. 3. Use division into cases in a proof. 4. Use counterexamples. 5. Apply logical reasoning to solve a variety of problems.

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	**100%**

SECTION – A

Sets, Relation and Function: Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation

POSET and Lattices; Partial orderings, POSETS, Totally Ordered Set, Dual Order, Hasse Diagram, Lexicographic Ordering, Well-Ordering Theorem, Lattices and their properties, Bounded Lattices, Sub Lattices, Direct Products.

SECTION – B

Counting Techniques: Principles of Mathematical Induction: The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic. Basic counting techniques-inclusion and exclusion ,pigeon-hole principle.

Propositional Logic: Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers.

SECTION – C

Boolean algebra: Introduction to Boolean algebra and Boolean functions, Different representations of Boolean functions, Application of Boolean functions to synthesis of circuits. Karnaugh maps.

Algebraic Structures and Morphism: Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields (Definition and examples only

SECTION – D

Graphs and Trees: Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Colouring, Colouring maps and Planar Graphs, Colouring Vertices, Colouring Edges, List Colouring, Perfect Graph, definition properties and Example, rooted trees, trees and sorting, weighted trees and prefix codes, Bi-connected component and Articulation Points, Shortest distances.

DISCRETE MATHEMATICS LAB (MAH104-P)

LAB EXERCISE:

1. Introduction to programming.

2. Programming with control flow, i.e., for-loop, if-else-end etc.

3. Creation of user defined functions.

4. To use the set operation, i.e. union, intersection, Cartesian product etc.

5. Use of Boolean logics

Mini Project

Objective: Mini Project encourage students to explore and strengthen the understanding of subject through practical application of theoretical concepts. It also helps students to boost their skills and widen their horizon of thinking.

Students are required to identify an application of the given topics in the real-life problems by using discrete mathematics concepts theory. Students can work individually or in a group of 2 & 3. Some suggested topic for mini project are

1. Application of Graph theory in Physics

2. Application of Graph theory in Chemistry

3. Application of Graph theory in Signal Processing

4. Application of Graphs in Networking

5. Applications of Boolean algebra in switching circuit

6. Application of Kruskal's and prim's algorithm in real life problems.

7. Application of Boolean algebra in computer science.

8. Routing problems (e.g. Hamiltonian paths, travelling salesman problem)

9. Graph colorings applications (Chromatic Number, chromatic polynomial)

10. Traffic management using graph algorithm

11. Job Assignment problem. … etc

RECOMMENDED BOOKS:

Text books:

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw – Hill

2. Susanna S. Epp, Discrete Mathematics with Applications,4th edition, Wadsworth Publishing Co. Inc.

3. C L Liu and D P Mohapatra, Elements of Discrete Mathematics: A Computer Oriented Approach, 3rd Edition by, Tata McGraw – Hill.

4. M.K. Sen (Author), D.S. Malik (Author), Discrete Mathematics: Theory and Applications, Cengage.

Reference books:

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and Its
   Application to Computer Science", TMG Edition, Tata McGraw-Hill

2. Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press. Schum's
   Outlines Series, Seymour Lipchitz, Marc Lipson,

3. Discrete Mathematics, Tata McGraw - Hill

Course Title/ Code	Quantum mechanics for engineers (PHH101-T&P)
Course Type	Core (Allied)
Course Nature	Hard
L-T-P-O Structure	(3-1-2)
Objectives	1. To apply the concepts of quantum phenomena on physical systems. 2. To apply quantum mechanics on one and three dimensional physical problems. 3. To understand the basic concepts of quantum computing.

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	**100%**

Section A

Introduction to Quantum mechanics: Qualitative description of black body radiation, Compton effect and photo-electric effect. Uncertainty principle. Wave nature of Particles, phase and group velocity, Time-dependent and time independent Schrodinger equation for wavefunction, Born interpretation, probability current, Expectation values. Mathematical Preliminaries and introduction to quantum mechanics: Wave nature of particles and the Schrodinger equation. Complex numbers, Linear vector spaces, inner product, operators, eigenvalue problems, Hermitian operators.

Section B

Applications of Schrodinger equation (one dimensional): Solution of stationary-state Schrodinger equation for one dimensional problems– particle in a box, particle in attractive delta-function potential, linear harmonic oscillator. Numerical solution of stationary-state Schrodinger equation for one dimensional problems for different potentials. Scattering from a potential barrier and tunneling; related examples like alpha-decay, fieldionization and scanning tunneling microscope (qualitative description)

Section C

Applications of Schrodinger equation (Three dimensional): Three-dimensional problems: particle in three dimensional box and related examples, Angular momentum operator, Rigid Rotor, Hydrogen atom ground-state and orbitals, interaction with magnetic field and spin, Numerical solution stationary-state radial Schrodinger equation for spherically symmetric potentials.

Section D

Introduction to Quantum Computing: Difference between conventional and quantum computing, Mathematical Preliminaries to Quantum Computing: notation, Matrix Product, Kronecker Product, Qubits and quantum state, Quantum Gates, Basis states and superposition, Product states and entanglement, Notation for quantum circuits.

List of Experiments

1. Photoelectric effect experiment
2. Frank-Hertz experiment
3. Hall effect
4. Atleast 4-5 experiments using computer, based on the syllabus.
5. Black body radiation.
6. Tunneling diode characteristic.
7. Ultra Thin film characteristic.

Text Books

1. David Griffiths, Introduction to Electrodynamics
2. Quantum Physics by Ishwar singh Tyagi (Pearson Publication)

Reference Books

1. Halliday and Resnick, Physics
2. W. Saslow, Electricity, magnetism and light

Course Title/ Code	USER INTERFACE-I (CSW102B)
Course Type:	**Elective**(Departmental)
Course Nature:	Workshop
L-T-P-O Structure	(0-0-3-0)
Objectives	Student will be able to design a website.

Syllabus	Sections	Weightage
	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

INTRODUCTORY CONCEPTS: What Is HTML5, Structure of a Web Page: HTML5 DOCTYPE, Page Encoding, HTML5 Markup, New And Updated Elements, Structural Elements(html, head, body, div, br, hr, p, text formatting, text styles, layouts, marquee, lists: ordered, unordered and definition lists,), New Attributes, Deprecated Elements And Attributes.

HTML 5.0 Form, Graphics & Media: HTML5 DOM, Form: new input types & attributes, form validation, HTML canvas and SVG: Drawing shapes, Text & images, working with pixels, Embedding media**:** Audio and Video based On Plug-in, New Audio/Video Markup, Attributes and Methods, Audio/Video Events & Controls, Plug-ins in HTML inserting YouTube videos.

Section-B

CSS & CSS3: Introduction to CSS, Syntax, Selectors, Pseudo classes, Applying CSS to backgrounds, Text, Fonts, Links, Lists, Tables, Box Model: Border, Margin, Padding, Dimension, Display, Positioning, Align, CSS to Images and image Opacity, CSS Media Types, CSS Attr Selectors.

Section-C

CSS3: Introduction**,** Rounded Corners, Border Images, Backgrounds, Colors, Gradients, Shadows, Fonts and text effects, 2D transforms, 3D Transforms, Transitions & Animations.

JAVASCRIPT: Advantages of JavaScript; writing JavaScript into HTML; Attaching an External JavaScript File, Working with Data Types and Variables, operators and expressions; arrays.

Section-D

JAVASCRIPT: Functions in JavaScript: Creating & Calling Functions, Sending Parameters to a Function; condition checking, loops, If Structure, If Else Structure, For Loop, While Loop, dialogue boxes, Event Handling.

List of labs:

1. HTML5.0 Basic Tags

   2. HTML5.0: DOM & Forms

   3. HTML5.0: Canvas &SVG

   4. HTML5.0: Plugins

   5. CSS

6. CSS

7. CSS

8. CSS

9. CSS

10. Javascript

11. Javascript

12. Javascript

13. Javascript

14. Javascript

15. Minor Project

Text Books:
1. Pro HTML5 and CSS3 Design Patterns Paperback – 2012 by Dionysios Synodinos, Michael Bowers, Victor Sumner

2. "Programming JavaScript Applications: Robust Web Architecture with Node, HTML5, and Moderns JS Libraries"

3. Dive into HTML5 by Mark Pilgrim.

Reference Book:
1. "JavaScript for Kids: A Playful Introduction to Programming" by Nick Morgan,.

2. HTML5 Guidelines for Web Developers by Klaus Förster.

Course Title/Code	Python Programming (CSH108B-T)
Course Type:	Domain Core
Course Nature:	Hard
L-T-P-O Structure	3-1-2-0

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%

	TOTAL	100%

UNIT I Setting up the Python Environment

Compiler vs. Interpreter, Statically vs. Dynamically Typed Languages, Introduction to Python, Installing Python, Anaconda, Jupyter Notebook, Spyder, Components and Versions of Python, Difference between Python 2 and Python 3, Python Distributions

UNIT II Programming with Python

Python REPL,Variables, control structures, functions and objects, First-class functions, immutable data, strict and non-strict evaluation, Recursion instead of an explicit loop state, Functions, iterators, and generators, Writing pure functions, functions as first-class objects, Using strings, tuples and named tuples, Using lists, dicts, and sets, The itertools module,.Best practices and clean coding,.Reading data files into Python, writing files,.Introduction to Python libraries

UNIT III Data Preprocessing

Introduction,Introduction to Pandas and Basic Concepts of Pandas, Data Cleaning and Preparation, Handling Missing Data, Filtering out Missing Data, Filling in Missing Data, Data Transformation, Removing Duplicates, Transforming Data Using a Function or Mapping, Replacing Values, Renaming Axis Indexes, Discretization and Binning,Detecting and Filtering Outliers, Permutation and Random Sampling, String Manipulation, Feature Engineering

Unit IV Statistical Modeling

Derived Variables, Basic Exploratory Data Analysis, Methods for EDA and Examples, Statistical Modeling, Curve Fitting: Linear Regression, Nonlinear Regression

Python Programming Lab

List of Programs

1. Setting up the Python Environment using Anaconda IDE : Know Jupyter & Spyder
2. Write a program to perform Functions in Python
3. Write a program in Python First Class Functions & Immutable Data
4. Write a program in Python exploring Iterators
5. Write a program in Python exploring Generators
6. Work in Python using Collections
7. Write a program in Python to perform Higher Order Function-I
8. Write a program in Python to perform Higher Order Functions-II
9. Write a program in Python to perform File Operation in Python
10. Write a program in Python to perform Data Preprocessing
11. Write a program in Python to perform Exploratory Data Analysis
12. Write a program in Python to actuate Curve Fitting

Course Learning Outcomes (CLOs):-

On completion of this course, the students will be able to:-
1. Get hands-on programming experience.
2. Learn statistical implementations
3. Carry out exploratory data analysis

Course Title/ Code	Professional English-Advance (HLS103B)
Course Type	Core (Allied)
Course Nature	Soft
L-T-P-O Structure	(2-0-2)
Credits	3
Objectives	The students (A) will be able to articulate (B) communication skills and develop talent (C) for increased understanding of corporate requirement (D).

Pre requisites: Knowledge of fundamental grammar along with **LSRW** (**L**istening, **S**peaking**, R**eading & **W**riting).

Learning Outcomes: Course Learning Outcomes: At the end of the semester the students will be able:

- To communicate articulately.
- To show the spirit of cohesiveness and art of collaborative approach through activities.
- To exhibit the substantive writing skills.
- To demonstrate the procedure of debating skills.
- To display the developed critical aptitude.

	UNIT	WEIGHTAGE
	I	30%
	II	20%
SYLLABUS	III	25%
	IV	25%
	TOTAL	100%

Course Outline:

Section – A

Lexis & Semantics: Vocabulary Building: The Concept of Word Formation, Root Words from Foreign Languages and their use in English, and Standard abbreviations.

Sentence: Parts and Kinds, Simple, Compound & Complex Sentences, Sentence Structures, Use of Phrase & Clause in Sentences.

Section – B

Oral Communication: Importance of Speech Sounds, Organs of Speech, Vowel Sounds, Consonant Sounds, IPA Symbols, Phonetic Transcription, Intonation, Word Stress, Sentence Stress, Pronunciation, Listening Comprehension, Speech Training through Everyday Situations, Conversations & Dialogues, Interviews.

Section – C

Presentation Skills: Communication, Process of Communication, Basic forms of Communication, Barriers

& Filters of Communication, Body Language and Paralanguage, Gestures and Postures, Kinesics, Proxemics, Importance of Body Language in Presentation, Etiquette of the Telephone Handling and Business Meetings, Hearing and Listening, Essentials of Effective Listening, Importance of Effective Listening, Visual Presentation – How to prepare slide presentation, Formal Presentation.

Section – D

Technical Writing: Nature & Style of Sensible Writing, Writing Introduction & Conclusion, Creating Coherence, Organizing Principles of Paragraphs in Documents, Techniques of Writing Precisely, Writing Practices: Comprehension, Paraphrasing, Essay Writing & Importance of Proper Punctuation.

Lab Activities

1. Exercises based on Grammar
2. Exercises based on Semantics
3. Telephonic and Face-to-Face Communication
4. Listening to Understand (Hearing vs. Listening)
5. Business Letters
6. Reading/Listening Comprehension
7. Essay Writing Session
8. Precis Writing Session
9. Role Plays
10. Business QUIZ based on Lexis and Semantics
11. Presentation
12. Developing Outlines

Suggested Text Book Reading:

CIEFL, Hyderabad. *Exercises in Spoken English Parts I-III*. Oxford University Press.

Koneru, Aruna. *Professional Communication*. Mcgraw Hills Education Pvt. Ltd.

Kumar, Sanjay and Pushpa Lata. Oxford University Press, 2011. Print.

Lyons, Liz Hamp and Ben Hearsly. Study Writing. Cambridge University Press. 2006. Print.

Swan, Michael. *Practical English Usage*. OUP, 2014. Print.

Wood, F T. Remedial English Grammar. Macmillan, 2007. Print.

Zinsser, William. *On Writing Well*. Harper Resource Book, 2006. Print.

Subhrmania, T. Bala. A Textbook of English Phonetics for Indian Students.: Macmillan.

R C Sharma & Krishna Mohan. Communication. McGraw Hill Education, Chennai, 2017.

Effective Technical Communication. M Ashraf Rizvi. McGraw Hill Education, Chennai, 2018.

Course Title/ Code	Professional English-Basic

	(HLS104B)
Course Type	Core (Allied)
Course Nature	Soft
L-T-P-O Structure	(2-0-2)
Credits	3
Objectives	The students (A) will be able to imbibe (B) the basics of communication skills & English Language and literature (C) by understanding the need of industry (D).

Pre-requisite:

Knowledge of elementary grammar and basic nuances of oral and written English communication skills.

Course Learning Outcomes: At the end of the semester the students will be able:

- To demonstrate the basic skills of effective communication.
- To build an elementary understanding of form, meaning and use of words in varied discourses.
- To equip with fundamental writing skills.
- To show the essentials of debating skills.
- To exhibit creative thinking.

	UNIT	WEIGHTAGE
SYLLABUS	I	25%
	II	25%
	III	25%
	IV	25%
	TOTAL	100%

Course Outline:

Section – A

Communication: Communication: Introduction to Business Communication, Basic forms of communication – Verbal & Non-Verbal Communication, Process of Communication, Principles of Effective Communication, 7 Cs of Communication, Media of Communication, Types of Communication, Barriers of Communication, Formal and Informal Communication Network, Grapevine Communication, Miscommunication, Steps for improving communication, Impact of cross-cultural communication.

Section – B

Grammar: Parts of Speech, Subject-Verb Agreement, Tenses, Sentence: Kinds & Parts, Active & Passive Voices, Direct & Indirect Narration, Spotting the Errors.

Section – C

Lexis: Homonyms, Homophones, Homographs, Words often confused, One word Substitutes, Synonyms and Antonyms, Foreign Words, Phrasal Verbs & Idioms and Phrases.

Section – D

Technical Writing: ABC of Writing, 7 Cs of Writing Skills, Notice Writing, Situation Writing, Précis Writing, Report Writing, Email Writing & Email Etiquettes, Paraphrasing, Comprehension, Essay Writing.

Lab Exercises/Activities

1. Exercises based on Communication
2. Exercises based on Grammar
3. Exercise on Sentence
4. Spotting the Errors
5. Reading/Listening Comprehension
6. Essay Writing Session
7. Report Writing and Email Writing
8. Direct & Indirect Narration
9. Active & Passive Voices
10. Tense
11. Paraphrasing
12. Presentation

Suggested Text Book Reading:

Wren and Martin: *High School English Grammar and Composition A Text Book for Indian Students*. S.Chand and Co. ed. Paperback 2018.

A Practical Course for Developing Writing Skills in English. J K Gangal: PHI Learning Pvt.

McMillan English Check your Vocabulary. MaCarthy: Foundation Books, OUP, 2007.

English Grammar, Competition and Correspondence. M.A. Pink and A.C. Thomas: S. Chand and Co.

Course Title/ Code	**Environmental Science (CHH137) T**
Course Type	Audit (Allied)
Course Nature	Soft
L-T-P-O Structure	(2-0-0-2)
Objectives	1. to make the student identify the areas of environmental degradation 2. to make the student identify the impact of environmental degradation on the surroundings 3. To apply the concepts such as sustainable development in real life. 4. To help the engineering student to correlate his field with various aspects of environment. .

	Sections	Weightage
Syllabus	A	28%
	B	28%
	C	28%
	D	16%
	TOTAL	**100%**

SECTION-A

Unit 1: Multidisciplinary nature of environmental studies

Definition, scope and importance, Need for public awareness (OC)

Unit 2: Renewable and Non-Renewable Resources

Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.

Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

Energy resources: Growing energy needs, renewable and non-renewable energy sources, **use of alternate energy sources. Case studies (OC).**

Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
Role of an individual in conservation of natural resources. (OC)

Equitable use of resources for sustainable lifestyles

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SECTION-B

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Unit 3: Ecosystems

Concept of an ecosystem. Structure and function of an ecosystem.

- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the
- Following ecosystem:-
    - Forest ecosystem
    - Grassland ecosystem
    - Desert ecosystem
    - **Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) (OC)**

Unit 4: Biodiversity and its conservation

• **Introduction** – Definition: genetic, species and ecosystem diversity.
• Biogeographical classification of India
- **Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic And option values (OC)**
    - Biodiversity at global, National and local levels.
    - India as a mega-diversity nation
    - Hot-sports of biodiversity.
    - Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.
    - Endangered and endemic species of India
    - **Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity (OC).**

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SECTION-C

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Unit 5: Environmental Pollution

Definition

• Cause, effects and control measures of:-
- • Air pollution
- • Water pollution
- • Soil pollution
- • Marine pollution
- • Noise pollution
- • Thermal pollution
- • Nuclear hazards
- • Solid waste Management: Causes, effects and control measures of urban and Industrial wastes. (OC)
- • Role of an individual in prevention of pollution. (OC)
- • Pollution case studies. (OC**)**
- • Disaster management: floods, earthquake, cyclone and landslides.

Unit 6: Social Issues and the Environment

• From Unsustainable to Sustainable development
• Urban problems related to energy
• Water conservation, rain water harvesting, watershed management
• Resettlement and rehabilitation of people; its problems and concerns. Case Studies
• Environmental ethics: Issues and possible solutions.
• Climate change, global warming, acid rain, ozone layer depletion, nuclear Accidents and holocaust. Case Studies (OC).
• Wasteland reclamation.
• Consumerism and waste products.
• Environment Protection Act.
• Air (Prevention and Control of Pollution) Act (OC)
• Water (Prevention and control of Pollution) Act (OC)
• Wildlife Protection Act
• Forest Conservation Act
• Issues involved in enforcement of environmental legislation (OC).
• Public awareness (OC).

SECTION-D

Unit 7: Human Population and the Environment

• Population growth, variation among nations.
• Population explosion – Family Welfare Programme

• Environment and human health.

• Human Rights (OC).
• Value Education (OC).
• HIV/AIDS (OC).
• Women and Child Welfare (OC).
• Role of Information Technology in Environment and human health.
• **Case Studies (OC).**

*OC = Outcome component

Field work

- Visit to a local area to document environmental assets river/ forest/grassland/hill/mountain
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc.
- Any socially relevant problem identification and proposing its possible solution

NOTE: Manav Rachna has adopted five villages, where students would be visiting, will identify the socially relevant issues and work on to provide possible solution.

Professional Communication

Max. Marks	: 100
Internal	: 50
External (Written)	: 50

Course Outcome:

1 The employability of students will improve as they will be able to communicate effectively and become aware about the importance of the four pillars of Communication – listening, speaking, reading and writing.

2 The verbal and non- verbal communication skills of the students will improve.

3 They will be able to give presentations confidently and also speak fluently in various public speaking platforms like debate, declamation, and extempore. They will learn the effective use of body language.
4 They will be skilled in fluent reading
5 Students would be able to understand how they have to be professional in their grooming and attitude
6 They will be able to write effective letters/ application for professional purposes.

Unit 1: Listening Skills

1.1 The art of listening
1.2 Practicing listening skills
1.3 Intensive listening Vs extensive listening
1.4 Listening and note taking
1.5 Exercises of active listening.

Unit 2: Speaking Skills

2.1 Speaking practice in various social situations
2.2 Constructing small talks
2.3 Delivering Presentations
2.4 Body Language

Unit 3: Reading Skills

3.1 The art of effective reading
3.2 Overcoming common obstacles
3.3 Types of reading – skimming, scanning, extensive reading, intensive reading
3.4 Tips for effective reading.

Unit 4: Writing Skills

4.1 Avoiding common errors in construction of sentences and language
4.2 Practicing letter writing
4.3 Email Etiquette

Unit 5: Professional Grooming and Etiquette

5.1 Professional grooming
5.2 Personal Grooming
5.3 Professional Etiquette
5.4 Courtesy and communication discipline

Unit 6: Intercultural Communication

6.1 Cultural Sensitivity

6.2 Diversity in Inclusion

6.3 Avoiding Stereotype

6.4 Cross Cultural Communication

6.5 Racial Discrimination and factors constituting racial harassment

Text Books/Reference Books:

1. How to develop self- confidence and Influence people By Dale Carnegie; Edition 2018
2. Developing Writing Skills in English by J.K Gangal; Edition 2018
3. Everything about Corporate Etiquette by Vivek Bindra

CSU02- Semester-3

					SEMESTER - 3							
SUBJECT CODES	SUBJECT NAME	PRE-REQUISITE	OVERLAPPING/EQUIVALENT COURSES	**OFFERING DEPARTMENT	*COURSE NATURE (Hard/Soft/ Workshop/ NTCC/Audit)	COURSE TYPE (Core/Elective)	L	T	P	O	NO. OF CONTACT HOURS PER WEEK	NO. OF CREDITS
MAH201B-P	CALCULUS, PROBABILITY & STATISTICS	NIL	NA	MA	HARD	CORE	3	1	0	0	4	5
MAH201B-P	CALCULUS, PROBABILITY & STATISTICS LAB						0	0	2	0	2	
CSH206B-T	OPERATING SYSTEM	NIL	NA	CS	HARD	CORE	3	1	0	0	4	5

Code	Course						L	T	P	O	Contact Hours	Credits
CSH206B-P	OPERATING SYSTEM LAB						0	0	2	0	2	
CSH103B-T	DATA STRUCTURES & ALGORITHMS	NIL	NA	CS	HARD	CORE	3	1	0	0	4	5
CSH103B-P	DATA STRUCTURES & ALGORITHMS LAB						0	0	2	0	2	
CSH212B-T	SUPERVISED LEARNING	NIL	NA	CS	HARD	CORE	3	1	0	0	4	5
CSH212B-P	SUPERVISED LEARNING LAB						0	0	2	0	2	
EDS288/EDS289/ EDS235	APP. PHILOSOPHY/APP. PSYCHOLOGY/ APP. SOCIOLOGY	NIL	NA	ED	SOFT	ELECTIVE	1	0	2	0	3	2
MOOC	NPTEL COURSES FROM MOOC											
FLS101/FLS102/ FLS103	FOREIGN LANGUAGE (SPANISH-I/ GERMAN-I/ FRENCH-I)	NIL	NA	FL	AUDIT	ELECTIVE	1	1	0	0	2	0
MOOC	NPTEL COURSES FROM MOOC											
CDO201	PROFESSIONAL COMPETANCY ENHANCEMENT-I	NIL	NA	CDC	OUTCOME BASED	CORE	0	0	1	0	1	0.5
RDO501	INTRODUCTION TO RESEARCH	NIL	NA	RESEARCH	OUTCOME BASED	CORE	0	0	0	1	1	0.5
	TOTAL (L-T-P-O/CONTACT HOURS/CREDITS)						14	5	11	1	31	23

Detailed Syllabus

CSU02- Semester-3

Course Title	Calculus, Probability and Statistics (MAH201B-T & P)
Course Type	Core (Allied)
Course Nature	Hard
L-T-P structure	(3-1-2)

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	**100%**

Section A

Differential Calculus: Curvature (Cartesian, Parametric and Polar coordinates), Curvature at origin, Centre of curvature, Evolutes and involutes, Higher order partial order derivative, Homogeneous function and Euler's theorem, Differentiation of composite functions, Taylor's theorem for function of several variables.

Section B

Integral Calculus: Applications of definite integrals to evaluate surface areas and volumes of revolutions, Double integration, properties of double integration, Evaluation of double integral (Cartesian and Polar coordinates), Change of variables, change of order, Area and volume.

Section C

Joint Probability Distributions: Joint cumulative distribution function and its properties, Joint probability density functions, Marginal and conditional distributions, Expectation of function of two random variables, Conditional expectations, Independent random variables. Covariance, Correlation coefficient, Joint moment generating function (jmgf) and calculation of covariance (from jmgf), linear regression for two variables

Section D

Applied Statistics: Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations. Small samples: Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

Textbooks/References:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
3. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
5. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
6. Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.
7. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

8. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

9. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.

10. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.

11. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

12. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.

13. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.

Course Title/ Code	Operating Systems (CSH206B) T & P
Course Type:	Core
Course Nature:	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	Students shall be able to learn the conceptual design, functional architecture and services of an operating system to use the computer resources efficiently.

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

CO1: To **interpret** the basics of the Operating System (OS).
CO2: To **apply** the learned algorithms in relation to real problem scenario.
CO3: To **analyze** several concepts, techniques, algorithms and Operating Systems (OS).
CO4: **Application, analysis and exploration** of the learned aspects, concepts and prospects.

Section-A

Introduction: Operating system and functions, Classification of Operating systems- Batch, Interactive, Time sharing, Real Time System, Multiprocessor Systems, Multiuser Systems, Multithreaded Systems, Operating System Structure- Layered structure, System Components, Operating System services, Reentrant Kernels, Monolithic and Microkernel Systems.

Processes and Threads : Process Concept, Process Scheduling, Operations on Processes, Cooperating Processes, Interprocess Communication, Communication in Client-Server Systems. CPU Scheduling: Scheduling criteria, scheduling algorithms (First Come First Serve (FCFS), Shortest-Job-First (SJF).

Section-B

CPU Scheduling: Priority Scheduling, Round Robin (RR), multi-processor scheduling, Real-time scheduling. Multithreading Models, Threading Issues, Pthreads Basic Concepts.

Process Synchronization: Co-operating Process, Inter-Process Communication, Critical region, Semaphores. Classical Problems of Synchronization, Deadlocks: Overview, Methods of Handling Deadlocks, Deadlock Prevention, Avoidance, Detection and Recovery.

Section-C

Memory Management: Logical & Physical Address Space, swapping, contiguous and non-contiguous memory allocation, paging and segmentation techniques, segmentation with paging; virtual memory management - Demand Paging & Page- Replacement Algorithms; Demand Segmentation. File System: Types of files and access methods, directory structures, various allocation methods, disk scheduling and management and its associated algorithms, Introduction to distributed file system.

Section-D

Protection :Goals of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Revocation of Access Rights, Language-Based Protection, Capability-Based Systems, The Security Problem , User Authentication , Program Threats, System Threats, Securing Systems and Facilities.:: I/O Systems: Hardware, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O to Hardware Operations, STREAMS, Performance, Disk Structure, Disk Scheduling, Swap-Space Management.

List of Experiments:

1. Write programs using the following system calls of UNIX operating system fork, exec, getpid, exit, wait
2. Write programs using the following system calls of UNIX operating system: close, stat, opendir, readdir
3. Write programs using the I/O System calls of UNIX operating system (open, read, write, etc).
4. Write C programs to simulate UNIX commands like ls, grep.
5. Given the list of processes, their CPU burst times and arrival times. Display/print the Gantt chart for FCFS and SJF. For each of the Scheduling policies compute and print the average waiting time and average turnaround time.
6. Given the list of processes, their CPU burst times and arrival times. Display/print the Gantt chart for SJF. For each of the Scheduling policies compute and print the average waiting time and average turnaround time.
7. Given the list of processes, their CPU burst times and arrival times. Display/print the Gantt chart for Priority CPU scheduling. For each of the scheduling policies, compute and print the average waiting time and average turnaround time.
8. Given the list of processes, their CPU burst times and arrival times. Display/print the Gantt chart for Round robin CPU scheduling. For each of the scheduling policies, compute and print the average waiting time and average turnaround time.
9. Implement some Memory management schemes FIRST FIT
10. Implement some Memory management schemes BEST FIT.
11. Implement some Memory management schemes WORST FIT.
12. Implement any file allocation techniques Contiguous.
13. Implement any file allocation techniques Linked.
14. Implement any file allocation techniques Indexed.

Text Books:

1. Silberschatz, Galvin, and Gagne, "Operating System Concepts with Java," 7th Edition. *John Wiley & Sons*, Inc. 2007. ISBN: 0-471-76907-X
2. Harvey M Dietel ,"An Introduction to Operating System", Pearson Education

Reference Book:

1. William Stallings, "Operating Systems: Internal and Design Principles," 5th Edition. *Prentice-Hall*, Inc. 2005. ISBN: 9780131479548.
2. Andrew S. Tanenbaum and Albert S Woodhull, "Operating Systems Design and Implementation," 3rd Edition .*Prentice Hall*, 2006. ISBN: 9780131429383.

Course Title/ Code	*DATA STRUCTURES & ALGORITHMS (CSH103B) T & P*
Course Type:	*Core (Departmental)*
Course Nature:	*Hard*
L-T-P-O Structure	*(3-1-2-0)*
Objectives	*The course should assess how the choice of data structures and algorithm design methods impacts the performance of programs and choose the appropriate data structure and algorithm design method for a specified application.*

Syllabus	Sections	Weightage
	A	25%
	B	25%
	C	25%
	D	25%

	TOTAL	100%

Section-A

Data structures and Algorithms: Introduction to Data structure: Concept of data structure, choice of right data structures, types of data structures, Abstract Data types, Introduction to algorithms, how to design and develop an algorithm: stepwise refinement, algorithm analysis, complexity of algorithms

Arrays: Introduction, One Dimensional Arrays, two dimensional array, Multidimensional arrays, address calculation of a location in arrays operations defined: traversal, selection, searching, insertion, deletion, and sorting.

Searching: linear search, binary search, Sorting: selection sort, bubble sort, insertion sort, merge sort, quick sort.

Section-B

Pointers: Introduction to pointers, Pointer variables, Pointer and arrays, array of pointers, pointers and structures, Dynamic allocation. Linked Lists: Concept of a linked list, circular linked list, doubly linked list, operations on linked lists: traversal, selection, searching, insertion, deletion, and sorting, concepts of header linked lists. Applications of linkedlists.

Section-C

Stacks: Introduction to Stacks, array representation of stack, operations on stack: PUSH, POP, Evaluation of Expression: Concept of precedence and associatively in expressions, difficulties in dealing with infix expressions, Resolving precedence of operators and association of operands, postfix & prefix expressions, conversion of expression from one form to other form using stack (with & without parenthesis), Evaluation of expression in infix, postfix & prefix forms using stack. Recursion, Linked list representation of stack, Applications of stacks.

Queues: Queues, Circular queues, array representation of Queues, priority queues, dequeue, circular queue, operations on queue: insertion and deletion, Applications of Queues.

Section-D

Non-Linear Structures: Trees definition, characteristics concept of child, sibling, parent child relationship etc, binary tree: different types of binary trees based on distribution of nodes: complete binary tree, binary tree (threaded and unthreaded),operation on binary tree: insertion, deletion, searching and traversal of binary trees, traversing: Preorder, Postorder and Inorder, Introduction to binary search tree, operations and Time complexity on BST: insertion, deletion, searching, Introduction to AVL tree: Concept of balanced trees, balance factor in AVL trees, insertion into and deletion from AVL tree, balancing AVL tree after insertion and deletion, in B trees, Application of trees.

Graphs: Definition, Relation between tree & graph, directed and undirected graph, connected and disconnected graph, Representation of graphs using adjacency matrix and list, Depth first and breadth first traversal of graphs, Applications of Graph.

List of Experiments:

1. Programs on C language

2. Write a program on Linear search and Binary search Using C

3. Write a program to implement bubble sort, insertion sort, selection sort

4. Write a program to implement Merge sort, Quick sort

5. Programs on Link list

6. Programs on stack

7. Programs on queues

8. Programs on binary trees

• Traversal

• Insertion

• Deletion

9. Programs on binary search tree:

• Calculate the height of BST

• Calculate the number of leaf nodes

• Insertion

• Deletion

10. Programs on Graphs

• BFS

• DFS

11. Case studies on Trees and Graphs.

Text Books:

1. Data Structures with C by Seymour Lipschutz ,McGraw Hill Education(India) Private Limited.

2. Data Structures using C by A. K. Sharma, Pearson Publication.

3. Data Structures using C-Yashwant Kanetkar Publication.

Reference Books:

1. Data Structures using C by A. M. Tenenbaum, Langsam, Moshe J. Augentem, PHI Pub.

2. Data Structures and Algorithms by A.V. Aho, J.E. Hopcroft and T.D. Ullman Publisher.

Course Title/Code	Supervised Learning(CSH212 B-T&P)
Course Type:	Domain Core
Course Nature:	Hard
L-T-P-O Structure	3-1-2-0

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

UNIT I: Difference Between Supervised and Unsupervised Learning

Machine learning,why we need machine learning, machine learning process State the different types of learning: Supervised,unsupervised and reinforcement learning,, Detailing out on labeled data and its types,classification and regression models, unlabeled data and its types,clustering model; Gradient Descent- Overview,Gradient Descent, Finding a Minimum Using Gradient Descent, Estimating the Gradient, Using the Gradient Descent, Example, Loss Function, Different Loss Functions,

UNIT II: Regression Techniques

Regression Technique, Origin of Regression, Regression in Real World, regression concepts, Regression Types, Linear Regression Types, Linear Regression Variance, Co-Variance, Linear Regression Correlation Coefficient, OLS, R Squared, Goodness of fit, Linear Regression Using Gradient Descent, Gradient Descent Explained with an Example, Stochastic Gradient Descent, Cost Function –Partial Derivative, Testing Model Using Cross Validation, Cross Validation Types, regularized regression, Ridge Regression, lasso regression, L1 vs L2 Norm – Regression, Generalized Linear Regression, RANDOM COMPONENT OF A GLM

UNIT III: Classification Techniques- Decision Tress

Classification Technique, Decision Tree, Decision Tree Illustration using Sample Dataset, concept of homogeneity., entropy, Entropy Explained with Rainfall Example, plot of entropy versus the proportionsm, Information Gain, Algorithms to Create a Decision Tree, Gini Index, Truncation and Pruning, Decision Tree Working Methodology, Decision Tree Tuning Parameters

UNIT IV: Classification Techniques- Naïve Bayes

Naïve Bayes, bayes theorem., Example, Naïve Bayes Algorithm for Categorical Data, Popular Naive Bayes Classifiers, Types of Naive Bayes Classifier, Naïve Bayes for Text Classification, popular naive bayes classifiers, Naïve Bayes Algorithm, K Nearest Neighbour classification , Curse of Dimensionality, K-Factor, Implementation of KNN using Python

UNIT V Ensemble Methods

Ensemble Methods ,Why Ensemble?, Example, Methods for Constructing Ensemble, advantages and disadvantages of ensembling. Random Forest, Random Forest Example, Random Forest Use Case, Random Forest Algorithm,

Comparing other Models Accuracy, Bootstrapping and Bagging, Out of Bag Error, OOB Score Before Tuning, OOB and Hyper Parameter Tuning, Ensemble Model Using Majority Voting, Gradient Boosting, Weak Learner, Gradient Boosting Example, Moving towards XGBoost, Parameters of XGBoost

Supervised Learning Lab

List of Programs
1. Understanding the Learning Implementation on Jupyter Notebook
2. Using NumPy functions in Jupyter
3. Using Pandas in Jupyter
4. Using SciPy in Jupyter
5. Using Simple Linear Regression, calculate Gradient and Cost minimum, Along with line of best fit.
6. Understand Linear Regression and other regression techniques using house prices prediction dataset.
7. Understanding Decision tree with sample dataset.
8. KNN algorithm explained with Cancer Data. (Using Python)
9. Identifying optimal K value in K-means Clustering algorithm. (Using Python)
10. Random Forest algorithm explained with classification and Regression (Using Python)
11. Implement Gradient Boosting Machine using Python.
12. Understand Logistic Regression model using Iris dataset (using Python)

Course Title/Code	APPLIED PHILOSOPHY (EDS288)
Course Type	Elective (Allied)
Course Nature	Soft
L-T-P-O Structure	(1-0-2)
Objectives	To enable students to - confront the philosophical problems implicit in the experience of self, others and the society. - read critically the philosophy of influential philosophers with respect to society, Science and success in life - understand and apply concepts and theories of moral philosophy. - reflect philosophically and ethically on their own personal, professional and civic lives. -formulate for himself or herself a philosophy of life or world-view consistent with the objectives of liberal society.

Syllabus	Sections	Weightage
	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

SECTION A

INTRODUCTION TO PHILOSOPHY: Philosophy: Meaning, Nature and Scope, Practical uses of Philosophy, Branches of Philosophy.

SECTION B

THOUGHTS OF PHILOSOPHERS AND THEIR IMPLICATIONS: General Philosophy of John Dewey, Swami Vivekananda and Rabindra Nath Tagore**,** Philosophy of life and success: Steve Jobs, N.R. Narayana Murthi, Dr. A.P.J. Abdul Kalam and Muhammad Yunus, Philosophy of Science and technology- Francis Bacon and Martin Heidegger.

SECTION C

PHILOSOPHICAL PERSPECTIVES OF SOCIO-POLITICAL SCENARIO IN INDIA: Nature of Democracy and its implications, Meaning and requirements of National Integration, Universal Human Rights

SECTION D

PHILOSOPHICAL PERSPECTIVES OF RELIGIOUS SCENARIO IN INDIA: Secularism—its nature and implications, Moral Philosophy of religion with special reference to Hinduism, Jainism, Buddhism, Islam, Christianity, Sikhism. Religious pluralism and Religious tolerance.

Reference Books and Readings:

1. Bhatia, K. & Bhatia, B. (1974) The Philosophical and Sociological Foundations of Education. Delhi: Doaba House.
2. Brubacher, John. S. (1969). Modern Philosophies of Education, New Delhi: Tata McGraw-Hill
3. Dewey, J. (1966). Democracy in Education, New York: Macmillan.
4. Ferre, F.(1995). Philosophy of Technology. University of Georgia Press.
5. Gandhi, M. K. (1956). Basic Education. Ahmedabad, Navajivan.
6. Goel, A. & Goel S. L. (2005). Human values and Education. New Delhi: Deep and Deep Publications Pvt. Ltd.
7. Palmer, Joy A. et.al. (2001). Fifty major thinkers on education from confucious to Dewey. New Delhi: Rutledge.
8. Rajput, J.S. (2006). Human Values and Education. New Delhi: Paragon Publications.
9. Walia, J.S. (2011). Philosophical, Sociological and Economic Bases of Education.

LAB: (EDS288)

1. Prepare and present a report on 'philosophy of life' from the perspective of a young adult.
2. Quiz and interactive sessions on various philosophical perspectives of contemporary philosophers.
3. Organization of and participation in street plays /dramas/ declamation/ debates/ any other suitable activity on any theme of Philosophical perspectives of Socio-Political scenario in India.
4. Group discussions on any suitable topics concerning contemporary society like aggression among youth, Over-ambitiousness in young generation, misuse of democracy, implications of secularism etc. and to reflect upon different viewpoints.
5. Preparation of quotation boards to display quotes of great philosophers in the college premises.
6. Picture interpretation and philosophical reflection on social themes like juvenile crime, begging in India, Social networking etc.
7. Readings from the autobiographies and other publications of great philosophers e.g. 'Wings of Fire' followed by discussion session.
8. Showing Videos on Unique personalities: life and philosophies followed by reflection exercises.
9. Any other suitable activity.

Course Title/Code	Applied Psychology (EDS289)
Course Type	Elective
Course Nature	Soft
L-T-P-O Structure	(1-0-2-0)
Objectives	-To define psychology and its application across various fields.

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	**100%**

Section A

PSYCHOLOGY: ATTITUDE FORMATION

Psychology: Meaning, nature, Role of psychology across multi-disciplinary aspects, Introduction: Stereotypes, Prejudice, and Discrimination, Introduction: Attitude, Formation of attitude, Aptitude

Section B

PERSONALITY AND PERSONALITY DEVELOPMENT

Definition of personality and its characteristics, Trait approach to personality (Big five theory of personality), Jung's Theory of personality

Section C

SOCIAL PSYCHOLOGY

Introduction to social identity, social cognition, and social influence, social conflicts and its resolutions, Group dynamics: Introduction, formation, types of groups, cooperation, competition, and conflict in groups.

Section D

ORGANIZATIONAL PSYCHOLOGY

Organizational Psychology: Definition, fundamental concepts and importance, Introduction to job satisfaction, work motivation, and Stress Management. Introduction to teamwork and its benefits.

References Books and Readings:

1. Arrow, K. J. (1995). Barrier to Conflict Resolution. NY: W. W. Norton.
2. Bandra, A., & Walters, R. H. (1963). Social Learning and Personality Development. New York: Holt, Rinehart, & Winston.
3. Bandra, A. (1986). Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice- Hall, Inc.
4. Baron, R. A., Byrne, D. (1997). Social Psychology (8th Ed.). Boston, MA: Allyn & Bacon.

5. Baron, R. A. (2001). Psychology (5th ed.). London: Pearson.
6. Cialdini, R. B. (2001). Influence: Science and Practice (4th Ed.). Boston, MA: Allyn & Bacon.
7. Feldman, R. S. (2008). Essentials of Understanding Psychology. New Delhi: Tata McGraw Hill.
8. Friedkin, N. (1998). A structural theory of social influence. Cambridge: Cambridge University Press.
9. Gage, N. L., & Berliner, D. C. (1992). Educational Psychology (5th Ed.). Boston, MA: Houghton Mifflin Co.
10. Hall, C. S., Lindzey, G. & Campbell, J. B. (2004). Theories of Personality (4th Ed.). New York: Wiley.
11. Hunt, R. R., & Ellis, H. C. (2006). Fundamentals of Cognitive Psychology. New Delhi: Tata McGraw Hill.
12. McDavid, J. M., & Harari, H. (1994). Social Psychology: Individuals, Groups, and Societies. New Delhi: CBS Publishers.
13. Millward, L. (2005). Understanding Occupational and Organizational Psychology. London: Sage Publications.
14. Morgan, C. T., King, R. A., Weisz, J. R., & Schopler, J. (1993). Introduction to Psychology. (7th Ed.). New Delhi: Tata McGraw Hill.
15. Woolfork, A. E. (2014). Educational Psychology (12th Ed.). Boston: Allyn & Bacon.

LAB: (EDS289)

1. **The Sentence Completion test** to know the individual's personality and its related aspect.

2. A **Self concept Scale** to explore the major aspect of personality will be conducted.

3. **Multi variable Personality Inventory** will be conducted to explore the dimensions of personality.

4. **Eysenck Personality Test** will be conducted

5. To know different facet of personality a **Thematic Apperception Test** will be conducted.

6. **Socio-metric test** will be conducted to know the individual's social acceptance and group structure.

7. To explore the dimensions of personality **PIG Personality Test** will be administered.

8. To explore the multiple intelligence of students **My Preference test** is being conducted

9. Administration of **Cohen Perceived Stress** to know the level of stress among students and recording of the strategies to cope with it.

10. A **Career Aspiration Scale** will be conducted to identify different areas of aspirations.

11. **Self Reflection Activity**
    - Identify different stereotypes present in our Society and your views on them.
    - Write a brief note of any one attitude you desire to change and strategies to accomplish it.
    - Prepare a SWOT Analysis Chart to know your strengths, weaknesses, opportunities and threats.
    - A Brief account of your personality before and after the transaction of course content.

Course Title/Code	APPLIED SOCIOLOGY (EDS235)
Course Type	Elective (Allied)
Course Nature	Soft
L-T-P-O Structure	(1-0-2)

Objectives	1. To know and understand about the fundamental concepts of sociology and its applications.
	2. To develop the analytical skills of students about ways in which social processes affect our everyday lives.
	3. To understand the impact of various processes of social change and assess their impact on society.
	4. To understand and analyze the social cultural dynamics that contribute to transformation of Indian reality
	5. To study the various contemporary issues of society.
	6. To develop basic research skills in area of sociology.

Syllabus	Sections	Weightage
	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

Section A

Introduction and Applications of Sociology:
- Society, Community, Social Institutions, Social Groups, Introduction to Applied Sociology
- Sociology and Social Processes
- Sociology and Social Change
- Sociology and Social Problems
- Clinical Sociology

Section B

Sociological Processes:
- Social Stratification, Social Mobility and their impact on society
- Socialization, Agents of Socialization, Assessing the effects of Socialization
- Social Movements: Concept, Impact of Environmental Movements in India: Chipko Movement, Narmada Bachao Andolan

Section C

Processes and Issues of Social Change:
- Social Change: Westernization, Urbanization, Privatization, Globalization, Sustainable development
- Issues in urban development-Population, poverty, unplanned growth and ecological issues
- Conflict management:
  - Intergroup: Causes, Resolutions
  - Organizational Conflict, Conflict Management and Grievance Handling

Section D

Field Survey & Report Writing:
- Need, Meaning of Survey
- Types of Survey

- Steps in Conducting Survey
- Data Collection Methods
- Salient Features of Report Writing

LAB:

1. Showing Videos on the life and philosophies of Famous sociologists and to acquaint the students about their different theories
2. Preparation of quotation board with the help of displaying the pictures and quotes of famous sociologists
3. Choose a theme of your interest- for e.g., crime, technology environmental concerns or any other and look through the Sunday editorials of any national daily of the last 3 months to locate related articles.
4. Role Play: Gender issues in everyday life, students will form small groups and present skits to address this issue creatively; this will be followed by discussions.
5. Students may be given the assignment of taking pro-active role in initiating social change in a local field
6. Visit a shopping mall and observe the interaction between employees and customers/visitors. Identify themes based on your observation and prepare a questionnaire based on this experience.
7. Look at a set of published letters of Gandhi, Nehru, C.F. Andrews and Tagore etc. and identify key social issues that are discussed in the contents of the letters and prepare a report on it.
8. Students will be asked to write a short essay on the pressures they feel of the experience in performing masculinity or femininity, Presentations and discussions based around the essays.
9. Debate or discussion on "Is the family the site of love and care" or "Is the family democratic?"
10. Discuss the impact of modernization, industrialization and globalization on the day-today life.
11. Students may be asked to apply any applied research technique
12. Design a survey on factors effecting marriage choices of young people.
13. Any other suitable activity

References: Books and Readings

1. Andrew, W. (1997) Introduction to the Sociology of Development. New Jersey, Palgrave Macmillan.
2. Berg, L.B. (2001). Qualitative Research Methods for the Social Sciences (4th edition). Boston: Allyn and Bacon
3. Bhatia, H.(1970). Elements of Social Psychology. Bombay: Somaiyya Publications Pvt Ltd.
4. Bhattacharyya D.K (2009). *Organizational Behavior*, Oxford University Press, UK.
5. Dastupta Driskle(2007) : Discourse on Applied Sociology Volume-II, 2007
6. Desai, B Sonalde et al. (2010). Human Development in India: Challenges for a Society in Transition. OUP
7. Deshpande, S.(2003). Contemporary India: A Sociological View. New Delhi: Viking.
8. Hall R.H (2009). *Organizational Structures, Processes & outcomes, Asia*: Pearson Education Publications.
9. Hodegetts R M. (2009). *Organizational Behavior*, Macmillan.
10. Mc Michael.P. (1996). Development and Social change: A global perspective. California Thousand Oaks.
11. Merton, R and Nisbet, (1976) Contemporary Social Problems, New York: Harcourt, Brace and World.
12. Metha, S. (2009). Women and Social Change, Jaipur: Sage.
13. Michael Edwards (2011). Civil Society in India, edited The Oxford Handbook of Civil Society, Oxford, Oxford University Press
14. Mitra et.al. (2009). Democracy, Agency and Social Change in India, New Delhi: Sage
15. Pratt henry Fairchild(2009) : Outline of Applied Sociology, 2009
16. Ranjitkumar : Research Methodology, Person Education, Delhi.
17. Schaefer, R.T (2004). Sociology a Brief Introduction, (5thed.) New York: McGraw-Hill Inc..
18. Sirclaus Moser & G. Kalton: Survey Methods in Social Investigation, Heinemann Educational Books, London.
19. Sanderson. (2010). Social Psychology, New York: John Wiley.
20. Tepperman, L. & Curtis, J. (Eds.) (2009). Principles of Sociology: Canadian perspectives. Don Mills, ON: Oxford University Press.
21. Young, K. (2001). Handbook of Social Psychology, London: Routledge and Kegal Paul Ltd.

Course Title/ Code	**FRENCH-I(FLS103)**
Course Type:	**Allied Elective**
Course Nature:	Audit (University Compulsory)
L-T-P-O Structure	(1-1-0-0)
Prerequisite	Basic knowledge of grammatical structure, syntax, and vocabulary of English and/or Hindi.
Objectives	At the end of the course, students will be able to 1. Exchange greetings and do introductions using formal and informal expressions 2. Understand and use interrogative and answer simple questions 3. Learn Basic vocabulary that can be used to discuss everyday life and daily routines, using simple sentences and familiar vocabulary 4. Express their likes and dislikes. Also will have understanding of simple conversations about familiar topics (e.g., greetings, weather and daily activities,) with repetition when needed 5. Identify key details in a short, highly-contextualized audio text dealing with a familiar topic, relying on repetition and extra linguistic support when needed. 6. Describe themselves, other people, familiar places and objects in short discourse using simple sentences and basic vocabulary 7. Provide basic information about familiar situations and topics of interest 8. Express or/and justify opinions using equivalents of different verbs Differentiate certain patterns of behavior in the cultures of the French-speaking world and the student's native culture

Course Outcomes:

FLS103.1. Exchange greetings and do introductions using formal and informal expressions. Understand

and use interrogative and answer simple questions.

FLS103.2. Learn Basic vocabulary that can be used to discuss everyday life and daily routines, using

simple sentences and familiar vocabulary. Express their likes and dislikes. Also will have

understanding of simple conversations about familiar topics (e.g., greetings, weather and

daily activities,) with repetition when needed.

FLS103.3. Identify key details in a short, highly-contextualized audio text dealing with a familiar topic,

relying on repetition and extra linguistic support when needed. Describe themselves, other

people, familiar places and objects in short discourse using simple sentences and basic

vocabulary.

FLS103.4**.** Describe themselves, other people, familiar places and objects in short discourse using

simple sentences and basic vocabulary. Provide basic information about familiar situations and topics of interest.

FLS103.5. Express or/and justify opinions using equivalents of different verbs. Differentiate certain patterns of behavior in the cultures of the French-speaking world and the student's native culture.

FLS103.6. Describe various places, location, themselves using simple sentences and vocabulary.

SECTION-A

Unit - Saluer et épeler l'alphabet

1.1 Les Salutations & forms of politeness

1.2 Alphabets

Unit 2- Usage de Vous et de Tu

2.1 Taking leave expressions

2.2 Les pronoms sujets

2.3 Basic Questions

SECTION-B

Unit 3- Présentez-vous

3.1 Les verbes ER

3.2 Self introduction

3.3 Décrivez votre ami(e)

SECTION-C

Unit 4- Identifier un nombre, compter

4.1 Les noms

4.2 Verbes Avoir, Etre, Aller & Faire

4.3 Les nombres

Unit 5- Demander/ donner l'explications

5.1 Les articles define et indefini

5.2 Les mois de l'annee

5.3 Les jours de la semaine

Unit 6- Parler des saisons et demander l'heure

6.1 Time

6.2 Weather

6.3 Unseen Passage

Text Books/Reference Books/ Suggested Readings:

1. Alter Ego Level One Textbook, Annie Berthet, Catherine Hugot, Hachette Publications
2. Apprenons Le Francais II & III, Mahitha Ranjit, 2017, Saraswati Publications

Weblinks:

www.bonjourfrance.com

www.allabout.com

Course Title/ Code	GERMAN-I(FLS102)
Course Type:	Allied Elective
Course Nature:	Audit (University Compulsory)
L-T-P-O Structure	(1-1-0-0)
Prerequisite	Basic knowledge of grammatical structure, syntax, and vocabulary of English and/or Hindi.
Objectives	At the end of the course, students will be able to 1. Exchange greetings and do introductions using formal and informal expressions 2. Understand and use interrogative and answer simple questions 3. Learn Basic vocabulary that can be used to discuss everyday life and daily routines, using simple sentences and familiar vocabulary 4. Express their likes and dislikes. Also will have understanding of simple conversations about familiar topics (e.g., greetings, weather and daily activities,) with repetition when needed 5. Identify key details in a short, highly-contextualized audio text dealing with a familiar topic, relying on repetition and extra linguistic support when needed. 6. Describe themselves, other people, familiar places and objects in short discourse using simple sentences and basic vocabulary 7. Provide basic information about familiar situations and topics of interest 8. Express or/and justify opinions using equivalents of different verbs 9. Differentiate certain patterns of behavior in the cultures of the French-speaking world and the student's native culture

Course Outcomes:

FLS102.1. Students will be able to exchange greetings and introductions using formal and informal
expressions. They will be able to ask and answer simple questions.
FLS102.2. Students will be able to discuss everyday life and daily routines, using simple sentences and

familiar vocabulary.

FLS102.3. Students will be able to identify key details in short, highly-contextualized audio text dealing with a familiar topic, relying on repetition and extra linguistic support when needed.

FLS102.4. Students will be able to discuss likes and dislikes, understand simple conversations about familiar topics (e.g., greetings, weather and daily activities,) with repetition when needed

FLS102.5. Students will be able to differentiate certain patterns of behavior in the cultures of the German- speaking world and the student's native culture.

FLS102.6. Students will be able to describe various places, location, themselves using simple sentences and vocabulary.

SECTION-A

Unit-1: Begrüßungen

1.1 Salutations/Greetings

1.2 Introduction

Unit-2: sich vorstellen und Zahlen
2.1 Introduction

2.2 Alphabets

2.3 Numbers 1-20

SECTION-B

Unit-3: Berufe/ Pronomen

3.1 Personal pronouns

3.2 Hobbies and professions

SECTION-C

Unit-4: Café
4.1 Café related vocabulary and dialogues

4.2 Revision personal pronouns

Unit-5: Café dialog

5.1 Café related vocabulary and dialogues

5.2 Common verbs and their conjugations

SECTION-D

Unit-6: Zeit und Monate

6.1 Time

6.2 Days

6.3 Months

Text Books/Reference Books:

1. Studio D A1, Hermann Funk, 2011, Cornelson Publication
2. Tangaram Aktuell A1, Kursbuch & Arbeitsbuch, 2011, Hueber
3. Netzwerk, Stefanie Dengler, Paul Rusch et. Al, 2011, Klett

Weblinks:

http://www.nthuleen.com/

Course Title/ Code	SPANISH-I(FLS101)
Course Type:	**Allied Elective**
Course Nature:	Audit (University Compulsory)
L-T-P-O Structure	(1-1-0-0)
Prerequisite	Basic knowledge of grammatical structure, syntax, and vocabulary of English and/or Hindi.
Objectives	At the end of the course, students will be able to 1. Exchange greetings and do introductions using formal and informal expressions 2. Understand and use interrogative and answer simple questions 3. Learn Basic vocabulary that can be used to discuss everyday life and daily routines, using simple sentences and familiar vocabulary 4. Express their likes and dislikes. Also will have understanding of simple conversations about familiar topics (e.g., greetings, weather and daily activities,) with repetition when needed 5. Identify key details in a short, highly-contextualized audio text dealing with a familiar topic, relying on repetition and extra linguistic support when needed. 6. Describe themselves, other people, familiar places and objects in short discourse using simple sentences and basic vocabulary 7. Provide basic information about familiar situations and topics of interest 8. Express or/and justify opinions using equivalents of different verbs 9. Differentiate certain patterns of behavior in the cultures of the French-speaking world and the student's native culture

Course Outcomes:

FLS101.1. Students will be able to exchange greetings and introductions using formal and
informal expressions and students will be able to ask and answer simple questions.

FLS101.2. Students will be able to discuss everyday life and daily routines, using simple sentences and
familiar vocabulary and students will be able to discuss likes and dislikes understand simple
conversations about familiar topics.

FLS101.3. Students will be able to identify key details in a short, highly-contextualized audio text
dealing with a familiar topic, relying on repetition and extra linguistic support when needed and students will
be able to offer basic descriptions of self, other people, familiar places and objects in short discourse using
simple sentences and basic vocabulary.

FLS101.4. Students will be able to provide basic information about familiar situations and topics
of interest and students will be able to express or/and justify opinions using equivalents of
different verbs.

FLS101.5. Spanish-speaking world and student's native culture.

FLS101.6. Students will be able to describe various places, location, themselves using simple sentences and vocabulary.

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SECTION-A

Unit 1: Introduction to Spanish and SER
</div>

1.1 Presentation on Spanish language

1.2 Greetings and goodbyes

1.3 Spanish letters

1.4 Introduction of verbo SER

Unit 2: Verb Ser, Nationality, Profession and Counting

2.1 Uses of verbo SER

2.2 Adjectives related to verbo SER.

2.3 Introduction of Nationality

2.4 Professions and vocabulary related to professions.

2.5 Counting till number 20.

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SECTION-B
</div>

Unit 3: Articles, Interrogative and Estar

3.1 Introduction of Articles and Indefinite articles

3.2 Interrogatives

3.3 Introduction of Verbo Estar

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SECTION-C
</div>

Unit 4: Estar, Preposition, Tener and Self Introduction

4.1 Uses of Verbo ESTAR and adjectives related to it

4.2 Introducton of 'my house' vocabulary

4.3 Prepositions related to the positioning of an object

4.4 Self – introduction

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SECTION-D
</div>

Unit 5 : Day, Month and Regular AR verb

5.1 Days

5.2 Months

5.3 Introduction to regular –AR verbs

Text Books/Reference Books:

1.   ¡Ole!-Langers
2.   ¡Uno, dos, tres…………
Weblinks:

http://studyspanish.com/

Course Title/ Code	PROFESSIONAL COMPETANCY ENHANCEMENT-I(CDO201)
Course Type:	Allied Core
Course Nature:	Soft
L-T-P-O Structure/Credits	(3-0-0-0)/0.5

Course Outcomes:

Students will acquire basic knowledge about aptitude
Students will become better at analytics and problem solving
Students will be able to solve aptitude problems quickly utilizing the short cuts
Students will have enhanced level of reasoning, numerical skills and speed
Students will have the ability to 'quickly think on their feet'
Students will have enhanced concentration & thinking ability.

SECTION-A – Reasoning Ability

Unit 1: Mental Ability

1.1 Mental Ability Test

1.2 Direction Sense Test

1.3 Blood Relations Test

1.4 Cubes

1.5 Cuboids

1.6 Dice

1.7 Word Problems

1.8 Puzzles

 Unit 2: Verbal & Non Verbal Reasoning

2.1 Letter Series

2.2 Set Theory

2.3 Venn Diagram

2.4 Syllogism

2.5 Missing Value in figure

2.6 Practice Test

<div align="center">**SECTION-B**</div>

Unit 3: Logical Reasoning & Word Puzzles

3.1 Logical Reasoning I

       3.1.1. Row Arrangement

       3.1.2. Circular Arrangement

3.2 Logical Reasoning II

       3.2.1. Arrangement

       3.2.2. Puzzles

3.3 Logical Reasoning III

3.4 Practice Test

Personality Development

Unit 4: Personality Development

4.1 Concept of personality

Concept of personality

Bringing out the best in one's personality

4.2 Self awareness

Different learning styles

Areas of Self awareness

Developing self-awareness

4.3 Goal Setting

Five principles of goal setting

Setting "SMART" goals

6P's of goal setting

SWOT analysis

Short term& Long term goals

SECTION-C

Unit 5: Resume Writing

What, why and how of Resume

Building different sections of the Resume through projects and activities during the course

Unit 6 : Presentation Skills

Designing the presentation

Audience and content analysis

Delivering the presentation- Preparation, Practice, Performance

SECTION-D

Unit 7: Professional Communication

Email writing

Diction and Speech Clarity

LSRW & Introduction to verbal ability as an assessment tool for employability

Unit 8: Professional Grooming and Etiquette

Professional grooming

Personal Grooming

Professional Etiquette

Courtesy and communication discipline

Text Books/Reference Books:

1. A Modern Approach to Logical Reasoning: R S Aggarwal, S Chand & Company Pvt Ltd
2. A Modern Approach to Non Verbal Reasoning: R S Aggarwal, S Chand & Company Pvt Ltd

3. Developing Management Skills by *David A Whetten, Kim S Cameron*

4. Personality and Soft Skills Development by *Rajeev Kumar*

5. English for business, 100 tips foe effective communication,By: Dignen, Bob; McMaster, Ian. Planegg: Spotlight Verlag GmbH. 2016. eBook.

6.   Presentation Skills for technical professionals: Achieving Excellence,By: Karten, Naomi; Gottesdiener, Ellen. Series: Soft Skills for IT Professionals. Ely, Cambridgeshire, United Kingdom :IT Governance Publishing. 2010. eBook., Database: eBook Collection (EBSCOhost)

Weblinks:

http://www.indiabix.com/aptitude/questions-and-answers/

http://www.indiabix.com/non-verbal-reasoning/questions-and-answers/

Course Title/ Code	**INTRODUCTION TO RESEARCH(RDO501)**
Course Type:	**Allied Core**
Course Nature:	Research Type
L-T-P-O Structure/Credits	(0-0-1-0)/0.5
Pre-Requisites	Basic knowledge of Research

Course Outcomes:

1. The student shall be able to describe research and its impact.

2. The student shall be able to identify broad area of research, analyze, the processes and procedures to

Carryout research.

3. The student shall be able to use different tools for literature survey

4. The student is able choose specific area of research and supervisor/mentor is finalized

5. To understand and adopt the ethical practice that are to be followed in the research activities

6. To work in groups with guidance

SECTION-A

Unit 1: What is Research and its impact?

   1.1 Capturing the current research trends
   1.2 Insight about scientific research performed by renowned experts in the related field(case studies)
   1.3 Do's and Don'ts pertaining to research

SECTION-B

Unit 2: Identification of Broad Area of research

   2.1 Identification of thrust area of research for deciding broad area

   2.2 Framing the research questions and hypothesis

   2.3 Identification of the research gap based on feasibility of problem

2.4 Exploration of in-house and commercially available facilities related to broad area

<div align="center">**SECTION-C**</div>

Unit 3: Understanding the tools for Literature Survey

3.1 Finding research papers related to a topic

3.2 Understanding the different aspects of Literature search

3.3 Usage of different sources like Google scholar, WoS, SCI/ SCIE, PubMed, Scopus, ABDC, EBSCO etc.

3.4 Search for online journals relevant to research area

3.5 Indexing of Journals

3.5 Usage of scholarly networking sites like ResearchGate, Mendeley, and Academia.edu etc.

3.6 Demo sessions on the usage of above mentioned sources

<div align="center">**SECTION-D**</div>

Unit 4: Review of research papers pertaining to broad area and specific area of research

4.1 Selection of relevant papers

4.2 Finding specific research problem from broad area of research

4.3 Literature survey and justification of specific research problem

4.4 Experimentation and data cleaning and verification

4.5 Understanding and selection of the research domain

4.6 Seeking information through published work w.r.t the problem

4.7 Reading & categorizing the downloaded/referred papers and structuring of the idea

4.8 Model design about framing the research questions

Unit 5: Report Writing and Presentation skill Development

5.1 Report making on the surveyed literature to cater the basic idea of the research papers

5.2 Compiling and analyzing the published results to justify and understand the proposed ideas

5.3 Usage of MS-PowerPoint and other technical resources for the presentation

5.4 Development of presentation skills and group addressing

5.5 Scientific/technical writing and ethical practice, project report

<div align="center">**CSU02- Semester-4**</div>

SUBJECT CODES	SUBJECT NAME	PRE-REQUISITE	OVERLAPPING/ EQUIVALENT COURSES	**OFFERING DEPARTMENT	*COURSE NATURE (Hard/ Soft/ Workshop/ NTCC/ Audit)	COURSE TYPE (Core/Elective)	L	T	P	O	NO. OF CONTACT HOURS PER WEEK	NO. OF CREDITS
CSH201B-T	OOPS USING JAVA	NIL	NA	CS	HARD	CORE	3	1	0	0	4	5
CSH201B-P	OOPS USING JAVA LAB						0	0	2	0	2	
CSH202B-T	DATABASE MANAGEMENT SYSTEM	NIL	NA	CS	HARD	CORE	3	1	0	0	4	5
CSH202B-P	DATABASE MANAGEMENT SYSTEM LAB						0	0	2	0	2	
CSH209B-T	COMPUTER ARCHITECTURE &ORGANIZATION	NIL	NA	CS	HARD	CORE	3	0	0	0	3	4
CSH209B-P	COMPUTER ARCHITECTURE & ORGANIZATION LAB						0	0	2	0	2	
CSH213B-T	UnSUPERVISED LEARNING & NEURAL NETWORK	NIL	NA	CS	HARD	CORE	3	1	0	0	4	5
CSH213B-P	UnSUPERVISED LEARNING & NEURAL NETWORK LAB						0	0	2	0	2	
CSW203B	USER INTERFACE-II (MONGODB,TYPESCRIPT,ANGULAR JS)	USER INTERFACE-I (HTML5,CSS,JAVASCRIPT,JQUERY)	NA	CS	WORKSHOP	CORE	0	0	3	0	3	1.5
LWS324	INDIAN CONSTITUTION	NIL	NA	LW	AUDIT	CORE	1	0	0	0	1	0
EDS240	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	NIL	NA	ED	AUDIT	CORE	1	0	0	0	1	0
FLS105/FLS106/FLS107	FOREIGN LANGUAGE	NIL	NA	FL	AUDIT	ELECTIVE	1	1	0	0	2	0
MCS368B	ENTREPRENEURSHIP	NIL	NA	MC	SOFT	ELECTIVE	2	0	0	0	2	2
MOOC	NPTEL COURSES FROM MOOC					ELECTIVE						

CDO202	PROFESSIONAL COMPETANCY ENHANCEMENT-II	NIL	NA	CDC	OUTC OME	CORE	0	0	1	0	1	0.5
RDO502	RESEARCH & INNOVATION-1	NIL	NA	RESEAR CH	OUTC OME	CORE	0	0	0	1	1	0.5
	TOTAL (L-T-P-O/CONTACT HOURS/CREDITS)						1 7	1 4	1 2	1	34	23.5
CSO215B	SUMMER TRAINING POST 4TH SEMESTER											2

Detailed Syllabus

CSU02- Semester-4

Course Title/ Code	Object Oriented Programming Using Java(CSH201B) T & P
Course Type	Core (Departmental)
Course Nature	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	Student will be able to apply the object-oriented programming principles and techniques for solving the real life problems.

Syllabus	Sections	Weightage
	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	**100%**

Section-A

Introduction to OOPS: Paradigms of Programming Languages - Basic concepts of Object Oriented Programming, Differences between Procedure Oriented Programming and Object Oriented Programming, Objects and Classes, Data abstraction and Encapsulation, Inheritance, Polymorphism, Dynamic binding, Message communication, Benefits of OOP, Application of OOPs.

Introduction to Java: History of Java, Java features, Java Environment: JDK API. Types of java program, Creating and Executing a Java program, Java Tokens: Keywords, Character set, Identifiers, Literals, Separator, Java Virtual Machine (JVM), Comments in Java program, Command line input and Arguments, Data Types, Variables, Operators, Control Statements, Arrays, String handling, Scanner Class.

Class and objects: Defining a class, Methods, Creating objects, Accessing class members. Constructors, Method overloading, constructor overloading, this keyword.

Section-B

Inheritance: Defining a subclass, Deriving a subclass, Single Inheritance, Multilevel Inheritance, Hierarchical Inheritance, Overriding methods, super keyword, Final variables and methods, Final classes, Final methods, Abstract methods and classes, Visibility Control, Public access, Private access, protected. **Interfaces:** Defining interface, Extending interface, Implementing Interface, Accessing interface variables, Static members, Nesting of Methods

Packages: Java API Packages: System Packages, Naming Conventions, Creating & Accessing a Package, Adding Class to a Package, Hiding Classes

Section-C

Code Design: Basic concepts of design patterns and preliminaries of its categories. SOLID Design Principles.

Exception Handling: Exception Handling Mechanism, using try and catch blocks, nesting try Statements, Multiple catch Block, Throwing Exceptions, using finally clause, creating a Custom Exception.

Section-D

Multithreading: Getting the main thread, naming a Thread, Pausing a thread, Creating a Thread with the Runnable Interface, Creating a Thread with Thread Class, Creating Multiple Threads, Waiting for (joining) Threads, Checking whether thread is alive, Setting Thread Priority and Stopping Threads, Thread Synchronization, Suspending and Resuming Threads.

I/O Streams: I/O Basics Reading Console Input Writing Console Output, Using the File Class, InputStream, OutputStream, FileInputStream, FileOutputStream, Buffered Input Stream, Buffered Output Stream, Random Access File, File Reader, File Writer, Buffered Reader, Buffered Writer, Serialization.

List of Experiments
1. Basic programs in java, use of if else construct and switch construct.
2. Programs on Loops and Arrays.
3. Programs on Strings and classes creation in java.
4. Programs on constructors and use of keyword this keyword, static keyword, final keyword, finalize method.
5. Programs on single inheritance,

6. Programs on multilevel inheritance, Hierarchical inheritance.
7. Programs on method overriding, super keyword and final method.
8. Programs on interfaces
9. Programs on SOLID design principles.
10. Programs on Packages
11. Programs Exception Handling
12. Programs on threads
13. Programs on File Handling
14. Mini-Project

Text Books:
1. Programming with Java Primer   by E BalagurusamyTmh Publication
2. Java; the complete reference, 7th editon, Herbert schildt, TMH.
3. H. M. Deitel and P. J. Deitel, Java How to Program, Prentice Hall, 7th Edition, 2007
4. Head First Design Patterns: A Brain-Friendly Guide 1st Edition, by Eric Freeman, Bert Bates, Kathy Sierra, Elisabeth Robson

Reference Books:
1. Java2 Programming Black Book, Steven Holzner (no. of copies: 23)
2. C. S. Horstmann and G. Cornell, Core Java 2 (Volume I-Fundamentals), Prentice Hall, 7th Edition, 2004. (no. of copies: 10)
3. Head First Java By Kathy Sierra

Course Title/ Code	Database Management System (CSH202B) T & P
Course Type	Core (Departmental)
Course Nature	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	To do logical and physical design of databases and manipulate them.

Syllabus	Sections	Weightage
	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	**100%**

Section-A

File system & Introduction to DBMS: File, operations on files, file header, Different file organizations - serial, sequential, indexed sequential, direct/hash, Indexing – primary, secondary, single level, multi-level, clustered,

Introduction to DBMS – comparison with conventional file processing, ANSI SPARC three level DBMS architecture, data independence, data abstraction, different users of DBMS, Applications of DBMS, SQL(Introduction, Data Types, Constraints, Creation of Tables)

Section-B

Relational model and Algebra: Introduction to SQL(Insertion of Data, Updating in the data, Alternation in the Schema, Data Fetching, Functions), Relational model – Mathematical formulation, Relation and its properties, domain compatibility, Relational algebra – set operations (union, intersect, difference, cross product), relational operations (select, project, division, joins-cross, inner/outer, theta, natural, equivalence), group operations Tuple calculus, Relational Calculus.

Section-C

Relational Database design: SQL (Set Operations, group by, order by, Joins), Relational Database Design and ER Model(Entity, Relationship, Strong Entity, Weak Entity, Type of Attributes and their representation), EER(Generalized and Specialization) , Functional dependency, Armstrong inference axioms, Closure and its algorithm, Minimal set of Functional Dependencies and its algorithm, Keys – super key, minimal super key, candidate keys, primary key, foreign key, Algorithm to find primary key.

Good decomposition properties – dependency preservation and loss less join, Algorithm for checking los less join decomposition, Synthesis Approach, Anomalies – insertion, deletion and updating, I NF, 2 NF, 3 NF, BCNF, Multi - valued dependency, 4 NF, Join dependency, 5 NF.

Section-D

Transaction processing, Concurrency control & recovery: SQL(Sub queries, View, Sequence, DCL(Roll back, commit)), Introduction to transaction, properties of transaction and life cycle of transaction, Schedule – serial, non-serial, serializable (result, conflict and view), strict schedule, Concurrency and problems related, Concurrency control techniques – Locking, two phase locking, strict, rigorous 2PL, Deadlock – detection, prevention, breaking deadlock, Recovery System, Basic Concepts of Recovery, Database Update(update in place, Deferred Update), Undo-Redo Algorithm, No Undo-Redo Algorithm, Undo-NoRedo Algorithm, Shadow Paging Technique.

List of Experiments

1. File Vs DBMS
2. DDL statement
3. DML Statement
4. DCL Statement
5. Project
6. Tool related to RDBMS

Text Books:

1. Fundamentals of Database Systems by R. Elmasri and S.B. Navathe,6th edition, 2013, Addision-Wesley, Low Priced Edition
2. Database system concepts, 6th edition, McGraw-Hill, AviSilberschatz, Henry F. Korth, S. Sudarshan

Reference Book:
1. An Introduction to database systems by Bipin C. Desai, Galgolia Publications.
2. Modern Database Management by Feffray A. lioffcr, Mary B. Prcscotl, Fred R Mefaddcn, 6th edition. Pearson Education

Course Title/ Code	Computer Architecture & Organization (CSH209B) T & P

Course Type:	Core
Course Nature:	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	Students will be able to understand the design and working of various components constituting a computer system.

Section-A

Basic Computer Organization: Von Neumann concept - Store program control concept - Flynn's classification of computers (SISD, MISD, MIMD, SIMD) - Multilevel viewpoint of a machine: digital logic, micro architecture, ISA. Decimal, Binary, Octal and Hexadecimal number system, Binary arithmetic's, Signed binary numbers, 1's & 2's Complement representation, Fixed and floating point numbers; Boolean algebra and Logic gates - Combinational logic blocks(Adders, Multiplexers, Encoders, de-coder) - Sequential logic blocks(Latches, Flip-Flops, Registers, Counters).

Section-B

CPU and Instruction Set Architecture: Basics: Instruction Codes – Computer Registers – Computer Instructions – Timing and Control – Instruction Cycle - Types of Instructions - Instruction set formats (fixed, variable, hybrid). Processor Organization: General register organization – Stack organization – Instruction formats – Addressing modes – Data transfer and Manipulation – Program control - Instruction set based classification of processors (RISC, CISC, and their comparison) - Design of accumulator logic.

Section-C

Memory Hierarchy & I/O Organization: The need for a Memory Hierarchy - Locality of reference principle - Memory parameters: access/ cycle time, cost per bit - Main memory (Semiconductor RAM & ROM organization, memory expansion, Static & dynamic memory types) - Auxiliary Memory - Cache memory (Associative & direct mapped & Set-associative Cache Organizations, Cache Coherence, I/O interface - Modes of transfer - DMA - Types of Interrupts - Input-Output and Interrupt.

Section-D

Micro programmed Control: Control Memory - Address sequencing - Micro program example – Design of control unit - Microinstruction sequencing - Implementation of control unit. Introduction to Parallelism: Goals of parallelism (Exploitation of concurrency, throughput enhancement) - Enhancing performance with pipelining - Amdahl's law - Instruction level parallelism (pipelining, super scaling –basic features) - Processor level parallelism (Multiprocessor systems overview).

List of Experiments:

1. To recognize various components of PC.

2. To understand the programing language MASM 8086.

3. To print a string with and without using macro.

4. To print the successor and predecessor of a character.

5. To print factorial of a no and Fibonacci series.

6. To print the reverse of a string and check whether it is palindrome or not by using macro.

7. To check whether a number is even, odd or prime using assembly code.

8. To find the largest and smallest number.

9. To print square and cube of first n natural numbers using assembly code.

10. To design a simple calculator.

Text Books:

1. Computer System Architecture by M. Mano, 2001, Prentice-Hall.

2. Computer Organization and Design, 2nd Ed., by David A. Patterson and John L. Hennessy, Morgan 1997, Kauffmann.

3. Computer Architecture and Organization, 3rd Edi, by John P. Hayes, 1998, TMH.

Reference Book:

1. Operating Systems Internals and Design Principles by William Stallings,4th edition, 2001, Prentice-Hall Upper Saddle River, New Jersey

2. Computer Organization, 5th Edi, by Carl Hamacher, Zvonko Vranesic,2002, SafwatZaky.

3. Structured Computer Organisation by A.S. Tanenbaum, 4th edition, Prentice-Hall of India, 1999, Eastern Economic Edition.

4. Computer Organisation & Architecture: Designing for performance by W. Stallings, 4th edition, 1996, Prentice-Hall International edition.

5. Computer Architecture- Nicholas Carter, 2002, T.M.H.

Course Title/ Code	User Interface II (CSW203B) P
Course Type:	Domain Elective
Course Nature:	Workshop
L-T-P-O Structure	(0-0-3-0)
Prerequisite	User Interface I
Objectives	Student will be able to develop a dynamic Website.

Syllabus	Sections	Weightage
	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

Section-A

TypeScript: Introduction, Data Types and Variables, Destructuring & Spread, Working with Classes, Function Types, Modules, Namespaces, Ambients, Working with Interfaces, Generics.

Section-B

Angular JS4: Introduction, Directives and Templates, Data binding, Modules, Styles Binding In Components, Advanced Components Features, Template Driven Forms.

Section-C

Angular JS4: Model Driven Forms, Working with Pipes, Custom Attribute and Validators, Dependency Injection, Services, Routing, Module, Crud Operations Using Http Service.

Section-D

Node.js and MongoDB: Introduction, Filesystem, URL Module, Events, NPM, Upload files, Email, MongoDB Create Database, Create collection, Insert, Find, Query, Sort, Delete, Drop Collection, Update, Limit, join.

List of Experiments:
1. Revision of javascript.
2. Typescript
3. Typescript
4. **Angular JS**
5. **Angular JS**
6. Angular JS
7. Node jS
8. Node jS
9. Mongodb
10. Mongodb
11. Projec**t**

Text / Reference Book:
1. Learning AngularJS – A guide to AngularJS Development, Ken Williamson, O'reilly
2. MongoDB: The Definitive Guide, Book by Kristina Chodorow and Michael Dirolf
3. Learning Angular: A Hands-On Guide to Angular 2 and Angular 4, Brad Dayley, Brendan Dayley, Caleb Dayley
4. MongoDB in Action, Book by Kyle Banker.

Course Title/Code	UnSupervised Learning (CSH213B-T&P)
Course Type:	Domain Core
Course Nature:	Hard

	Section s	Weightag e
Syllabu s	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

L-T-P-O Structure — 3-1-2-0

UNIT I Dimensionality Reduction

Introduction, Singular Value Decomposition, SVD code:, Principal Component Analysis (PCA), Isometric Maps (Isomaps), Multidimensional Scaling (MDS), ISOMAPS with MDS, ISOMAPS (Code), Visualizing the ISOMAPS Data, Applying PCA on the Same Data, Visualization of PCA, Feature Selection Techniques, Wrapper Method

UNIT II Clustering

What is Clustering and Why is it Important?, Techniques in Clustering, K-Means Clustering, Steps for K-Means Algorithms, Density Based Spatial Clustering (DBSCAN), Types of Points in DBSCAN, DBSCAN Example, DBSCAN: Advantages, DBSCAN: Disadvantages, Hierarchical Clustering, Dendrograms, Hierarchical Clustering Code, DBSCAN Dendrogram Visualization

UNIT III Neural Networks

Introduction to Neural Networks, Types of Neural Networks, Perceptron, Limitations of Perceptron, Activation Functions, Types of Activation Functions, Linear Activation Function, Non- Linear Data, Non-Linear Activation Function (Sigmoid), Non- Linear Activation Function (TanH), Non-Linear Activation Function (ReLu), Non-Linear Activation Function (Leaky ReLu), Derivative of Activation FunctionsNeural Networks, Feed Forward Network, ANN Forward Propagation, Flow of Data in ANN, Backpropagation, Cost Function in Backpropagation, ANN Evaluation, Complete Flow of Data in Neural Network, ANN Training ANN Design, Dropout in Neural Networks

UNIT IV Understanding Images:

Understanding Images, Need of Convolution Neural Network Convolution, Neural Network Working, Working of CNN with Kernel, Understanding Convolution Mathematically, An Example of CNN, Convolution of Images, Convolution Neurons Visualization, Parameters for Feature Maps, Activation Function in Convolution Neural Network, Pooling Step, Advantages of Pooling, Batch Normalization, Typical Convolution Neural Network, Training CNN using Backpropagation, Steps for CNN Backpropagation, Example of Convolution Neural Network Architecture, Visualization of Convolutional Neural Networks,

UNIT V RNN Overview

Using MLP instead of RNN, Recurrent Neural Network (RNN), Steps in Recurrent Neuron, RNN Mathematically, Example of Forward Propagation for RNN, Back Propagation in Recurrent Neural Network, Steps for Back Propagation, Applications of RNN, Limitations of RNN, LSTM Conveyor Belt Analogy, Architecture of LSTM, Gates in LSTM, Forget Gate, Input Gate, Output Gate

Unsupervised Learning & Neural Networks Lab

List of Programs

1. Write a program for using PCA on MNIST Dataset.
2. Write a program for using PCA on Cat and Dog Dataset.
3. Write a program for using LDA on Cat and Dog Dataset.
4. Write a program for using DBSCAN on IRIS Dataset.
5. Write a program for using SVD on MNIST Digits Dataset.
6. Write a program for Feature Selection Techniques (Forward/ Backward).
7. Write a program for K-Means Clustering on IRIS Dataset.
8. Write a program for Hierarchical Clustering on Customers Dataset.
9. Write a program for Neural Networks on Mobile Price Classification.
10. Write a program for Convolution Neural Network on MNIST Dataset.
11. Write a program for Convolution Neural Network on Malaria Dataset.
12. Write a program for Convolution Neural Network on Aerial Cactus Dataset.

Course Learning Outcomes (CLOs)

On completion of this course, the students will be able to:-
1. Understand Unsupervised Techniques
2. Understand Neural Network basics with hands-on.

Course Title/ Code	Indian Constitution (LWS324)
Course Type:	Audit(Allied)
Course Nature:	Basic
L-T-P-O Structure	1-1-0-0
Objectives	The objective of this paper is to orient the students about the Basic features and fundamental principles on the Constitution of India.

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	**100%**

SECTION-A

● Meaning of the constitution law and constitutionalism
● Historical perspective of the Constitution of India
● Salient features and characteristics of the Constitution of India

SECTION-B

● Scheme of the fundamental rights
● The scheme of the Fundamental Duties and its legal status
● The Directive Principles of State Policy – Its importance and implementation

- Federal structure and distribution of legislative and financial powers between the Union and the States
- Parliamentary Form of Government in India – The constitution powers and status of the President of India
- Local Self Government – Constitutional Scheme in India

SECTION-D

- Amendment of the Constitutional Powers and Procedure
- The historical perspectives of the constitutional amendments in India
- Emergency Provisions: National Emergency, President Rule, Financial Emergency

Course Title/Code	**Essence of Indian Traditional Knowledge (EDS 240)**
Course Type	**Core**
Course Nature	**Audit**
L-T-P-O Structure	**(1-0-0-0)**
Objectives	The course aims at · Imparting basics of Indian Traditional Knowledge from modern perspective. · Developing deeper understanding of various Indian Schools of Philosophy. · Appreciating the contribution of prominent Indian thinkers in shaping Indian Culture · Realising the importance of Indian Traditional Knowledge in bringing a holistic and meaningful worldview

Syllabus

Section A

Epistemology as branch of Philosophy and Conceptualisation of Knowledge in Indian Tradition

Section B

Different Philosophical Schools: Idealism, Realism, Naturalism, Existentialism and Pragmatism

Section C

Contribution of Indian Philosophers:Kautilya, Vivekananda, Gandhi, Tagore and Aurobindo

Section D

Relevance of Indian Traditional Knowledge in modern context with special reference to Yoga and Spirituality

REFERENCE BOOKS

Agarwal, D.P. 2000. Ancient Metal Technology and Archaeology of South Asia. New Delhi: Aryan Books International.

Biswas, Arun Kumar. 1994. Minerals and Metals in Ancient India. Vol. 1 Archaeological Evidence. New Delhi: D. K. Printworld (P) Ltd.

Dilip K. Chakrabarti. The Early use of Iron in India. 1992. New Delhi: The Oxford University Press.

Chakrabarti D.K. (1996a). Copper and its Alloys in Ancient India. Delhi: MunshiramManoharlal Publishers Private Limited

Mukherjee, M. 1978 Metal craftsmen of India, Calcutta

Rakesh Tewari, 2003, The origins of iron-working in India: new evidence from the Central Ganga Plain and the Eastern Vindhyas

Srinivasan, Sharda and SrinivasaRangnathan. 2004. India's Legendary Wootz Steel. Bangalore: Tata Steel.

Tripathi, Vibha (Ed.). 1998. Archaeometallurgy in India. Delhi: Sharada Publishing House.

Tripathi, Vibha. 2001. The Age of Iron in India. New Delhi: Aryan Books International.

Chatterjee, Satischandra. 2007. An introduction to Indian philosophy.

Michaels, Axel (2004). Hinduism: Past and Present. New York: Princeton University Press.

Radhakrishnan, S (1929). Indian Philosophy, Volume 1. Muirhead library of philosophy (2nd ed.). London: George Allen and Unwin Ltd.

Radhakrishnan, S.; Moore, CA (1967). A Sourcebook in Indian Philosophy.Princeton.

Course Title/ Code	FRENCH-II (FLS107)
Course Type:	Allied Elective
Course Nature:	Audit (University Compulsory)
L-T-P-O Structure	(1-1-0-0)
Pre-Requisites	Basic knowledge of grammatical structure, syntax, and vocabulary of French
Objectives	At the end of the course, students will be able to 1. Recognize numbers and tell their age using numbers. 2. Tell and ask time in 12 hour and 24 hour format 3. Learn Basic vocabulary that can be used to discuss the weather and seasons 4. Identify colors, professions and adjectives in French and describing different people and objects using these three. 5. Describe orally and in writing themselves, their family and their friends. 6. Use reflexive verbs to describe daily routine. 7. Identify key details in a short, highly-contextualized audio text dealing with a familiar topic, relying on repetition and extra linguistic support when needed. 8. Provide basic information about familiar situations and topics of interest 9. Express or/and justify opinions using equivalents of different verbs 10. Differentiate certain patterns of behavior in the cultures of the French-speaking world and the student's native culture

Course Outcomes:

FLS107.1.Exchange greetings and do introductions using formal and informal expressions. Understand and use interrogative and answer simple questions.

FLS107.2. Learn Basic vocabulary that can be used to discuss everyday life and daily routines, using simple sentences and familiar vocabulary. Express their likes and dislikes. Also will have understanding of simple conversations about familiar topics (e.g., greetings, weather and daily activities,) with repetition when needed.

FLS107.3. Identify key details in a short, highly-contextualized audio text dealing with a familiar topic, relying on repetition and extra linguistic support when needed. Describe themselves, other people, familiar places and objects in short discourse using simple sentences and basic vocabulary.

FLS107.4. Describe themselves, other people, familiar places and objects in short discourse using simple sentences and basic vocabulary. Provide basic information about familiar situations and topics of interest.

FLS107.5. Express or/and justify opinions using equivalents of different verbs. Differentiate certain patterns of behavior in the cultures of the French-speaking world and the student's native culture.

FLS107.6. Describe various places, location, themselves using simple sentences and vocabulary.

SECTION-A

Unit 1- Se présenter (1)

1.1 Les pluriels

1.2 Adjectives to describe a person

Unit 2- Se présenter (2)

2.1 Professions

2.2 Short essay on family & friend

2.3 Comprehension

SECTION-B

Unit 3- Parler de ses habitudes quotidiennes

3.1 Les verbes pronominaux

3.2 Décrivez votre journée

SECTION-C

Unit 4- Nommez et localiser des lieux dans la ville

4.1 Prepositions

4.2 Asking & telling the way

Unit 5- Informations simples sur le climat, la météo

5.1 Les saisons

5.2 Les expressions de la saison

5.3 Comprehension

SECTION-D

Unit 6- Demander/ indiquer les horaires et les couleurs

6.1 Timings

6.2 Colours

Text Books/Reference Books/ Suggested Readings:

1. Alter Ego Level One Textbook, Annie Berthet, Catherine Hugot, Veronique M Kizirian,Hachette Publications
2. Apprenons Le Francais II & III, Mahitha Ranjit, 2017, Saraswati Publications

Weblinks:

www.bonjourfrance.com

www.allabout.com

	GERMAN-II (FLS106)

Course Title/ Code	
Course Type:	**Allied Elective**
Course Nature:	Audit (University Compulsory)
L-T-P-O Structure	(1-1-0-0)
Pre-Requisites	Students are expected to have basic knowledge of German grammar. They should know regular verbs and conjugations. They should be able introduce themselves and make small sentences in German language.
Objectives	At the end of the course, students will be able to 1. Exchange greetings and do introductions using formal and informal expressions 2. Understand and use interrogative and answer simple questions 3. Learn Basic vocabulary that can be used to discuss everyday life and daily routines, using simple sentences and familiar vocabulary 4. Express their likes and dislikes. Also will have understanding of simple conversations about familiar topics (e.g., greetings, weather and daily activities,) with repetition when needed 5. Identify key details in a short, highly-contextualized audio text dealing with a familiar topic, relying on repetition and extra linguistic support when needed. 6. Describe themselves, other people, familiar places and objects in short discourse using simple sentences and basic vocabulary 7. Provide basic information about familiar situations and topics of interest 8. Express or/and justify opinions using equivalents of different verbs 9. Differentiate certain patterns of behavior in the cultures of the German-speaking world and the student's native culture.

Course Outcomes:

FLS106.1. Students will be able to discuss about various directions, countries and languages they speak.

FLS106.2. Students will be able to write short essays on family and friends. They will have knowledge of tenses.

FLS106.3. Students will be able to identify classroom vocabulary in the German language

FLS106.4. Students will be able to speak ordinal and cardinal numbers and they will also learn months, days in German

FLS106.5. They will be able to express or/and justify opinions using equivalents of different verbs.

FLS106.6. They will be able to describe themselves, other people, familiar places and objects in short discourse using simple sentences and basic vocabulary.

SECTION-A

Unit 1

1.1 Ordinal & Cardinal numbers

1.2 Months, days, Feiertage and dates

SECTION-B

Unit 2

2.1 Verbs: to be and to have

2.2 helping verbs practice worksheets

2.3 Vocabulary (Family) short essay on family, friends etc.

SECTION-C

Unit 3

3.1 Vocabulary (classroom)

3.2 Definite and indefinite articles

SECTION-D

Unit 4

4.1 Countries, languages, directions

4.2 Past of the verb 'to be'

Text Books/Reference Books:

1. Rita Maria Niemann, Cornelsen, 2005, Studio d A1: Deutsch als Fremdsprache, Volume 6
2. Dallapiazza, Rosa-Ma
3. ria and Jan, Eduard von. Tangram aktuell 1. Deutsch als Fremdsprache Tangram aktuell 1 - Lektion 1-4: Deutsch als. (Hueber Verlag, 2005).
4. Dallapiazza, Rosa-Maria and Jan, Eduard von. Tangram aktuell 1. Deutsch als Fremdsprache Tangram aktuell 1 - Lektion 5-8: Deutsch als. (Hueber Verlag, 2005)
5. Paul Rusch, 2015: Langenscheidt and Klett

Weblinks:

http://www.nthuleen.com/

Course Title/ Code	SPANISH-II (FLS105)
Course Type:	**Allied Elective**
Course Nature:	Audit (University Compulsory)
L-T-P-O Structure	(1-1-0-0)
Pre-Requisites	Basic knowledge of grammatical structure, syntax, and vocabulary of Spanish

	At the end of the course, students will be able to
Objectives	1. Exchange greetings and do introductions using formal and informal expressions 2. Understand and use interrogative and answer simple questions 3. Learn Basic vocabulary that can be used to discuss everyday life and daily routines, using simple sentences and familiar vocabulary 4. Express their likes and dislikes. Also will have understanding of simple conversations about familiar topics (e.g., greetings, weather and daily activities,) with repetition when needed 5. Identify key details in a short, highly-contextualized audio text dealing with a familiar topic, relying on repetition and extra linguistic support when needed. 6. Describe colours, clothing, profession, family and marital status in short discourse using simple sentences and basic vocabulary 7. Provide basic information about familiar situations and topics of interest 8. Express or/and justify opinions using equivalents of different verbs 9. Differentiate certain patterns of behavior in the cultures of the Spanish-speaking world and the student's native culture

Course Outcomes:

FLS105.1.Exchange greetings and do introductions using formal and informal expressions. Understand and use interrogative and answer simple questions.

FLS105.2.Learn Basic vocabulary that can be used to discuss everyday life and daily routines, using simple sentences and familiar vocabulary. Express their likes and dislikes. Also will have understanding of simple conversations about familiar topics (e.g., greetings, weather and daily activities,) with repetition when needed.

FLS105.3. Identify key details in a short, highly-contextualized audio text dealing with a familiar topic, relying on repetition and extra linguistic support when needed. Describe themselves, other people, familiar places and objects in short discourse using simple sentences and basic vocabulary.

FLS105.4. Describe themselves, other people, familiar places and objects in short discourse using simple sentences and basic vocabulary. Provide basic information about familiar situations and topics of interest.

FLS105.5. Express or/and justify opinions using equivalents of different verbs. Differentiate certain patterns of behavior in the cultures of the Spanish-speaking world and the student's native culture.

FLS105.6. Describe various places, location, themselves using simple sentences and vocabulary.

<div align="center">SECTION-A</div>

Unit 1- Mi famila

1.1 Describe your family

1.2 Adjectives to describe a person

1.3 Short essay on family & friend

Unit 2- Gustar

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2.1 Likes and dislikes

2.2 Conjugation

2.3 Comprehension

SECTION-B

Unit 3- Verbos Irregulares y reflexivos

3.1 Conjugation

3.2 Routina diaria

3.3 Sentence formation

SECTION-C

Unit 4- El horario

4.1 Timings

4.2 Colours

Unit 5- Estar+gerundio

5.1 Conjugation

5.2 Prepositions

5.3 Picture description

SECTION-D

Unit 6- Ser y estar

6.1 Direction

6.2 Comprehension

Text Books/Reference Books:

1. ¡Ole!-Langers
2. ¡Uno, dos, tres…………

Weblinks:

http://studyspanish.com/

Course Title/ Code	PROFESSIONAL COMPETANCY ENHANCEMENT-II (CDO202)
Course Type:	**Allied Core**
Course Nature:	Soft

L-T-P-O Structure/Credits	(3-0-0-0)/ 0.5
Objectives	1. to improve students basic knowledge about Arithmetic Aptitude 2. to make students solve aptitude problems quickly utilizing the short cuts 3. to make students have the ability to 'quickly think on their feet' 4. to strengthen students communication skills

Section A – Quantitative Aptitude

Unit 1: Arithmetic I

.1 Simplification

1.1.1 Use of BODMAS rule and Formulas for solving equations.

1.1.2 Simple Fractions and Decimal Fractions.

1.1.3 Surds and Indices.

1.2 Ratio and Proportion

1.2.1 Changes in Ratios, Combined Ratio and Continued Proportion.

1.2.2 Application in different questions.

1.2.3 Variations and Partnership.

1.3 Percentage

1.3.1 Basic Conversion, Consumption & Expenditure, Successive changes and Errors.

1.3.2 Application in Areas and Volumes.

1.4 Profit and Loss

1.4.1 Sales and Purchase Transactions.

1.4.2 MRP and Discount, Equivalent discounts.

1.4.3 Errors in weight (Dishonest Dealer).

1.5 Average

1.5.1 Combined and Mistaken Averages.

1.5.2 Changes in Average.

1.5.3 Application in Cricket and others.

1.5.4 Practice Exercise.

1.6 Interest

1.6.1 Simple and Compound Interest Formulae.

1.6.2 Relations and their Applications.

1.6.3 Practice Exercise.

Unit 2: Arithmetic II

2.1 Time and work

2.1.1 Combined work, Work & Wages, Work & Efficiency.

2.1.2 Working Alternatively, Work and Equations.

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2.1.3 Pipes and Cisterns, Inlet and Outlet pipes, Capacity of Tank and Leakage.

2.2 Alligations & Mixtures

2.2.1 Formula Based

2.2.2 Successive Displacement

2.2.3 Mixtures

2.2.4 Error in Measurement

2.2.5 Profit on False Weight

2.3 Revision & Practice

2.3.1 Problems on Ages & Numbers

2.3.2 Calendar

2.3.3 Coding & Decoding

2.3.4 Data Sufficiency

Section B – Verbal Ability Test

Unit 3. Communication Skills in English

1.1 Relevance of Verbal Ability AND PREPARATORY GUIDELINES

1.2 Functional Grammar – Subject Verb Agreement

1.3 Tenses – Perfect, Simple , Continuous

1.4 Common Errors and rectification

Unit 4: Word Power Building Skills

2.1 Words: Antonyms, Synonyms, Analogies,

2.2 Compound words: Homophones, Homonyms, Word Families

2.3 Root Word Technique for Prefixes & Suffixes

2.4: Word Power: 7 Tips for Learning New Words

2.5 Practice Vocabulary Exercises

Section C

Unit 5: Writing Skills

3.1 Writing: Introduction of Writing Skills, Objectives of enhancing Writing Skills & Types of Writing

3.2 Sentences, Phrases, Types of Sentences, Parts of Sentences

3.3 Paragraph Writing: Construction, Linkage & Cohesion

3.4 Practice Exercises: Writing Skills

Section D

Unit 6: Reading Skills

4.1 Objectives of Reading, Definition & Types of Reading & Importance of Reading

4.2 Reading Techniques: SW3R, Active Reading, Detailed, Speed

4.2 Practice Exercises: Short & Medium Passages

Text Books/Reference Books:

1. Quantitative Aptitude : R S Aggarwal, S Chand & Company Pvt Ltd

2. Quantitative Aptitude for CAT: Arun Sharma

3. Verbal Ability and Reading Comprehension: MVN Enterprises

Web links:

http://www.indiabix.com/aptitude/questions-and-answers/

http://www.indiabix.com/non-verbal-reasoning/questions-and-answers/

Course Title/ Code	**RESEARCH & INNOVATION-I (RDO502)**
Course Type:	**Research Type**
Course Nature:	Hard
L-T-P-O Structure/Credits	(0-0-1-0)/ 0.5
Pre-requisites:	**Basic knowledge of Research**

Course Outcomes:

XX-400.1. The students will be able to critically evaluate the work done by various researchers relevant to

The research topic

XX-400.2. To integrate the relevant theory and practices followed in a logical way and draw appropriate conclusions

XX-400.3. To understand the research methodologies/approaches/techniques used in the literature

XX-400.4. To structure and organize the collected information or findings through an appropriate abstract, headings, reference citations and smooth transitions between sections

Section A
Unit-1 Literature Survey (LS)/Design of Experiment

1.1 Collection of research papers related to previously identified gap/problem (15 papers or more)

1.2 Comprehend and arrange the literature based on the idea framed

1.3 Presenting the collected data and inferring it with the further scope of expansion and Designing the experiment wherever applicable.

Section B
Unit-2 Structuring of Review Paper and setting up of experimental facility

2.1 Analysis of different approach/methodology adopted by various researchers

2.2 Listing out the components of the paper/ setting up experimental facility w.r.t the problem

2.3 Identification of suitable Journal or Conference

2.4 Formatting/Styling the paper according to the respective template

Section C
Unit-3 Departmental Presentation in the Mid Term Exam

3.1 Structuring and preparation of PPT

3.2 Mock presentation

3.3 Review on presentation skills and content delivered both

3.4 Incorporating the review comments in the slides

Course Title/ Code	Entrepreneurship (MCS368B)
Course Type:	**Elective (Allied)**
Course Nature:	**Soft**
L-T-P-O Structure	**(2-0-0-0)**

SECTION-A

Decision to become an entrepreneur

Introduction to entrepreneurship- Defining entrepreneurship, characteristics of successful entrepreneurs, importance of entrepreneurship, Myths about entrepreneurs, Corporate entrepreneurship, Self Discovery & SWOT analysis, Effectuation –Meaning , Five principles of effectuation, , Defining a Start-up, 4 Ps of a Start up, Reasons of Start-up failure, Basic Model of entrepreneurial process.

SECTION-B

Opportunity discovery

Recognizing opportunities and generating Ideas, Validating the market need, Identify problem worth solving using Jobs to be done(JTBD) methodology, design Thinking- Meaning, Design Thinking Values, Design Thinking Process, Double diamond approach in design thinking

SECTION-C

Customer and Solution-

Customer Vs. Consumer, different market types and their specific requirements, estimate the market size, identify your customer Segment (through STP), Switching costs and psychological biases, understanding Market research for start ups, Customer profile ,Value proposition Canvas- understanding the jobs, pains and gains.

SECTION-D

Business Model & Validation and Business Plan

Business Model- Concept, Elements of Business Model and Lean Approach, Lean canvas template, , Blue Ocean Strategy, difference between Solution Demo and MVP, Business plan- definition and importance, components of Business plan- market, technical and financial, legal and ethical aspects in a Start-Up.

Text book:

Entrepreneurship: Successfully Launching New Ventures, 6th edition, Bruce R. Barringer and R Duane Ireland,
 Published by Pearson Copyright © 2019, 6th edition

<p style="text-align:center">**CSU02- Semester-5**</p>

	SEMESTER - 5												
SUBJECT CODES	SUBJECT NAME	PRE-REQUISITE	OVERLAPPING/EQUIVALENT COURSES	**OFFERING DEPARTMENT	*COURSE NATURE (Hard/Soft/Workshop/ NTCC/Audit)		COURSE TYPE (Core/Elective)	L	T	P	O	NO. OF CONTACT HOURS PER WEEK	NO. OF CREDITS
ECH308B-T	DIGITAL ELECTRONICS & MICROCONTROLLER	NIL	NA	EC	HARD		CORE	3	1	0	0	4	5
ECH308B-P	DIGITAL ELECTRONICS & MICROCONTROLLER LAB							0	0	2	0	2	
CSH204-B-T	ANALYSIS & DESIGN OF ALGORITHMS	Data Structures	NA	CS	HARD		CORE	3	1	0	0	4	5
CSH204-B-P	ANALYSIS & DESIGN OF ALGORITHMS LAB							0	0	2	0	2	
CSH323B-T	ADVANCED NEURAL NETWORK	NIL	NA	CS	HARD		CORE	3	1	0	0	4	5
CSH323B-P	ADVANCED NEURAL NETWORK LAB							0	0	2	0	2	
CSH311B-T	THEORY OF AUTOMATA & COMPILER DESIGN	NIL	NA	CS	HARD		CORE	3	1	0	0	4	5
CSH311B-P	THEORY OF AUTOMATA &							0	0	2	0	2	

	COMPILER DESIGN LAB												
CHS234/ECS306B/ CSS325B- T&P	ENVIORNMENTAL ETHICS & SUSTAINABLE DEVELOPMENT/ GREEN COMPUTING/ E-WASTE MANAGEMENT	NIL	NA	CH/EC	SOFT	ELECTIVE	1	0	2	0	3		2
MOOC	NPTEL COURSES FROM MOOC												
CDO301	PROFESSIONAL COMPETANCY ENHANCEMENT-III	NIL	NA	CDC	OUTCOME	CORE	0	0	1	0	1		0.5
RDO601	RESEARCH & INNOVATION-II	NIL	NA	RESEARCH	OUTCOME	CORE	0	0	0	1	1		0.5
TOTAL (L-T-P-O/CONTACT HOURS/CREDITS)							13	4	1	0	28		23

Detailed Syllabus

CSU02- Semester-5

Course Title/ Code	DIGITAL SYSTEM DESIGN & MICROCONTROLLERS (ECH308B-T/P)
Course Type:	Core (Allied)
Course Nature:	Hard
L-T-P-O Structure	(3-1-2-0)

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	**100%**

Section A

Logic Simplification and Combinational Logic Design: Review of Boolean Algebra and De Morgan's Theorem, SOP & POS forms, Canonical forms, Karnaugh maps up to 6 variables, Binary codes, Code Conversion. MSI devices like

Comparators, Multiplexers, Encoder, Decoder, Driver & Multiplexed Display, Half and Full Adders, Subtractor, Serial and Parallel Adders, BCD Adder.

Section B

Sequential Logic Design: Building blocks like S-R, J-K and Master-Slave JK FF, Edge triggered FF, Ripple and Synchronous counters, Shift registers, Finite state machines, Design of synchronous FSM, Algorithmic State Machines charts. Designing synchronous circuits like Pulse train generator, Pseudo Random Binary Sequence generator, Clock generation.

Section C

VLSI Design flow: Design entry: Schematic, FSM & HDL, different modeling styles in VHDL, Data typesand objects, Dataflow, Behavioral and Structural Modeling, Synthesis and Simulation VHDL constructs and codes for combinational and sequential circuits. Concept of Programmable logic devices like FPGA. Logic implementation using Programmable Devices.

Section D

8- bit Microprocessor and Microcontroller architecture, Comparison of 8-bit microcontrollers, 16-bit and 32-bit microcontrollers. 8051 Architecture Internal Block Diagram, CPU, ALU, address, data and control bus, Working registers, SFRs, Clock and RESET circuits, Stack and Stack Pointer, Program Counter, I/O ports, Memory Structures, Data and Program Memory, Timing diagrams and Execution Cycles. Addressing mode, 8051 Instruction set, Instruction timings. Data transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Subroutine instructions, Bit manipulation instruction. Assembly language programs.

Text/Reference Books:
1. R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2009.
2. Douglas Perry, "VHDL", Tata McGraw Hill, 4th edition, 2002.
3. W.H. Gothmann, "Digital Electronics- An introduction to theory and practice", PHI, 2nd edition ,2006.
4. D.V. Hall, "Digital Circuits and Systems", Tata McGraw Hill, 1989
5. Charles Roth, "Digital System Design using VHDL", Tata McGraw Hill 2nd edition 2012.
6. M. A.Mazidi, J. G. Mazidi and R. D. McKinlay, "The8051Microcontroller and Embedded Systems: Using Assembly and C",Pearson Education, 2007.
7. K. J. Ayala, "8051 Microcontroller", Delmar Cengage Learning,2004.

Course Title/Code	Advanced Neural Networks (CSH323B-T&P)
Course Type:	Domain Core
Course Nature:	Hard
L-T-P-O Structure	3-1-2-0

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%

	TOTAL	100%

UNIT I: RNN

Gradient Descents, Recurrent Neural Network, Predicting the next character using RNNs, Hopifi eld Network, Gated Recurrent Unit (GRU), Bidirectional RNN

UNIT II Deep Learning:

Introduction to Deep Learning, Introduction to Tensorflow, creating a Deep Learning Network using Tensorflow

UNIT III Boltzmann Machines

Introduction to Boltzmann Machines, Restricted Boltzmann Machines, Collaborative Filtering using Boltzmann Machines, Markov Random Fields, Deep Boltzmann Machine

UNIT IV Deep Belief Networks

Introduction to Deep Belief Network, Stacking RBM to create Deep Belief Network, Wake Sleep Algorithm

UNIT V Modern Statistical Concepts

Learn about confidence intervals, define jackknife regression, Explain graphical models, Describe tetter goodness of fi t and yield metrics

Advanced Neural Networks Lab

List of Programs

1. Build a perceptron model from Scratch
2. Write a program to visualize different activation functions and their derivative
3. Write a program for Hyperparameter Tuning and Optimization in Tensorflow
4. Write a program for simulation of Jackknife estimation of mean and median
5. Write a program for understanding different tensorflow syntax and different operations.
6. Write a program to understand Keras in Tensorflow
7. Write a program for Linear Regression in Tensorflow
8. Write a program for Logistic Regression with Tensorflow
9. Write a program for Next character prediction using RNN in Tensorflow
10. Write a program for next character prediction using Bidirectional RNN in ensorflow
11. Write a program for next word prediction using RNN in Tensorflow
12. Write a program for Collaborative Filtering using RBM in Tensorflow
13. Write a program for Classification using DBN
14. Write a program for A/B Testing using Bayesian Method in Tensorflow

Course Learning Outcomes (CLOs)

On completion of this course, the students will be able to:-

1. UnderstandRegression with Tensorflow
2. Learn Keras concepts

Course Title/ Code	ENVIRONMENTAL ETHICS & SUSTAINABLE DEVELOPMENT(CHS234)
Course Type:	Elective (Allied)

Course Nature:	Soft
L-T-P-O Structure	(1-0-2)
Objectives	The students would be able to describe, explain and analyses the sustainable developmentconcerns and challenges. At the end of the course, the students would be able to • develop an inter-disciplinary understanding of sustainable development concerns; • recognise the challenges of sustainable development; the opportunities and limits in meeting these challenges; and • defend or criticise the sustainability initiatives adopted by different enterprises.

Syllabus	Sections	Weightage
	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	**100%**

Section A

Introduction to Sustainable Development
Definition of Sustainable Development; Triple Bottom Line, Components of TBL, Changing Perspective & Debates in Sustainable Development - Need for Sustainable Development, Evolution of the concept of Sustainable Development: Stockholm Conference, The Brundtland Commission, Earth Summit, Agenda 21; Millennium Development Goals

Section B

Challenges to Sustainable Development and Sustainable Development Goals (SDGs)
Challenges to Sustainable Development - Agriculture, Population & Food Security, Public Health and Nutrition, Education, Natural Resources (Forests, Energy, Water), Climate Change Sustainable Development Goals (SDGs) - Introduction, Challenges to SDGs, Indian Scenario.

Section C

Sustainability Strategies & Reporting
Sustainability Strategies & Reporting - Introduction, Rationale and Mechanisms, Key Principles, Sustainability Strategies Adopted by Different Enterprises – Case Studies

Section D

Sustainable Development and Contemporary Issues
Sustainable Consumption, Indigenous Knowledge, Gender Issues, Population & Sustainable Agriculture, Sustainable Tourism

Tools: Video lecture; research papers or articles, survey, presentations, white board

LAB EXPERIMENTS/ACTIVITIES

1. Survey - Business and non-business students' perception towards TBL (based on the readings listed above); inferences on the basis of survey; http://www.aabri.com/manuscripts/121249.pdf
2. Workshop based - Sustainable agriculture- Mushroom farming
3. Workshop based - Back to nature - DIY composting bin
4. Review - Sustainable Consumption in India: Challenges and Opportunities; Divesh Kumar, Praveen Goyal, Zillur Rahman, Ishwar Kumar; IJMBs Vol. 1, Issue 3, September 2011; http; ://www.ijmbs.com/13/devesh.pdf
5. Calculate Carbon Footprint/Ecological footprint
6. Stimulus Activity (Piece of writing) - Sustainable Consumption
7. CSR - Workshop for Village school children
8. Simulation Activity - Challenges to Sustainable Development
9. Case Studies - Sustainability initiatives @ TATA Motors, CAIRN INDIA, Mahindra & Mahindra, Subaru Isuzu, Disney, Novo Nordisk, etc.

VIDEO LECTURES:

1. Triple Bottom Line (TBL) - https://www.youtube.com/watch?v=2f5m-jBf81Q
2. How Humans Made Malaria So Deadly - https://www.youtube.com/watch?v=64pvlCtH-O
3. Ocean Confetti! - https://www.youtube.com/watch?v=qVoFeELi_vQ&spfreload=5
4. Sustainability explained through animation - https://www.youtube.com/watch?v=B5NiTN0chj0
5. SDGs - https://www.youtube.com/watch?v=uHEfRAooih8
6. Micro-plastics - https://www.youtube.com/watch?v=UpGt5L3GC7o
7. Sustainable Consumption - http://www.ijmbs.com/13/devesh.pdf.

BOOKS/READING MATERIAL

1. Environmental Management for Sustainable Development; C.J. Barrow; Routledge Publishers
2. Roberts, J.T., and Hite, A., 2000, From Modernization to Globalization - Perspectives on Development and Social Change, Blackwell Publishing
3. Sachs, J., 2004, Stages of Development, Speech at the Chinese Academy of Arts and Sciences
4. Giddings, B., Hopwood, B., and Geoff O'Brien, 2002, Environment, Economy and Society: Fitting Them Together into Sustainable Development, Published online in Wiley Inter Science (www.interscience.wiley.com). DOI: 10.1002/sd.199
5. IPCC, Adaptation to Climate Change in the context of Sustainable Development and Equity, www.ipcc.ch/ipccreports/tar/wg2/pdf/wg2TARchap18.pdf
6. Brundtland Commission, 1987, "Our Common Future", Oxford University Press
7. Food Insecurity Atlas of Rural India (2001) MS Swaminathan Research Foundation and World Food Programme.
   http://home.wfp.org/stellent/groups/public/documents/ena/wfp076968.pdf.
8. Maternal and Child Undernutrition 1 Maternal and child undernutrition: global and regional exposures and health consequences http://www.who.int/nutrition/topics/Lancetseries_Undernutrition1.pdf.

Course Title/Code	E-Waste: Environmental Problems and Management (ECS306B)
Course Type:	Domain Elective (Allied)
Course Nature:	Hard

L-T-P-O Structure	1-0-2-0
Course Objectives	1. Gain a better understanding and appreciation for the challenges related to waste management. 2. Create awareness about environmental impacts of e-waste. 3. Identify various components of e-waste

Syllabus	Sections	Weightage
	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

Section A

INTRODUCTION: E-Waste, Indian and global scenario of e-Waste, Growth of Electrical and Electronics industry in India, E-waste generation in India, Composition of e-waste, Possible hazardous substances present in e-waste, Environmental and Health implications.

Section B

E-WASTE LEGISLATION: Regulatory regime for e-waste in India, The hazardous waste(Management and Handling) rules 2003, E- waste management rules 2015, Regulatory compliance including roles and responsibility of different stakeholders – producer, manufacturer, consumer etc., Proposed reduction in the use of hazardous substances (RoHS) & REACH, Extended producer responsibility (EPR).

Section C

END OF LIFE MANAGEMENT OF E-WASTE: Historic methods of waste disposal – dumping, burning, landfill; Recycling and recovery technologies – sorting, crushing, separation; Life cycle assessment of a product – introduction; Case study – optimal planning for electronic waste.

Section D

ENVIRONMENTALLY SOUND E-WASTE MANAGEMENT: Emerging recycling and recovery technologies, Guidelines for environmentally sound management of e-waste, environmentally sound treatment technology for e-waste, Guidelines for establishment of integrated e-waste recycling and treatment facility, Case studies and unique initiatives from around the world.

LAB EXPERIMENTS:

1. Identify the hazardous materials present in printed circuit boards.
2. Extraction of copper of printed circuit boards in etching solution.
3. Demo of recycling process through videos.
4. Extraction of precious metal from e Waste.
5. Invited guest lecture.
6. Field visit to a waste management initiative in NCR.
7. Activity based learning: survey of the household practice of e-waste disposal and awareness.

8. Case study – presentation and group discussion.

REFERENCE BOOKS:

1. Electronic Waste Management, R E Hester, R M Harrison, RSC publishing.
2. E Waste: Implications, Regulations and Management in India and current global practices, Rakesh Johri, TERI PRESS.

Course Title/ Code	Green Computing (CSS325B-T&P)
Course Type:	Elective (Department)
Course Nature:	Soft
L-T-P-O Structure	(1-0-2)

	Sections	Weightage
	A	25%
	B	25%
Syllabus	C	25%
	D	25%
	TOTAL	100%

Section A

Overview and Issues: Problems: Toxins, Power Consumption, Equipment Disposal; Company's Carbon Footprint: Measuring, Carbon Footprint Calculator (online); Plan for the Future; Cost Savings: Hardware, Power.

Initiatives and Standards: Global Initiatives: United Nations, Basel Action Network, Basel Convention; WEEE Directive, Restriction on Hazardous Substances Directive, the Paris Climate Agreement.

Section B

Minimizing Power Usage: Power Problems, Monitoring Power Usage, Servers, Low-Cost Options, Reducing Power Use, Data De-Duplication, Virtualization, Management, Low Power Computers, PCs, Linux, Components, Servers, Computer Settings, Storage, Monitors, Power Supplies, Wireless Devices, Software.

Green Data Centers: The benefits of a green data center, developing a strategy, Energy optimization with IT equipment.

Section C

Changing the Way of Work: Old Behaviours, starting at the Top, Process Reengineering with Green in Mind, Analysing the Global Impact of Local Actions, Recycling, Energy, Pollutants, Teleworkers, Telecommuting, Outsourcing, how to Outsource, Ethics of Green Computing in Daily Life.

Recycling: Problems: China, Africa; Materials, Means of Disposal, Recycling, Refurbishing, Recycling Life Cycle, Life of a Product, Cost, Green Design, Recycling Companies, Certifications, Hard Drive Recycling, Consequences, cleaning a Hard Drive, Pros and cons of each method, CDs and DVDs, good and bad about CDs and DVDs disposal, Change the mind-set.

Section D

Greening Your Information Systems: Initial Improvement Calculations, Change Business Processes, Customer Interaction, Paper Reduction, Green Supply Chain, Improve Technology Infrastructure, Reduce PCs and Servers, Shared Services, Hardware Costs, Cooling.

Green Computing in Ancient India: Balance of life in Indian villages with nature: Use of biomass as fuel, no electricity; devices made of natural materials, absence of e-waste.

Applications of Green Computing: Energy Efficiency of algorithms, Green Networks, Green Cloud Computing, Green Internet of Things, Green Artificial Intelligence, Relevance to Industry 4.0.

Text books:

1. Green IT, Toby Velte, Anthony Velte, Robert Elsenpeter, McGraw Hill, 2008.

2. Green Data Center: Steps for the Journey Alvin Galea, Michael Schaefer, Mike Ebbers, Shroff Publishers and Distributers, 2011.

Reference Books:

1. Green Computing and Green IT Best Practice, Jason Harris, Emereo.

Online Content:

1. www.footprintcalculator.com

2. Living in Balance with Nature, Sachin Lakra, Kindle Desktop Publishing (online e-book only available at www.amazon.com).

Course Title/ Code	Professional Competency Enhancement-IV (CDO301)
Course Type:	Allied Core
Course Nature:	Soft
L-T-P-O Structure/Credits	(3-0-0)/0.5

Curriculum Outline – Aptitude Development

Section-A

Unit-1:Percentages

Increase & Decrease Concepts, Time Saver Tricks, Concepts of Population, Marks, Examinations & Exams.

Unit-2: Profit, Loss & Discount

Buying & Selling, Dishonest Dealers, Successive Discounts, Marked Price Concepts

Section-B

Unit-3:Ratio & Proportion

Combined Ratio, Division of Values, Proportion, Bags & Money and Partnership

Unit-4: Alligations or Mixtures

Rule of Alligation, Successive Replacement & Mixing

Section-C

Unit-5:Time & Work

Combined Work, Efficiency & Wages, Alternative, Changing Man Power

Unit-6: Pipes & Cisterns

Inputs & Leaks, Capacity of Tank

Section-D

Unit-7:Time, Speed & Distance

Average Speed, Relative speed, Trains, Boats & Streams, Circular Motion

Course Title/ Code	Research & Innovation-II (RDO601)
Course Type:	Research Type
Course Nature:	Hard
L-T-P-O Structure/Credits	(0-0-1)/0.5
Pre-Requisites:	Basic knowledge of Research

Course outcomes

XX-500.1. The students will be able to apply the contextual knowledge in designing and conducting the experiments

XX-500.2. To analyze and interpret the research outcomes

XX-500.3. To gain hands on experience in techniques/technologies

XX-500.4. To get an insight on the follow-up research

SECTION-A

Unit-1 Setting up the simulation/experiment environment

1.1 To conceptualize simulation/verifying experimental set up

1.2 Measurements on experimental system/simulations of the model

1.3 Choosing the appropriate research methodology

1.4 Finding the resources for performing experiments/simulations

SECTION-B

Unit-2 Planning of experiments

2.1 Formulate experimental procedures with Modification of the experimental set-up, if required

2.2 Procurement of materials

SECTION-C

Unit-3 Execution of experiments/simulations

3.1 Conduct experiments/ build prototype

3.2 Tabulating and recording data

3.3 Analysis and interpretation of the data

3.4 Comparison of the results with other reported experiments

3.5 Interpretation of observations

SECTION-D

Unit-4 Documentation and presentation

4.1 Integration of relevant theory, findings in a structured way and draw appropriate conclusions

4.2 Review and modification of the draft

4.3 Seminar presentation

4.4 Communication to conference/Journal

Course Title/ Code	Theory of Automata & Compiler Design (CSH311B) T & P
Course Type	Core
Course Nature	Hard

L-T-P-O Structure	(3-1-2-0)
Objectives	Student will able to understand the principles and techniques of programming language translation.

Syllabus	Sections	Weightage
	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

Section-A

Finite Automaton: Finite State Systems, Representation of finite automaton, Non-Deterministic finite automata (NDFA), Deterministic finite automata (DFA), Equivalence of DFA and NDFA. Removals of ε – moves from finite automata, Minimization of finite Automata, Regular Expressions: - regular expression, Equivalence of finite automata and Regular Expressions, Arden's theorem. The Pumping Lemma for Regular Sets, Closure properties of regular sets and regular language.

Section-B

Context free grammar: - Reduced forms, Chomsky Normal Form (CNF), Griebach Normal Form (GNF). Pushdown Automata: - NDPDA, DPDA, LBA. Turing Machines: - Deterministic and Non-Deterministic Turing Machines, universal Turing machine, Design of TM Chomsky hierarchy.

Section-C

Compilers and translators, structure of compiler. Lexical Analyser: Lexical Analysis, recognition of tokens, Syntax Analysis: parsing, Parsing Technique: Topdown approach(Recursive Descent, Recursive Predictive and Non Recursive Predictive parsing Techniques). Bottom Up approach: Shift- reduce parsing, operator precedence parsing, LR parsers, SLR, LALR and Canonical LR parser.

Section-D

Syntax Directed Translations: Syntax directed definition, construction of syntax trees, syntax directed translation scheme, and implementation of syntax directed translation, three address code, quadruples and triples. Code Optimization & Code Generation: Code generation, forms of objects code, machine dependent code, optimization, register allocation for temporary and user defined variables. Peephole optimization.

List of Experiment:
1. Regular expression,
2. Finite Automaton,
3. Identify and remove Left Recursion
4. Pushdown Automaton Lexical Analyzer
5. First and Follow
6. Parsing algorithm: SLR,CLR, and LALR,
7. Optimization: common subexpressions
8. dead code elimination

9. Create basic block.

Text Books:

1. Compilers Principle, Techniques & Tools - Alfread V. AHO, Ravi Sethi& J.D.Ullman; - 1998 Addison Wesley.
2. Compiler Design by O.G. Kakde, 1995, Laxmi Publ.

Reference Books:

1. Theory and practice of compiler writing, Tremblay & Sorenson, 1985, Mc. Graw Hill.

CSU02- Semester-6

	SEMESTER - 6												
SUBJECT CODES	SUBJECT NAME	PRE-REQUISITE	OVERLAPPING/EQUIVALENT COURSES	**OFFERING DEPARTMENT	*COURSE NATURE (Hard/Soft/ Workshop/ NTCC/ Audit)	COURSE TYPE (Core/Elective)	L	T	P	O	NO. OF CONTACT HOURS PER WEEK	NO. OF CREDITS
CSH207B-T	SOFTWARE ENGINEERING	NIL	NA	CS	HARD	CORE	3	1	0	0	4	5
CSH207B-P	SOFTWARE ENGINEERING LAB						0	0	2	0	2	
CSH301B-T	COMPUTER NETWORKS	NIL	NA	CS	HARD	CORE	3	1	0	0	4	5
CSH301B-P	COMPUTER NETWORKS LAB						0	0	2	0	2	
CSH324B-T	NATURAL LANGUAGE PROCESSING	NIL	NA	CS	HARD	CORE	3	1	0	0	4	5
CSH324B-P	NATURAL LANGUAG						0	0	2	0	2	

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Code	Course	Pre-req 1	Pre-req 2	Dept	Type	Category	L	T	P		Credits	
	E PROCESSING LAB											
CSH308B-T	ADVANCED JAVA						2	0	0	0	2	
CSH308B-P	ADVANCED JAVA LAB	OOPS using JAVA	NA	CS	HARD	CORE	0	0	2	0	2	3
CSH303B-T	MOBILE COMPUTING WITH ANDROID	OOPS USING JAVA	NA									
CSH303B-P	MOBILE COMPUTING WITH ANDROID LAB											
CSH313B-T	DATA WAREHOUSE & DATA MINING	NIL	NA	CS	HARD	ELECTIVE	3	0	2	0	5	4
CSH313B-P	DATA WAREHOUSE & DATA MINING LAB											
CSH306B-T	SYSTEM NETWORK & ADMINISTRATION	NIL	NA									
CSH306B-P	SYSTEM NETWORK & ADMINISTRATION LAB											
MOOC	NPTEL COURSES FROM MOOC											
LWS323/LWS325	CYBER LAW/ LAW RELATING TO INTELLECTUAL PROPERTY RIGHTS	NIL	NA	LW	SOFT	ELECTIVE	2	0	0	0	2	2
MOOC	NPTEL COURSES											

							L	T	P	O	Contact Hours	Credits
ECW312B/MEW315B/CSW317B	ELECTRONIC DESIGN WORKSHOP/ 3-D SOFTWARE/ AGILE TECHNOLOGIES	NIL	NA	EC/ME/CS	WORKSHOP	ELECTIVE	0	0	3	0	3	1.5
MOOC	NPTEL COURSES FROM MOOC											
CSW407B	USER EXPERIENCE	NIL	NA	CS	WORKSHOP	CORE	0	0	3	0	3	1.5
ECW310B/MEW318B/CSW318B/CSW352B/CSW207	SENSORS & IOT/ 3 D Printing/ R PROGRAMMING/ IMAGE EDITING & ANIMATION	NIL	NA	EC/ME/CS	Workshop	ELECTIVE	0	0	3	0	3	1.5
MOOC	NPTEL COURSES FROM MOOC											
CDO302	PROFESSIONAL COMPETANCY ENHANCEMENT-IV	NIL	NA	CDC	OUTCOME	CORE	0	0	1	0	1	0.5
TOTAL (L-T-P-O/CONTACT HOURS/CREDITS)							16	3	0	0	39	29

Detailed Syllabus

CSU02- Semester-6

Course Title/ Code	Software Engineering(CSH207B) T & P
Course Type:	Core (Department)

B.Tech(CSE) 90

Course Nature:	Hard
L-T-P-O Structure	(3-1-2-0)
Objective	To study software development principles and to focus on the fundamentals of modeling aspects of software project using the Unified Modeling Language.

Syllabus	Sections	Weightage
	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

Section-A

Introduction: Evolving role of software, Software Characteristics, Software crisis, Silver bullet, Software myths, Software process, Personal Software Process (PSP), Team Software Process (TSP), emergence of software engineering, project and product

Software Development Life-cycle: Software life cycle models: Build and fix, Waterfall, incremental and evolutionary process, model, spiral model, agile methodology, and selection of a life cycle model.

Section-B

Software Requirement Analysis and Specifications: Problem Analysis, Requirements engineering: Requirement elicitation, Requirement Analysis, Requirement documentation, Requirement Review, Types of requirements, Behavioral and non-behavioral requirement, feasibility study, Requirement elicitation: Interviews, Brainstorming, FAST, QFD, Use case Approach; Requirement analysis: DFDs, E-R diagram; Requirement documentation: Software Requirement Specification.

Software Project Planning: Project management concepts, planning the software project, Size Estimation—LOC based, FP based, COCOMO- A Heuristic estimation techniques, staffing level estimation, Putnam Resource Allocation model, risk analysis and management

Section-C

Software Design: Design concepts and principles: the design process, Modularity: Cohesion, Coupling, Strategies of design: bottom up, top down, hybrid design, User interface design, Object Oriented design: Class Diagrams, Interaction Diagrams-State chart Diagrams-Activity Diagrams

Software Metrics: Token Count,Data Structure Metrics, Information Flow Metrics.

Software Quality Models and Standards: Quality concepts, Software quality Assurance, SQA activities, CMM, The ISO 9000 Quality standards: The ISO approach to quality assurance systems, The ISO 9001 standard, software reliability

Section-D

Software Testing: Software process, Functional testing: Boundary value analysis, Equivalence class testing, Decision table testing, Cause effect graphing, Structural testing: Path testing, Data flow and mutation testing, unit testing, integration and system testing, Debugging, Testing Tools & Standards.

Software Maintenance: Management of Maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software Re-engineering, Configuration Management, Documentation

LIST OF EXPERIMENTS: Tool Used: - Rational Rose Software

1. To identify the requirements of the project from the Problem statement and conduct Requirement elicitation techniques like Interviews, Brainstorming, FAST, QFD.
2. To perform E-R Modeling (E-R diagram, DFD) for the Problem Statement.
3. To Model UML Use Case Diagrams and capture Use Case Scenarios.
4. To design Software Requirement Specification document.
5. To estimate Size Metrics by calculating the number of Unadjusted Function points of the project using programming
6. To estimate Size Metrics by calculating the number of total Function point of the project using programming.
7. To draw Class Diagram and Interaction Diagrams.
8. To draw State Chart and Activity Diagrams.
9. To design test cases for the project using Black box testing.
10. To design test cases for the project using White box testing.

Text Books:

1. R. S. Pressman, "Software Engineering – A practitioner's approach", 3rd ed., McGraw Hill Int. Ed., 1992.
2. K.K. Aggarwal&Yogesh Singh, "Software Engineering", New Age International, 2001

Reference Books:

1. R. Fairley, "Software Engineering Concepts", Tata McGraw Hill, 1997.
2. P. Jalote, "An Integrated approach to Software Engineering", Narosa, 1991.
3. James Peter, W Pedrycz, "Software Engineering", John Wiley & Sons
4. Sommerville, "Software Engineering", Addison Wesley, 1999.

Course Title/ Code	Advanced Java(CSH308B) T&P
Course Type	**(Department)**
Course Nature	Hard
L-T-P-O Structure	(0-0-3-0)
Objectives	Students will be able to design/Create GUI desktop applications and web applications with database connectivity along with client server architecture and frameworks for solving real life problems.

Syllabus	Sections	Weightage
	A	25%

B	25%	
C	25%	
D	25%	
TOTAL	**100%**	

Section-A

GUI Application: Review of Java Basic Features (OOPS concepts, data types), Event Handling: Delegation event model, event interfaces & classes, Swing: Swing containers, LayoutManager, Swing Components (JLabel, JFrame, JPanel, Swign buttons, JList, JComboBox, JRadio buttons, JTextField, JTable ,JTree), Swing Menu. JAR files

Java Database Connectivity: Connectivity model, java.sql package, JDBC Exception classes, Database connectivity steps, Data manipulation and navigation, creating database applications.

Section-B

Java Generic: type parameters, methods and classes**, Lambda expression** with single or multiple parameters**, Collection framework:** Collection interface and methods, List, Queue, Set & Map -interfaces and classes, Iterator, ListIterator & Enumeration interface.

Networking: Networking basics, Client/server model, Socket programming using Socket and ServerSocket class, Inet Address class, URL & URLConnection class, create networking applications.

Section-C

Java Servlets: Lifecycle& Architecture, ServerletConfig, Servlet Context, Sharing information among servlet, GenericServlet, ServletRequest, and ServletResponse , HttpServletRequest, HttpServletResponse and HttpServlet ,Request-response, headers, GET, POST.

Session Management: Hidden form fields, Cookies, session tracking, Http Session, Exception handling and error pages.

Section-D

Java Server Pages: Introduction, Architecture, Lifecycle , JSP mplicit object , JSP syntax: directives, scripting element, standard action elements, Model View Controller (MVC) , Data Sharing among JSP pages.

Frameworks in Java Struts: Introduction to the Apache Struts, MVC Architecture, Struts Architecture, How Struts Works? , Introduction to the Struts Controller, Introduction to the Struts Action Class, Using Struts ActionFrom Class, Using Struts HTML Tags, Introduction to Struts Validator Framework, Client Side Address Validation in Struts, Custom Validators Example, Developing Application with Struts Tiles.

LIST OF EXPERIMENTS:
1. GUI using Swings
2. Event Handling in GUI application
3. Java Database Connectivity (JDBC)
4. Java Generic program
5. Java Collection program
6. Networking and Socket Programming
7. Servlet application
8. JSP application
9. Struts framework

Text Books:

1. Core Java, Volume II: Advanced Features 9th Edition by Cay Horstmann
2. Java: The Complete Reference, Ninth Edition
3. Advanced Java Programming by Uttam K. Roy (Oxford university)

Reference Book:
1. O'Reilly Series for JSP and Servlets

2. O'Reilly Series for Swings and AWT

Course Title/Code	Computer Networks (CSH301B) T & P
Course Type	Core
Course Nature	Hard
L-T-P-O Structure	(3-0-2)
Objectives	● To familiarize the students with different protocols, network components, functioning of different layers and IEEE standards employed in computer networking.

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

Section-A

DATA COMMUNICATION: Components –Transmission Modes, Synchronous and Asynchronous transmission – networks – Components and Categories – types of Connections – Topologies –Protocols and Standards – ISO / OSI model – TCP/IP Model

PHYSICAL LAYER: Transmission Media -- Line Configuration -- Line Coding -- Modem -- Interconnection devices: Hub, Repeater, Switch, Bridges, Router, and Gateway

Section-B

DATA LINK LAYER& LOCAL AREA NETWORK: Framing -- Error – detection and correction, Window based – Flow Control and Error control - stop and wait –sliding window- go back-N ARQ – selective repeat ARQ. –Access Techniques: STDM, FDMA, TDMA, Spread Spectrum techniques, and CDMA, DSSS, FHSSS – Media Access Control: Aloha. Pure Aloha, Slotted Aloha, Polling, CSMA, CSMA/CD -- IEEE 802 Standards -LAN - Ethernet IEEE 802.3 - IEEE 802.5 – IEEE 802.6 -- IEEE 802.11 – FDDI--X.25 – HDLC -- Frame Relay – ATM -- SONET/SDH

Section-C

NETWORK LAYER: Internetworks Switching : Circuit Switching, Packet Switching, Virtual Circuit and PVC, Message Switching, Cell Switching – IP addressing – Subnetting–classful and classless– Routing Algorithms – Distance Vector

Routing – Link State Routing, Path Vector Routing -- Error control and congestion control—ARP,RARP,ICMP,DHCP --IPV4 and IPV6 – NAT -- Mobile IP

Section-D

TRANSPORT LAYER: Duties of transport layer – Multiplexing – Demultiplexing – Sockets – User Datagram Protocol (UDP) – Transmission Control Protocol (TCP) – Congestion Control – Quality of services (QOS).
APPLICATION LAYER: Client Server model -- Network File System -- Remote Login- TELNET, FTP -- EMAIL SYSTEM: SMTP, POP3, IMAP4 -- DNS, DNS Server – HTTP – SNMP, Network Security .Firewalls -- Proxy Servers – VLAN-- VPN -- NETWORK Simulator case Study—Cisco Packet Tracer.

LIST OF EXPERIMENTS:
1. Study of different types of Network cables and practically implement the cross-wired cable and straight through cable using clamping tool.
2. Working of Network Devices in Detail.
3. Sharing of Drive or folder over the Network
4. Sharing of printer over the network.
5. Study of basic network command and Network configuration commands i.e. attributes likeipconfig, ping, Tracert, Pathping, Netstat, Arp, Netstate
6. Find the IPAddress using getHostAddress,getByName.
7. Configure a Network topology using packet tracer software.
8. Track the network using a network management and monitoring tool
9. Connect the computers in Local Area Network using hub.
10. Find the MAC address using packet tracer software.
11. LAN-to-LAN Connections.
12. Advanced LAN Switching Configuration - VLANs
13. Building Inter-VLAN Network with a Router and Layer-3 Switch
14. Basic Router Configuration
15. RIP Version 2 and Debugging
16. Configure a Network using Distance Vector Routing protocol.
17. Configure Network using Link State Vector Routing protocol.

Text Books:

1. Data Communications and Networking by ForouzanBehrouz A., TMH Publications
2. Computer Networks (3rd edition), Tanenbaum Andrew S., International edition, 1996

Reference Books:

1. Data Communications, Computer Networks and Open Systems (4th edition), Halsall Fred, 2000, Addison Wesley, Low Price Edition. -
2. Computer Networks – A System Approach, Larry L. Peterson & Bruce S. Davie, 2nd Edition Computer Networking – ED Tittel , 2002, T.M.H.

Course Title/Code	Natural Language Processing (CSH324B-T&P)
Course Type:	Domain Core
Course Nature:	Hard

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

L-T-P-O Structure — 3-1-2-0

UNIT I Natural Language Processing

Introduction to Natural Language Processing

Types of NLP systems, How computer understands text, Terminologies used in NLP, Steps Involved in NLP, Steps involved in preprocessing , Pipeline of NLP Problems o Challenges in NLP

UNIT II Words & Vectors

Concepts of words and vectors, Techniques of converting words to numbers, GloVe Word Embeddings, Word2Vec and its types, such as Skip Gram, Model and Continuous BOW o Advanced word vectors, limitations of CBOW and Skip Gram

UNIT III Processing Techniques

Word window classification, Dependency parsing, Constituency parsing o Machine translation, Attention, End to end models for speech processing, Deep learning for speech recognition, Tree recursive neural networks o RNN for language modelling, Dynamic neural network for question answering

UNIT IV: Case Studies

Smart Home Services Provider Uses Natural Language Generation to Create Highly Personalized Website Copy, Online Education Company Improves Customer Support with Autosuggestion of Macros, Using Natural Languag for Health care Summaries, Microsoft Gets the Pulse of Customer Sentiment with Natural Language Processing

Natural Language Processing Lab

List of Programs
1. Text Classification using Word Embeddings.
2. Find Synonyms and antonyms using Word Embeddings.
3. Introduction to Topic Modelling.
4. Converting a Foreign Language to English using Machine Translation(German to English).
5. Twitter Sentiment Analysis.
6. Explaining Lemmatization, PoS Tagging,
7. Stemming and Tokenization using an Example.
8. Understanding Dependency Parsing in a given sentence.
9. Perform Speech to Text Conversion using PyAudio and Google Speech Recognition.
10. Creating Custom Speech Recognition Corpus.
11. Introduction to Dynamic Memory Network.
12. Dialog Generation using Deep Learning.

Course Learning Outcomes (CLOs):

On completion of this course, the students will be able to:-
1. Understand the sentiment analysis
2. Learn text classification concepts

Course Title/ Code	Mobile Computing with Android (CSH303B) T & P
Course Type:	Elective
Course Nature:	Hard Course
L-T-P-O Structure	(3-0-2-0)
Objectives	Students would be able to develop Android applications

Syllabus	Sections	Weightage
	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

Section-A

Get started with Kotlin: Kotlin basics, installing IntelliJ IDEA, understanding project structure in Kotlin, Kotlin functions, classes and inheritance, interface, lambdas, higher order functions, and extension functions. Android Introduction: Android ecosystem, building blocks, framework architecture, installing Android Studio and AVD, understanding project structure, android resources, building your first app.

Section –B

Android application UI and Architecture: Creating activities and fragments and their lifecycle, understanding Implicit and Explicit, Manifest File use. User interfaces and layouts (Linear, Relative, and Constraint), layout properties, data binding, creating navigation graphs, and navigating between screens in an Android app. Architecture: UI layers, persistence.

Section-C

Android Menu, Background operation and Testing: Component Event Handle, Component Focus, Threads, Menu: Appbar with Option menu, Contextual menu, Pop Menu, Sub menu, and menu via XML and Code, Dialog, Navigation: Back & Hierarchy, Array & Base Adapters. Custom List View, Grid View using adapters & Recycler View, Styles and Themes, Adaptive Layout and Resource. Testing using TestCase Class / Espresso. **Background Operation:** AsyncTask and AsyncTaskLoader, Broadcast Receivers, Service, Notification.

Section-D

DATABASES AND ANIMATIONS: Storing Options: Shared Preference, Internal & External Storage, SQLite, SQLite Operation, and Sharing Data between Applications with Content Providers and Content Resolver. Working with Cursors: Inserts,

Update and delete. Reading and Updating Contacts, Reading Bookmarks. Graphics and Animation: Custom views, Canvas, animation APIs, Multimedia: Audio, Video. Permission, performance and Security. Firebase feature and App publish.

LIST OF EXPERIMENTS:

1. Installation and setup of java development kit(JDK),setup android SDK,setup eclipse IDE,setup android development tools (ADT) plugins,create android virtual device.
2. Creating basic kotlin programs.
3. Create "Hello World" application. That will display "Hello World" in the middle of the screen using TextView Widget in the red color.
4. Create application for demonstration of android activity life cycle and Scroll View in Android.
5. Create an application for demonstration of Relative and Table Layout in android.
6. Create Registration page to demonstration of Basic widgets available in android.
7. Create sample application with login module.(Check username and password). On successful login, ChangeTextView "Login Successful". And on failing login, alert user using Toast "Login fail.
8. Create login application where you will have to validate username and passwords till the username and password is not validated, login button should remain disabled.
9. Create an application to run Explicit Activity using Intent.
10. Create an application that will get the Text entered in Edit Text and display that text using Toast.
11. Create an application that will pass two numbers using TextView to the next screen, and on the next screen display the sum of that number.
12. Create an application to Demonstrate Dialog Box Control In Android.
13. Create an UI such that one screen have list of all the types of cars. On selecting any car name, next screen should show Car details like: name, launched date, Company name using database connectivity.
14. Run audio file in the background of previous application.
15. Animate an image view when it is clicked.

Text Books:
1. Dawn Griffiths, David Griffiths, "Head First Kotlin", O'Reilly Media, Inc., ISBN: 9781491996690
2. John Horton, "Android Programming with Kotlin for Beginners", Packt Publishing, ISBN:9781789800883, 1789800889

Reference Book:

1. Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd (2011).
2. Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd(2009)
3. https://google-developer-training.github.io/android-developer-fundamentals-course-concepts-v2/index.html
4. https://developer.android.com/courses/kotlin-android-fundamentals/toc

Course Title/ Code	Data Warehousing and Data Mining(CSH313B) T & P
Course Type:	ELECTIVE (Departmental)
Course Nature:	HARD
L-T-P-O Structure	(3-0-2-0)
Objectives	The student will be able to design and represent multi-dimensional models and obtain business intelligence from them.

Syllabus	Sections	Weightage

A	25%
B	25%
C	25%
D	25%
TOTAL	100%

Section-A

Introduction to data ware house and decision making: Need for data warehousing, Escalating Need for strategic information, Decision making, failures of past decision-support systems, operational versus decision-support systems, data warehousing – the only viable solution. Applications of Data ware house**:** Operational System and Business Intelligence.

Data ware house: Data warehouse definition, types of data warehouses and data marts, types of data marts, ETL process, 3 – Tier data warehouse architecture, Meta data, role of meta data repository in data warehouse, distributed and virtual data warehouses.

Section-B

Multidimensional Data Model: Difference between Database System and Data Warehouse, Multidimensional data model, Facts, Dimensions, Measures, Data cubes, Schemas for Multidimensional Database (Stars, snowflakes and fact constellations) defining schemas. OLAP Technology: Starnet query model, Concepts Hierarchies, Partitioning strategies, OLAP operations: Slice, Dice. Roll up, Drill down, Pivot etc., Types of OLAP servers: ROLAP, MOLAP, HOLAP. Data warehouse implementation: Computation of data cubes, Partial Materialization, Indexing OLAP data, and Efficient Processing of OLAP queries. Tuning and testing of data warehouse.

Section-C

Data Mining: Data mining definition & task, KDD versus data mining, Data Mining Applications , Data preprocessing, Classification of data mining systems, Data mining task primitives, data mining techniques, Data mining query languages .Data mining techniques: Mining frequent Patterns, Association, and correlation.

Section-D

Classification & Prediction: Decision tree knowledge discovery, Bayesian Classification, Neural Networks (MLP) &Support Victor Machines (SVM). Classification Accuracy and error measures, evaluating the accuracy of Classifier.
Clustering Analysis: K-means and K-Medoids, outlier analysis. Mining complex data object: (Spatial databases, Multimedia databases, Time series and Sequence data mining Text Databases and mining Word Wide Web).

LIST OF EXPERIMENTS:

1. To generate a data table in MS Access and perform various tasks on the data.
2. To Implement Pivot Table, Report Generation for the table data.
3. To study /implementation of various task on data using MS Excel.
4. To implement Pivot Chart , Pivot table of a given Data in table using MS Excel.
5. Introduction to data mining tool.
6. To implement Classification.
7. To Implement Association rule.
8. To implement Clustering.
9. To study PDI(Pentaho Data Integration) IDE.
10. To Create new repository in PDI and performing various tasks.

Text Books:

1. Data Warehousing In the Real World; Sam Anahory& Dennis Murray; 1997, PearsonNo .of copies in the Library.
2. Data Mining- Concepts & Techniques; Jiawei Han &Micheline Kamber- 2001, Morgan K aufmann.No.of copies in the Library.
3. Data Mining Techniques; Arun Pujari; 2001, University Press; Hyderabad.No.of copies in the Library.

Reference Book:

1. Paul Raj Poonia, "Fundamentals of Data Warehousing", John Wiley & Sons, 2003.No.of copies in the Library.
2. Sam Anahony, "Data Warehousing in the real world: A practical guide for building decision support systems", John Wiley, 2004.
3. W. H. Inmon, "Building the operational data store", 2nd Ed., John Wiley, 1999.
4. Mattison R., Web Warehousing and Knowledge Management, Tat McGraw-Hill .
5. Ponniah P., Data Warehousing, Wiley.

Course Title/ Code	System and Network Administration (CSH306B) T & P
Course Type:	Hard (Department)
Course Nature:	Elective
L-T-P-O Structure	(3-0-2-0)
Objectives	To understand roles and responsibilities of System and Network Administrator and to become skilled at related technologies.

Syllabus	Sections	Weightage
	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	**100%**

Section –A

INTRODUCTION TO SYSTEMS AND NETWORK ADMINISTRATION: The Scope of Systems and Network Administration, Goals of Systems and Network Administration, System Components and their Management. Windows and Unix/Linux Variants: History, File Systems and Standards (UFS, NFS, NTFS), Processes and Job Control, Privileged, User and Group Accounts, Logs and Audits, Systems Performance Tuning.

Section-B

HOST MANAGEMENT: Installing the Operating System, Basic DOS/Windows/Unix commands and tools, Command Line vs. GUI, Start up (booting) and Shutdown, Task Manager, System Processes: Scheduling jobs (Scheduler/Cron), job monitoring, (Event viewer/Ps), start and stop jobs, (Command vs. Scheduled Tasks GUI tool), Disk administration: Formatting, partitioning, Disk De-Fragmentation, RAID, Swap space, Basic client/server file sharing: Files, Directories and Memory Management, Permissions, Access Control List.

<div align="center">**Section-C**</div>

NETWORK ADMINISTRATION: TCP/IP, Connecting Devices, Addressing and Subnetting, DNS, DHCP, VLAN Principles and Configuration, Routing Concepts, Static and Dynamic Routing, Proxy Server, Network Address Translation (NAT), VPN, Firewalls: Filtering Rules.

<div align="center">**Section-D**</div>

ADVANCED TOPICS: Automating System Administration Tasks, Scripts, Registry edit (Shell/Python), Performance Monitoring and Optimization, Other Control Panel and Administration tools items, Computer Management GUI tool. Windows update, Security and backups, Patches, Passwords, Kerberos, Enigma, TCP Wrappers, Backup methods.

LIST OF EXPERIMENTS:

1. Installation of Operating System.
2. Management of User and Group account.
3. Setting up of a LAN environment.
4. Introduction and Installation of Window Server
5. Configuring the Windows Server Environment.
6. Setting up the Local Security Policy.
7. Troubleshooting Resources (Utility Commands).
8. Use of Event Viewer and Performance Monitor
9. Installation of Local and Network Printer.
10. Sharing Files and other resources.
11. Setting up Firewall and Filtering rules.
12. Case Study of recent configuration loop holes.

Text Books:
1. "Principles of Network and System Administration", Mark Burgess, 2000, John Wiley and Sons Ltd

Reference Book:
2. "TCP/IP Protocol Suit", Behrouz A. Forouzan, (2nd Edition), Mc Graw Hill Publications.
3. "Linux Network Administrator's Guide", Olaf Kirch and Terry Dawson, (2nd Edition), O'Reilly and Associates Inc., 2000, (Shroff Publishers and Distributors, Culcutta),
4. "TCP/IP Network Administration" (3rd Edition), Craig Hunt, O'Reilly and Associates Inc., 2002)
5. "Modern Operating Systems", Andrew S. Tanenbaum, (4th Edition), PHI Publications.

Course Title/Code	ELECTRONIC DESIGN WORKSHOP/ ECW312B
Course Type:	WORKSHOP (Departmental)
Course Nature:	Hard
L-T-P-O Structure	0-0-3-0
Course Objectives	Design, implement and test the prototype in order to solve the conceived problem.

Experiment List: Using Eagle 8.3.2 version/ PCB Design Hardware Lab

1. Design & Analysis of low pass & high pass filter using Resistance & capacitance
2. Design & Analysis of band pass & band stop filter using Resistance & capacitance
3. Design & Analysis of half-wave rectifier with effects of variable capacitance
4. Design & Analysis of full-wave rectifier with effects of variable capacitance
5. Project: Design & Analysis of 5V power supply.
6. Project: Design & Analysis of Mobile Phone Charger.
7. Project: Design & Analysis of Water Level Indicator.
8. Project: Design of FM receiver for Radio Manav Rachna.

Course Title/Code	3 DESIGN SOFTWARE-I (MEW315B)
Course Type	OPEN ELECTIVE (Allied)
Course Nature	Workshop
L-T-P-O Structure	0-0-3-0
Course Objective	To give better visualisation and future forecasting capabilities of the component. Ability to understand various international codes and standards as they are included in the design software. Integration of drawing with CNC machines and 3D printers for manufacturing purpose. Can do the analysis of various components in order to find out the design statistics.

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	**100%**

Section A

Introduction to design software: a solid modeler, Feature-Based, Parametric, and Associative. The design software interface : screen layout, Main Window ,Pull-Down Menus Toolbar, Display Area , Message Area, working with models ,Using Dialog Boxes Retrieving Models, Retrieving Multiple ,Models ,Saving Changes, Closing Windows, Deleting Files ,pick and place features: Creating the Straight Hole Feature, Creating the Simple Round , Specifying Radius Values for a Simple Round, Creating an Edge Chamfer
Sketcher basics: The sketcher environment, he sketcher interface, intent manager ,pop-up menus sketcher mode functionality, sketcher menus , specifying references , creating geometry ,dimensioning, constraining ,additional sketcher tools, setting sketcher preferences sketcher philosophy, rules of thumb ,laboratory practical.

Section B

Sketched features: Two sketched features, specifying extruded and revolved forms, sketching and reference planes, The Sketching Plane's Default Orientation
Datum planes: Using base features and datum planes,the base feature and its importance, datum plane, using default datums as the base feature, creating additional datum planes, defining a datum plane, internal datums.

Section C

Parent/child relationships: Parent/child relationships with pick-and-place features, parent/child relationships with a sketched feature, changing the parents of a feature, order of feature regeneration, using feature insert mode

Sweeps and blends: Swept features, defining a sweep, sweep sections and trajectories, blend features, creating parallel blends

Duplicating features: patterns and copy: Creating a pattern, benefits of patterning, types of patterns, pattern options, the copy feature, specifying location, choosing features, establishing dependence

Section D

Drawings and views: Drawing fundamentals, creating a drawing, adding drawing views, types of views, adding a cross section, manipulating views, laboratory practical

Creating assemblies Assembly creation: the surface normal vector, constraint options, packaging or under-constrained, components, assembly modification, changing design intent of the assembly, other assembly options, extracting a bill of materials, creating exploded views.

TEXT BOOKS & REFERENCES
1. Design Software: Tutorial and Multimedia CD

Course Title/ Code	Agile Technologies (CSW317B)
Course Type	Core (Departmental)
Course Nature	Workshop
L-T-P-O Structure	(0-0-3-0)
Objectives	To introduce the practical applications of agile software development tools.

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	**100%**

Section-A

Agile Programming Tools: UNIX, Eclipse, Git, jUnit,Processes: Stories, End-to-end Testing, Unit Testing, TDD, Refactoring. Reading: Scrum, Extreme Programming, Features Driven Development, Lean Software Development

Section-B

Agile DesignTools: Use Cases, PowerPoint Design, Requirements/Story Extraction, Test Case Management. Processes: Use cases to Design, Design to Backlog, Backlog to Tasks, End to End Testing, Estimation

Section-C

Agile Architecture/Design and Continuous IntegrationTools: Jenkins, Maven, Cucumber. Processes: Scrum, Architecture, Iterative Refinement, Agile Design.

Agile Process ManagementTools: Agilefant. Processes: Agile Process Management, Estimation, Burn-down, Release Planning, Multi-team coordination, Distributed teams

List of Experiments

1. Test Driven Development on Eclipse using jUnit
2. Software Configuration Management using Git
3. Backlog development from use cases and user interface designs using Specification by Example
4. End-to-end/Acceptance tests using Cucumber
5. Continuous Integration using Jenkins
6. Agile Process Management using Agilefant.

Text Books:

1. Robert C. Martin, Clean Code: A Handbook of Agile Software Craftsmanship, available at http://www.it-ebooks.info/book/1441/.

Reference Links:

1. Agile software development, http://en.wikipedia.org/wiki/Agile_software_development
2. Scrum, http://en.wikipedia.org/wiki/Scrum_%28software_development%29
3. Extreme Programming, http://en.wikipedia.org/wiki/Extreme_programming
4. Feature-drive development, http://en.wikipedia.org/wiki/Feature-driven_development
5. Lean Software development, http://en.wikipedia.org/wiki/Lean_software_development
6. Test-driven development, http://en.wikipedia.org/wiki/Test-driven_development
7. Unit testing, http://en.wikipedia.org/wiki/Unit_testing
8. Specification by example, http://en.wikipedia.org/wiki/Specification_by_example
9. Behavior-driven development, http://en.wikipedia.org/wiki/Behavior-driven_development
10. Code refactoring, http://en.wikipedia.org/wiki/Code_refactoring
11. User Experience, http://en.wikipedia.org/wiki/User_experience

Tool Web Sites:

1. Ubuntu, http://www.ubuntu.com/desktop
2. Eclipse, https://eclipse.org/users/
3. jUnit, http://junit.org/
4. Git, http://git-scm.com/
5. Jenkins, https://jenkins-ci.org/
6. Ant, http://ant.apache.org/
7. Maven, https://maven.apache.org/
8. Cucumber, https://cukes.info/
9. Fitnesse, http://www.fitnesse.org/
10. Agilefant, http://agilefant.com/

Course Title/Code	IOT & SENSORS WORKSHOP (ECW310B)
Course Type:	WORKSHOP (Departmental)
Course Nature:	Hard
L-T-P-O Structure	0-0-3-0

Course Objectives	Design, implement and test the prototype in order to solve the conceived problem.

LIST OF EXPERIMENTS:

1. IOT and Acoustic and Sound Sensors.
2. IOT and Chemical Sensors
3. IOT and Optical Sensors
4. IOT and Mechanical Sensors
5. IOT and Electromechanical Sensors
6. IOT and Thermal Sensors
7. IOT and Proximity Sensors
8. IOT and Pressure Sensors
9. IOT and Magnetic Sensors
10. Mini Project

Course Title/ Code	3D Printing(MEW318B)
Course Type:	OPEN ELECTIVE (Departmental)
Course Nature:	WORKSHOP
L-T-P-O Structure	(0-0-3-0)
Course Objective:	To increase knowledge on modelling & characterizations and develop specific tools for that Explain current and emerging 3D printing applications in a variety of industries Evaluate real-life scenarios and recommend the appropriate use of 3D printing technology Identify opportunities to apply 3D printing technology for time and cost savings Design and print objects containing moving parts without assembly

- Introduction of 3D Printing
- Evolution of 3D Printing
- What is additive manufacturing?
- General procedure of 3D Printing
- 3D CAD file formats
- Stereo lithography (stl) files
- Various Printing technologies (SLA, SLS, FDM, Poly jet printing,
- Color jet Printing, SHS, SLM, LOM, Multi jet Printing, DLP)
- FDM in detail
- Operating Plasto 200 - Live demonstration
- STL principles
- Object placement
- Object analysis
- Slicing and printing
- Print settings

Course Title/ Code	R Programming (CSW318B)
Course Type	Core (Departmental)
Course Nature	Workshop
L-T-P-O Structure	(0-0-3-0)
Objectives	To introduce the practical applications of R development tools.

Syllabus	Sections	Weightage
	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

Section-A

Introduction to R, Understand the use of 'R' in the industry, Compare R with other software in analytics, Install R and the packages useful for Business Analytics,Using the R console, Getting help, Learning about the environment, Saving your work.R Vectors, Data Frames

Section-B

Variables: Variables and Assignment, Decision Making, Loops in R, Classes & Objects in R, Reading CSV, Excel and Text files. Writing and saving data objects to file, the various steps involved in Data Cleaning, Functions used in Data Inspection.

Section-C

Tackling the problems faced during Data Cleaning, Uses of the functions like grepl(), grep(), sub(),Packages installation used for database import, Connect to RDBMS from R using ODBC and basic SQL queries in R.

Section-D

Understanding Data Visualization, Graphical functions present in R, Plot various graphs like tableplot, Scatter Plot, Histogram, Box plot,Line graph,Bar charts,Pie charts. Customizing Graphical Parameters to improvise the plots, R Mean, Median, Mode, Linear Regression, Logistic Regression,Poission Regression, Normal Distribution and Binomial Distribution.Time Series Analysis, Decision Tree, Random Forest, Dimensionality reduction of Data: PCA, SVD, Predictive Analysis. Time series Decomposition, Time series clustering and classification.

Course Title/ Code	User Experience(CSW407B) T & P

Course Type:	Elective (Departmental)
Course Nature:	Workshop
L-T-P-O Structure	(0-0-3-0)
Objectives	Students will be able to learn the ability to design good interface. To make clear distinction between good design and better design.

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	**100%**

Section A

HCI: Introduction to HCI, Goals of System Engineering, Goals of User-Interface Design, Usability of Interactive Systems Motivations for Human Factors in Design, Guidelines, Principles and Theories, Conceptual, Semantic, Syntactic and Lexical Model, GOMS (Goals, Operators, Methods, and Selection) and Keyboard-level model, HCI, Object-Action Interface Model. Interaction Styles: Introduction to interaction Devices, Keyboards and Function Keys, Pointing Devices, Speech and Auditory Interfaces, Speech Recognition, Image and Video Displays, Printers, Response Time and Display Rate with Respect to Display, Goals of Collaboration, Asynchronous and Synchronous Interfaces, Face-to-Face Interfaces.

Section B

Design Processes: Three Pillars of Design, Development Methodologies, Ethnographic Observation, Participatory Design, Scenario Development, Expert Reviews.
Tools and Testing: Usability Testing and Laboratories, Acceptance Testing, Evaluation during Active Use, Specification Methods, Interface Building Tools, Evaluation Tools.

Section C

Direct Manipulation (examples, explanations), Visual Thinking and Icons, 3D Interfaces, Virtual Reality, Introduction to Menu Selection, Form Fill-in and Dialog Boxes, Task Related Organizations, Fast Movement through Menus, Item Presentation Sequences, Response Time and Display Rate, Data Entry with Menus, Menu Layout, Command-Organizational Strategies, Naming and Abbreviations, Command Menus, Natural language in Computing.

Section D

Presentation Design Issues: Error Messages, Display Design, Individual-Window Design, Multiple Window Design and Coordination by Tightly-coupled Windows, Color.
Information Search & Visualization: Introduction, Search in Textual Documents and Database Querying, Multimedia Document Searches, Advanced Filtering and Search Interfaces, Information Visualization, OAI Model for Website Design.

LIST OF EXPERIMENTS:

1. Introduction to PENCIL Tools and its Controls.
2. To study the process of creating an animation with 2D objects, motion and sound.
3. To draw the Path and resizable shapes.
4. To draw the images and special constraints for Dimension and Handle.
5. Using external SVG.
6. Drawing sketchy lines.
7. Designing a model for website development.
8. Designing a User Interface.
9. Creating a PENCIL based Presentation with UI Controls.
10. Project based on PENCIL.

Text Books:

1. Schneiderman, Ben and Catherine Plaisant, Designing the User Interface (DTUI), Fifth edition, (Addison-Wesley, 2010)
2. Dix, Alan, Janet Finlay, Gregory D Abowd, Russell Beale, Human-Computer Interaction (HCI), Third edition (Pearson, 2004)

Reference Book:

1. Bill Buxton, Sketching User Experiences: Getting the Design Right and the Right Design (Interactive Technologies) , Elsevier, 2007.
2. Bill Moggridge, Designing Interactions , MIT Press, 2008.

Course Title/ Code	**PROFESSIONAL COMPETANCY ENHANCEMENT-IV(CDO302)**
Course Type:	**Allied Core**
Course Nature:	Soft
L-T-P-O Structure/Credits	(2-0-0-0)/0.5

Course Outcomes:

Students will acquire basic knowledge about aptitude
Students will become better at analytics and problem solving
Students will be able to solve aptitude problems quickly utilizing the short cuts
Students will have enhanced level of reasoning, numerical skills and speed
Students will have the ability to 'quickly think on their feet'
Students will have enhanced concentration & thinking ability.

SECTION-A – Quantitative Aptitude

Unit 1: Modern Math

1.1 Permutation and Combination

      1.1.1 Principal of counting and basic formulas

      1.1.2 Arrangements, Selection and Selection + Arrangement.

      1.1.3 Linear/Circular arrangements, Digits and Alphabetic Problems and Applications.

1.2 Probability

1.2.1 Events and Sample Space, Basic Formulas.

1.2.2 Problems on Coins, Cards and Dices.

1.2.3 Conditional Probability, Bayes' Theorem and their Applications.

Unit 2: Advanced Math

2.1 Mensuration 1- Areas

2.1.1 Different types of Triangles and their area and perimeter.

2.1.2 Different types of Quadrilateral and their area and perimeter.

2.1.3 Circumference and Area of Circle, Area of Sector and length of Sector.

2.1.4 Mixed Figures and their Applications.

2.2 Mensuration 2- Surface Areas and Volumes

2.2.1 Problems on Cubes & Cuboids, Cone, Cylinder and Sphere.

2.2.2 Prism and Pyramid.

2.2.3 Mixed Figures and their Applications.

SECTION-B

Unit 3: ALGEBRA :

3.1   Linear and Quadratic equations.

3.2   Inequalities.

3.3   Integral Solutions and Max and Min values

Unit 4:Professional Writing

4.1. Profiling on Social Sites: LinkedIn, Facebook, Instagram

4.2. Cover Letter/Emails

4.3. Resume Writing

SECTION-C

Unit 5: Group Discussions

5.1. Do's and Dont's of a Group Discussion

5.2. Roles played in a Group Discussion

5.3. Tips for Cracking a Group Discussion

SECTION-D

Unit 6: Managing Interviews

6.1. Developing the employability mindset

6.2. Preparing for Self -Introduction

6.3. Researching the employer

6.4. Portfolio Management

6.5. Answering Questions in an Interview

Text Books/Reference Books:

1. Quantitative Aptitude : R S Aggarwal, S Chand & Company Pvt Ltd
2. Quantitative Aptitude for CAT: Arun Sharma
3. Verbal Ability and Reading Comprehension: MVN Enterprises

Weblinks:

http://www.indiabix.com/aptitude/questions-and-answers/

http://www.indiabix.com/non-verbal-reasoning/questions-and-answers/

Course Title/ Code	Cyber Law (LWS323)
Course Type:	Elective
Course Nature:	Soft
L-T-P-O Structure	(2-0-0-0)
Objectives	The Objective is this paper is to focus on basic concepts of Cyber Law relevant for understanding evolution of Cyber law and its conformity in any changing society.

	Sections	**Weightage**
Syllabus	A	25%
	B	25%
	C	25%
	D	25%

Section A

Computer and its impact in society:- (Contact Hours - 4)

A. Need for Cyber Law in 21st Century.
B. Development of Cyber Law in India.

Section B

Privacy Issues & Access Rights :- (Contact Hours -6)

A. Freedom of speech and expression in Cyberspace.
B. Right to Privacy and Right to Data Protection.

<div align="center">

Section C

</div>

Cybercrimes and Legal framework:- (Contact Hours -3)

A. Kinds of Cyber Crimes: Hacking, Digital Forgery, Phishing, Spam, Malware etc.
B. Cyber Stalking, Cyber Pornography, Cyber Vandalizing etc.
C. Concept of Property in Cyberspace.

<div align="center">

Section D

</div>

Information and Technology Act & Intellectual Property Rights :- (Contact Hours - 3)

A. Historical Background & Objectives etc.
B. Legal Recognition of Electronic Record & Procedures.
C. Offences and Penalties etc.

Tutorial activities 1 Hr/Week
- Quiz on Cyber Law and Cyberspace
- Discussion on Different types of Cyber Crimes and its negative effects on the Society
- Study about the various implementations of Information technology act,2000
- Any other suitable activity

Reference Books:

1. Cyber Law - Law of Information Technology and Internet – Anirudh Rastogi
2. Cyber Law in India(Law on Internet) – Dr. Farooq Ahmad

Course Outcome:-

1. The student will be able to understand the concepts and development of Cyber law in India.
2. The student will be able to examine the practical aspect of the existence of Cyber Crimes from Historic to Present Phase.
3. The Student will try to understand and deduce the various factors attributing to the rise of Cyber Crime and its impact on society.
4. The Student will understand the development of Legal Reforms in Present day society and what factors impact such legal reforms.

Course Title/ Code	Law Relating to Intellectual Property Rights (LWS325)
Course Type:	Elective
Course Nature:	Soft
L-T-P-O Structure	(2-0-0-0)
Objectives	The objective of this paper is to orient students to legal studies. The paper focuses on generally about law and legal system.

Syllabus	Section	Weightage
	A	25%
	B	25%
	C	25%
	D	25%

Section A
Introduction to IPRs and Trademark and Trade Secrets (Contact Hours 4)
a. Introduction to various types of IPR Laws
b. Protection of Trademarks under Trademarks Act – Basic legal Framework
c. Trade Secrets and protection thereof

Section B
Protection of Copyright, Traditional Knowledge, Design and Integrated Circuits (Contact hours 4)
a. Legal Framework relating to Copyright protection in India
b. Protection of Industrial Designs under Designs Act
c. Protection of integrated circuits

Section C
Law relating to Patents (Contact Hours - 4)
a. Legal Framework for registration and protection of patents and related rights

Section D
IT Law and Cyber Offencesand other IPRs (Contact Hours – 4)
1. Introduction to Information Technology Act, 2002
2. **Cyber** Offences
3. Geographical Indicators and PPVFBR

Tutorial activities 1 Hr/Week
a. Statutes and Case Laws
b. Case studies from India and abroad

CSU02- Semester-7

SEMESTER - 7												
SUBJECT CODES	SUBJECT NAME	PRE-REQUISITE	OVERLAPPING/EQUIVALENT COURSES	**OFFERING DEPARTMENT	*COURSE NATURE (Hard/Soft/Workshop/NTCC/Audit)	COURSE TYPE (Core/Elective)	L	T	P	O	NO. OF CONTACT HOURS PER WEEK	NO. OF CREDITS
CSH416 B-T	COMPUTER VISION & DATA	NIL	NA	CS	HARD	CORE	3	1	0	0	4	5

Code	Course	Prereq		Dept	Level	Category	L	T	P	S		Credit
	VISUALIZATION											
CSH416 B-P	COMPUTER VISION & DATA VISUALIZATION LAB						0	0	2	0	2	
CSH311 B-T	THEORY OF AUTOMATA & COMPILER DESIGN	NIL	NA	CS	HARD	CORE	3	1	0	0	4	5
CSH311 B-P	THEORY OF AUTOMATA & COMPILER DESIGN LAB						0	0	2	0	2	
CSH310 B-T	COMPUTER GRAPHICS & MULTIMEDIA	NIL	NA	CS	HARD	CORE	3	1	0	0	4	5
CSH310 B-P	COMPUTER GRAPHICS & MULTIMEDIA LAB						0	0	2	0	2	
CSH312 B-T	ADVANCED ANDROID DEVELOPMENT	MOBILE COMPUTING WITH ANDROID	NA	CS	HARD	ELECTIVE	3	0	2	0	5	4
CSH312 B-P	ADVANCED ANDROID DEVELOPMENT LAB											
CSH315 B-T	N/W SECURITY & CRYPTOGRAPHY	COMPUTER NETWORKS	NA									
CSH315 B-P	N/W SECURITY & CRYPTOGRAPHY LAB											
CSH404 B-T	CLOUD COMPUTING	NIL	NA									
CSH404 B-P	CLOUD COMPUTING LAB											
CSH405 B-T	SOFTWARE TESTING	SOFTWARE ENGGINEERING.	NA									
CSH405 B-P	SOFTWARE TESTING											
CSH402 B-T	BIG DATA	NIL	NA									
CSH402 B-P	BIG DATA LAB											
MOOC	NPTEL COURSES FROM MOOC											
EDH422	BIOLOGY	NIL	NA	ED	HARD	CORE	2	0	0	0	2	2
ECH403 B-T	WIRELESS SENSOR	NIL	NA	ECE	HARD	ELECTIVE	3	1	2	0	6	5

B.Tech(CSE) 113

	NETWORK												
ECH403 B-P	WIRELESS SENSOR NETWORK LAB												
MEH403 B-T	OPERATION RESEARCH BY OPTIMISING TECHNIQUE			ME									
MEH403 B-P	OPERATION RESEARCH BY OPTIMISING TECHNIQUE LAB												
CSH414 B-T	INFORMATION RETRIEVAL												
CSH414 B-P	INFORMATION RETRIEVAL LAB			CSE									
MOOC	NPTEL COURSES FROM MOOC												
TOTAL (L-T-P-O/CONTACT HOURS/CREDITS)									**14**	**3**	**8**	**0**	**31**	**26**

Detailed Syllabus

CSU02- Semester-7

Course Title/Code	Computer Vision & Data Visualization CSH416B-T&P
Course Type:	Domain Core
Course Nature:	Hard
L-T-P-O Structure	3-1-2-0

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	**100%**

Unit 1: Introduction to Computer Vision and Image Processing

B.Tech(CSE) 114

Image Processing, Elements of Image Processing System, Computer Vision, Computer Graphics, Application Areas, Imaging Geometry, Image Sampling, Mathematical Tools, Image transformations: 2D and 3 D Transformation, Image Enhancements-Intro, Image Segmentation-Intro, Cognitive Aspects of Color, VR/AR, Object Recognition, Object Tracking

Unit 2: Introduction to Open CV

Introduction, GUI Features, Operations: Pixel Editing, Geometric Transformations, Feature Detection, Video Analysis and Tracking, Stereo Imaging, Calibration, OpenCV-Python, Visualizations, Image Denoising, Object Detection, Transformation and Spatial Filtering Introduction, Functions, Histogram, Histogram Equalization, Histogram Matching (Specification), Local Histogram Processing, Using Histogram Statistics for Image Enhancement Introduction to Spatial Filtering, Smoothing & Sharpening Image Filters

Unit 3: Image compression & Segmentation

Fundamentals, Coding Redundancy, Spatial Redundancy, Irrelevant Information, Models, Compression Methods, Huffman Coding, Golomb Coding, Arithmetic Coding, LZW Coding, Run-Length Qlding, Symbol-Based Coding, Bit-Plane Coding, Block Transform Coding, Predictive Coding, Wavelet Coding, Human Vision, Applications, Point Line and Edge Detection, Shot Boundary Detection, Interactive Segmentation, Visual Appearance, Image Segmentation by Clustering Pixels, Basic Clustering Methods, The Watershed Algorithm, Segmentation Using K-means, Graphs, Fitting, Motion Segmentation, Model Selection, Case Studies

Unit 4: Object Recognition & Tracking

Shape correspondence and shape matching, Sliding Window Method, Patterns, Structural Methods, Deformable Objects, Tracking, Strategies, Matching, Tracking with Filters, Data Association, Particle Filtering

Unit 5: Motion Estimation

Regularization theory, Optical computation, Stereo Vision, Motion estimation, Structure from motion

Computer Vision & Data Visualization Lab

List of Objectives

1. Discuss about important transformations used in imaging.
2. Write a code to detect car from image.
3. Write a program that will detect a change in the video feed.
4. Explain the 4 variations of image denoising in OpenCV, using Python.
5. How to perform histogram matching using OpenCV?
6. Compress an image without losing the quality of the image.
7. Analyze an image using histogram and enhance the image using Histogram statistics.
8. Detect Lane lines from images or video, primarily by using edge detection.
9. Implement image segmentation using edge detection segmentation and python.
10. Implement image segmentation using clustering and python.
11. Implement image segmentation using CNN.
12. Write a program to calculate the distance from an object to the camera using stereo vision.
13. Perform motion estimation in videos.

Course Learning Outcomes (CLOs):

On completion of this course, the students will be able to:-
- Understand the computer Vision Techniques
- Learn image Segmentation using Python

Computer Vision & Data Visualization Lab

List of Objectives

14. Discuss about important transformations used in imaging.
15. Write a code to detect car from image.
16. Write a program that will detect a change in the video feed.
17. Explain the 4 variations of image denoising in OpenCV, using Python.
18. How to perform histogram matching using OpenCV?
19. Compress an image without losing the quality of the image.
20. Analyze an image using histogram and enhance the image using Histogram statistics.
21. Detect Lane lines from images or video, primarily by using edge detection.
22. Implement image segmentation using edge detection segmentation and python.
23. Implement image segmentation using clustering and python.
24. Implement image segmentation using CNN.
25. Write a program to calculate the distance from an object to the camera using stereo vision.
26. Perform motion estimation in videos.

Course Learning Outcomes (CLOs):

On completion of this course, the students will be able to:-
- Understand the computer Vision Techniques
- Learn image Segmentation using Python

Course Title/ Code	Computer Graphics and Multimedia(CSH310B) T & P
Course Type:	CORE (Department)
Course Nature:	HARD
L-T-P-O Structure	3-1-2-0
Objectives	The student will be able to apply the Computer Graphics algorithms and techniques to generate graphical outputs and to examine applications of modeling, design and visualization.

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

Section-A

Introduction: Concepts and Application of Graphics, Display Devices: CRT, Raster, And Random, Flat Panel displays.
Basics Primitives: Scan conversion, Point representation, Line representation: DDA, Bresenham's Line Algorithm

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(1stOctant, Integer, General), Circle representation: Generalized Circle generating Algorithm, Bresenham's Circle, Midpoint Circle. **Filled area algorithms**: Flood Fill, Boundary Fill, Scan Line Fill, Edge Fill.

Section-B

2-D Transformation: Basic Transformations (Translation, Rotation, Scaling, Reflection, Shearing), Matrix representation and Homogeneous Coordinates, Coordinate transformation, Composite transformations.**3-D Transformation:** Basic Transformations, Matrix representation, Coordinate transformation, Composite transformations. **Viewing and clipping**: 2-D Viewing, Pipeline, Window to viewport mapping, Clipping: Point, Line and Polygon Clipping.

Section-C

3-D Projections- Parallel and Perspective. **Hidden Surface removal**: Introduction to hidden surface removal, Z-buffer Algorithm, Scanline Algorithm, Area subdivision method.
Representing Curves & Surfaces: Parametric representation, Bezier curve, B-Spline curve, Interpolation method.**Illumination**: Shading, Image manipulation, Illumination model, shading models for polygons, shadow, and transparency.

Section-D

Multimedia Fundamentals: Concepts**,** Application & Framework of Multimedia system, Multimedia devices
.**Multimedia building blocks**: Using Text in Multimedia, Still Images: bitmap, vector drawing & 3-D drawing and rendering, Image file formats. Sound: Audio-Speech recognition, Digital Audio MIDI, Multimedia Authoring Tools.
Compression Techniques:JPEG Compression, MPEG Compression, DVI.A**nimation:** Introduction to Animation, Principle of Animation, Animation Types, Animation Tools.

LIST OF EXPERIMENTS:

1. Understanding of Basic Graphics Code.
2. Understanding of Basic Graphics Functions.
     a. Line ( ); Cleardevice ( ); Closegraph( ); Getx( ); Gety( ); Getmaxx (); Getmaxy ( ); Getpixel( ); Putpixel( ); Getcolor( ); Getbkcolor( );   Circle( ); Rectangle ( ); Ellipse( ); Arc ( ) ; Setcolor ( ); Setbkcolor( ); Settext( ); Outtext( ); Outtextxy( ).
3. Program to draw the shape of hut,flag,car.
4. Implement the DDA and Bresenham algorithm to draw a line.
5. Implement the Bresenham and midpoint algorithm to draw Circle.
6. Program to Change the Color and Design of Circle.
7. Program to implement the Flood Fill and Boundary Fill Algorithm.
8. To perform 2D transformations (translation, rotation, scaling, shearing, reflection).
9. To implement composite transformations and clipping algorithm.
10. To perform animations using C.
11. To study the introduction to Flash and Flash tools.
12. To apply animations on various objects using Frames.
13. To study the implementation of animations using layers and guided layers.
14. To implement motion tweening and shape tweening.

Text Books:

1. Computer Graphics by Donald Hearn and M.Pauline Baker, 2nd Edition, 1999, PHIedition, 1996.
2. An introduction, Villamil & Molina, Multimedia Mc Milan, 1997.

Reference Book:

1. Computer Graphics Principles and Practices second edition by James D. Foley, Andeiesvan Dam, Stevan K. Feiner and Johb F. Hughes, 2000, Addision Wesley.
2. Procedural Elements for Computer Graphics – David F. Rogers, 2001, T.M.H Second Edition.
3. Mathematical Elements for Computer Graphics – David F. Rogers, 2001, T.M.H Second Edition.
4. Multimedia: Making it work, Tay Vaughan, fifth edition, 1994, TMH.
5. Multimedia Systems by John .F. Koegel, 2001, Buford.

Course Title/ Code	Advance Android Development (CSH312B) T & P
Course Type:	Elective (Departmental)
Course Nature:	Hard
L-T-P-O Structure	(3-0-2-0)
Objectives	Students would be able to develop advance android application.

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

Section-A

Fragment: Creating a fragment and its layout, adding a fragment to an activity, Fragment lifecycle, Communication between a Fragment and an Activity. App widgets: creating widget to an app, updating the widget provider-info. Sensors: Discovering sensors and sensor capabilities, sensor configuration. Device orientation and rotation. Motion and position sensor.

Section-B

Performance: Good performance, performance test, frame rate, minimize overdraw, Garbage collection, Memory leak and memory churn, memory profiler tool, Network and battery best practices, Optimizing images and serializing data. Localization: Understanding language and locale settings, using the Translation Editor, Formatting date and time, numbers, currencies.

Section-C

Location: Requesting location permissions and last known location, Geocoding, creating a Location. Request object, working with the user's location settings. Places: Using the place-picker UI, Getting the device's current place, using the place-autocomplete service. Mapping: GoogleMap objects, Map types, Configuring the initial map state, Lite mode, Map style.

Section-D

Custom views: Creating and drawing the custom view, using custom view in a layout, using property accessories and modifiers. **Canvas:** Canvas object, creating and drawing canvas object, drawing shapes and text, Transformations, Clipping, saving and restoring a canvas. **Animation:** View animation, Property animation, Drawable animation, Physics-based animation.

LIST OF EXPERIMENTS:

1. Lab: Creating a Fragment with a UI and communication with a fragment
2. Lab: Building app widgets
3. Lab: Working with sensor data
4. Lab: Working with sensor-based orientation
5. Lab: Using the profile GPU Rendering tool
6. Lab: Using the Debug GPU Overdraw and Layout Inspector tools
7. Lab: Using the Systrace and dumpsys tools, memory profiler tool
8. Lab: Using resources for languages
9. Lab: Using the device location
10. Lab: Using the places API
11. Lab: Adding a Google Map to your app
12. Lab: Creating a custom view from scratch and View subclass
13. Lab: Creating and drawing a canvas object
14. Lab: Creating property animations

Text Books:

1. Advanced Android Application Development by Joseph Annuzzi (Jr.), Lauren Darcey, Shane Conder, Addison-Wesley.
2. https://developers.google.com/training/courses/android-advanced
3. Android Developer Advance – Concepts by Developed by Google Developer Training

Reference Book:
1. Professional Android 2 Application Development by Reto Meier, Wiley.

Course Title/ Code	Network Security and Cryptography (CSH315B) T & P
Course Type:	**Elective (Departmental)**
Course Nature:	Hard
L-T-P-O Structure	(3-0-2-0)
Prerequisite	Computer Networks
Objectives	Students will be able to understand different security methods and issues and will be able to secure their data from attacks.

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	**100%**

Section-A

INTRODUCTION: Need of security, Security approaches, Principles of Security, Types of attacks, Encryption, Decryption, Symmetric and asymmetric key cryptography, Diffie-hellman key exchange algorithm and man in the middle attack, programs that attack, Introduction to Steganography.

Section-B

Cryptographic techniques and authentication: Substitution and transposition techniques, DES (Data Encryption Standard), Double DES and Meet in the middle attack, Tripple DES, AES (Advanced Encryption Standard), IDEA(International Data Encryption Algorithm), RSA algorithm, Digital signature, Knapsack algorithm, Authentication and authorization, Authentication techniques: What you know, What you have, What you are, Mutual authentication, Reflection attack.

Section-C

Message Digest and internet security protocols: Introduction to Message Digest, Requirements of message digest, Birthday attack, MD5, SHA (Secure Hash Algorithm), SSL (Secure Socket layer), TSP (Time Stamping Protocol), SSL (Secure Socket Layer), SET (Secure Electronic Transaction).

Section-D

Advanced security: Firewalls, IP security, VPN (Virtual Private Network), Denial of Service (DOS) attack, Electronic money, Single Sign On (SSO)

Case study of Phishing and Pharming attack, Case study of unbreakable codes.

LIST OF EXPERIMENTS:

1. Exercise to perform passive attacks.
2. Exercise to perform active attacks.
3. Exercise to Encrypt and decrypt a text using DES
4. Exercise on substitution techniques.
5. Exercise on transformation techniques.
6. Exercise on authentication techniques.
7. Exercise to create message digest.
8. Exercise to break unbreakable codes.

Text Books:
1. KahateAtul, "Cryptography and Network Security", Tata McGraw-Hill Education Pvt. Ltd, New Delhi.
2. Stallings William, "Cryptography and Network Security", Pearson Education Inc.

Reference Book:
1. Forouzan Behrouz A.,"Cryptography and Network Security",McGraw Hill Companies Inc., New York.

Course Title/ Code	Cloud Computing (CSH404B) T & P
Course Type:	Elective (Departmental)

Course Nature:	Hard	
L-T-P-O Structure	(3-0-2-0)	
Objectives	Students will be able to learn the concepts, techniques and implementation of clouds.	

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	**100%**

Section-A

Overview of Cloud Computing: Brief history and evolution - History of Cloud Computing, Evolution of Cloud Computing, Traditional vs. Cloud Computing. Why Cloud Computing, Cloud service models (IaaS, PaaS&SaaS). Cloud deployment models (Public, Private, Hybrid and Community Cloud), Benefits and Challenges of Cloud Computing.

Working with Private Cloud: Basics of virtualization, Virtualization technologies, Server virtualization, VM migration techniques, Role of virtualization in Cloud Computing. Business cases for the need of Cloud computing environment, Private Cloud Definition, Characteristics of Private Cloud, Private Cloud deployment models, Private Cloud Vendors, Private Cloud Building blocks

namely Physical Layer, Virtualization Layer, Cloud Management Layer, Challenges to private Cloud, Virtual Private Cloud. Implementing private cloud (one out of CloudStack, OpenStack, Eucalyptus, IBM or Microsoft)

Section-B

Working with Public Clouds: Public Cloud, Public Cloud Service Models, and Public Cloud Players. Infrastructure as a Service Offerings, IaaSVendors, PaaS offerings, PaaS vendors, Software as a Service. Implementing public cloud (one out of AWS, Windows Azure, IBM or Rackspace).

Application Development: Service creation environments to develop cloud based applications. Development environments for service development; Amazon, Azure, Google App.

Section-C

Cloud Services Management: Reliability, availability and security of services deployed from the cloud. Performance and scalability of services, tools and technologies used to manage cloud services deployment; Cloud Economics: Cloud Computing infrastructures available for implementing cloud based services.

Cloud Infrastructure: Architectural Design of Compute and Storage Clouds - Layered Cloud Architecture Development –Design Challenges. Inter Cloud Resource Management System – Resource Provisioning and platform Deployment-Global Exchange of Cloud Resources.

Future directions in Cloud Computing: Future technology trends in Cloud Computing with a focus on Cloud service models, deployment models, cloud applications, and cloud security. Migration paths for cloud, Selection criteria for cloud deployment.Current issues in cloud computing leading to future research directions.

Section-D

Business Clouds: Cloud Computing in Business, Various Biz Clouds focused on industry domains (Retail, Banking and Financial sector, Life Sciences, Social networking, Telecom, Education). Cloud Enablers (Business Intelligence on cloud, Big Data Analytics on Cloud)

Programming Cloud IT Model: Parallel and Distributed Programming Paradigms, Twister and Iterative MapReduce, Hadoop Library from Apache- Mapping Applications – Programming Support of Google App Engine, Cloud Software Environments – including Eucalyptus, Open Nebula, OpenStack, Aneka and Cloud Sim.

LIST OF EXPERIMENTS:

1. Creation of EC2 Instance on Amazon.
2. Implementation of Load Balancing.
3. Deployment of various services on Amazon.
4. Design, development and implementation of a given business application.
5. Management of one application using multi-cloud management.

Text Books:
1. A Practical Approach Cloud Computing: By Anthony T Velte, Toby J Velte, Robert C Elsenpeter.
2. Distributed and Cloud Computing: From Parallel Processing to the Internet of Things, *Kai Hwang, Jack Dongarra and Geoffrey Fox*, Morgan Kaufmann, 2011.

Reference Book:
1. Cloud computing: Implementation, management and security By Rittinghouse, John, W.
2. Cloud Computing Bible, By Barrie Sosinsky, Wiley, 2011.
3. Cloud Computing Architected: Solution Design Handbook by Rhoton, John.
4. Cloud Security, A comprehensive Guide to Secure Cloud Com puting by Krutz, Ronald L.; Vines, Russell Dean
5. Cloud Computing: Principles and paradigms By Raj Kumar Buyya, James Broberg, AndrezeiM.Goscinski, 2011

Course Title/ Code	Software Testing(CSH405B)T&P
Course Type:	Domain Elective (Departmental)
Course Nature:	Hard
L-T-P-O Structure	(3-0-2-0)
Objectives	Student will be able to implement software testing skills to test any given software based on the requirements specification.

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%

	TOTAL	100%

Section-A

INTRODUCTION: Software Testing Techniques, software testing fundamentals: objectives, principles, testability; Test case design, V Model.

CODE TUNING TECHNIQUES: Use of Correct Data Type, Ordering statements in switch, Stop testing in a loop when result is known, Minimizing array references, Jamming and Un-switching of Loops, Minimizing Computations in loop.

FUNCTIONAL TESTING TECHNIQUES: BLACK BOX TESTING: Exploratory Testing, Logic Coverage: Interface Testing, Boundary Value Analysis, Robustness Testing, Worst Case Testing, Equivalence Class Testing.

Section-B

FUNCTIONAL/STRUCTURAL TESTING TECHNIQUES: Decision Table based Testing, Cause Effect Graphing Technique, and White box testing, Basis Path Testing, DD Paths and Cyclomatic Complexity.

STRUCTURAL TESTING TECHNIQUES: WHITE BOX TESTING: Graph Matrices, Data Flow Testing, Mutation Testing, Unit Testing, Integration Testing.

REDUCING THE NUMBER OF TEST CASES: Regression Testing, Regression Test Process, Selection of Regression Tests, Prioritization Guidelines, Slice based testing.

Section-C

OBJECT ORIENTED TESTING: Issues in OO Testing, Class Testing: Random Testing, Class Testing: Partition based Testing, Object Oriented Integration and System Testing, System Testing.

DEBUGGING AND DEFECT TRACKING REPORT: Debugging Techniques, Debugging through Code Inspection, Debugging using Logs, Debugging using IDE, Creating Defect Tracking Reports.

TEST MANAGEMENT: Test Planning, Test Management, Test Automation, Testing Tools, Static vs. Dynamic Testing Tools.

Section-D

TEST AUTOMATION USING SELENIUM: INTRODUCTION: Why Selenium? , Selenium Vs other tools (HP etc), Selenium Components, Selenium RC vs Web driver, Selenium Core, Selenium IDE, Remote Control (Selenium1), Web driver (Selenium2), Grid, Locators & types, Test Automation, Getting started with Selenium IDE, Useful Tools for Writing Test Cases Firefox Add-ons, Basic Html Theory.

TEST AUTOMATION USING SELENIUM: RECORDING TESTS: Selenium Commands – SELENESE, Pattern Matching, Element Locators, Selenium RC Overview, Install and Run Selenium RC, Recording and Playing Back Test Cases, Test Case Verification, Working with Test Suites, Test Case HTML Reports.

TEST AUTOMATION USING SELENIUM: RECORDING TESTS: The Eclipse IDE, Running a Test Using the JUnit Export from Selenium-IDE, Running a Test Using the TestNG Export from Selenium-IDE, Data Driven Testing using TestNG.

Text Books:
1. William Perry, "Effective Methods for Software Testing", John Wiley & Sons, New York, 1995.
2. Louise Tamres, "Software Testing", Pearson Education Asia, 2002.
3. CemKaner, Jack Falk, Nguyen Quoc, "Testing Computer Software", Second Edition, Van Nostrand Reinhold, New York, 1993.

4. David Burns, "SELENIUM 2 TESTING TOOLS : BEGINNER'S GUIDE", Packt Publishing.

Reference Books:
1. K.K. Aggarwal&Yogesh Singh, "Software Engineering", 2nd Ed., New Age International Publishers, New Delhi, 2005.
2. Boris Beizer, "Software Testing Techniques", Second Volume, Second Edition, Van Nostrand Reinhold, New York, 1990.
3. AdityaGarg, "A Practitoner's Guide To Test Automation Using Selenium", 1st Edition, McGraw Hill Education (India) Private Limited.

Course Title/ Code	BIG DATA(CSH402B) T & P
Course Type:	ELECTIVE (Departmental)
Course Nature:	HARD
L-T-P-O Structure	3-0-2-0
Objectives	Student will be able to do Big Data Programming and Analytics using Hadoop.

Syllabus	Sections	Weightage
	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	**100%**

Section-A

Introductory Concepts (Digital Data and Big Data): Digital Data Basics,Types of Digital Data (Structured, Semi-Structured, Unstructured), Introduction to Big Data, Why Big Data? Dimensions of Big Data, Challenges with Big Data, Big Data Stack,ScalingProblems.Big data processing tools(AWS).
Hadoop overview:
Brief history of Hadoop, Hadoop 1.0 vs. Hadoop 2.0,Hadoop Components, High level architecture of Hadoop,HadoopStreaming,Hadoop Compression.

Section-B

Big data programming using Hadoop: Hadoop Distributed File System: Architecture, Daemons related to HDFS, working with HDFS command,Special features of Hadoop, Introduction to functional programming, How Map Reduce Works, Mapreduce on YARN, Map Reduce Joins, Map Reduce Work Flows. HDFS and Hadoop Ecosystem.

Section C

Big Data Analytics : Analytics 1.0, Analytics 2.0, Analytics 3.0,Traditional BI vs. Big Data Environment ,Big Data technology Landscape,NoSQLDatabases,NoSQL Vs. RDBMS, New SQL.

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Frameworks: APACHE HIVE:History of HIVE,HIVE architecture,Hive Primitive Data Types and Collection Types,Hive File Formats ,Hive Query Language – Statements,DDL DML , Fundamentals of APACHE PIG & HBASE ,Business Intelligence on Hadoop.

LIST OF EXPERIMENTS:

1. To Install and set up of Hadoop along with Start up and shut down process
2. Introduction to (Hadoop Distributed File System) labs
   - Loading data
   - Viewing the cluster contents
   - Getting data out of the cluster
3. To write basic map reduce program
   - Driver code
   - 3Mapper
   - Reducer
4. To Creating Input and Output formats in Map Reduce Jobs
   - Text Input format
   - Key value input format
   - Sequence file input format
5. To implementing Latin commands on pig/ How to use basic pig commands
6. Introduction to processing data with Hive
   - Creating tables with Hive
   - Managing hive table data location and lifetime
   - Loading data into hive tables
   - Partitioning the data
   - Querying tables with Hive QL

Text Books:

1. Tom White " Hadoop: The Definitive Guide" Third Edition, O'reilly Media, 2012.
2. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
3. Michael Minelli (Author), Michele Chambers (Author), AmbigaDhiraj (Author) , Big Data, Big Analytics: Emerging Business Intelligence   and Analytic Trends for Today's Businesses,Wiley Publications,2013.

Reference Book:

1. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGraw Hill Publishing, 2012.
2. AnandRajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
3. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley &sons, 2012.
4. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons, 2007.
5. Pete Warden, "Big Data Glossary", O'Reilly, 2011.
6. Paul Zikopoulos , Dirk deRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corrigan , Harness the Power of Big Data The IBM Big Data Platform, Tata McGraw Hill Publications, 2012.
7. Zikopoulos, Paul, Chris Eaton, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, Tata McGraw Hill Publications, 2011.

Course Title/Code	BIOLOGY FOR ENGINEERS (EDH422)
Course Type	Core (Allied)
Course Nature	Hard
L-T-P-O Structure	(2-0-2-0)
OUTCOMES	1. Describe how biological observations that lead to major discoveries. 2.Convey that classification per se is not what biology is all about but highlight the underlying criteria, such as morphological, biochemical and ecological 2. Highlight the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring 3. Convey that all forms of life have the same building blocks and yet the manifestationsare as diverse as one can imagine. 4. Identify DNA as a genetic material in the molecular basis of information transfer. 5.Analyse biological processes at the reductionistic level 6. Apply thermodynamic principles to biological systems. 7. Identify and classify microorganisms.

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	**100%**

Section A

INTRODUCTION

To convey that Biology is as important a scientific discipline as Mathematics, Physics and Chemistry. Why we need to study biology? Discuss how biological observations of 18th Century that lead to major discoveries.

highlight the fundamental importance of observations in any scientific inquiry. Bring out the fundamental differences between science and engineering by drawing a comparison between eye and camera, Bird flying and aircraft. Mention the most exciting aspect of biology as an independent scientific discipline.

Section B

CLASSIFICATION

Discuss classification based on (a) cellularity- Unicellular or multicellular (b) ultra-structure- prokaryotes or eukaryotes. Evolution of Life.

Molecular taxonomy- three major kingdoms of life. Concept of single celled organisms. Concept of species and strains. Identification and classification of microorganisms. Microscopy. Ecological aspects of single celled organisms. Sterilization and media compositions. Growth kinetics. Energy and Carbon utilization -Autotrophs, heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e)Habitata- acquatic or terrestrial. Model organisms for the study of biology come from different groups. E.coli, S.cerevisiae,

Section C

BIOMOLECULES AND MACROMOLECULAR ANALYSIS

Monomeric units and polymeric structures. Sugars, starch and cellulose. Amino acids and proteins. Nucleotides and DNA/RNA. Two carbon units and lipids. Enzymology: Enzyme classification. Mechanism of enzyme action Macromolecular: Hierarch in protein structure. Primary secondary, tertiary and quaternary structure.
Thermodynamics as applied to biological systems. Exothermic and endothermic versus
Endergonic and exergoinc reactions. Energy yielding and energy consuming reactions.

Section D

GENETICS

Mendel's laws, Concepts of recessiveness and dominance. Concept of mapping of phenotype to genes. Discuss about the single gene disorders in humans. Discuss the concept of complementation using human genetics.
Central Dogma, Molecular basis of information transfer. DNA as a genetic material. Concept of genetic code. Concepts of recessiveness and dominance. Discuss about the single gene disorders in humans. Universality and degeneracy of genetic code.

Practical BIOLOGY FOR ENGINEERS (EDH422)
1. Study the contribution of eminent biologists
2. Study the classification and evolution of Life and living organisms
3. Preparation of Bacterial Culture E.coli and S. cerevisiae
4. To study the double helical model of DNA
5. Understanding Mendel's Laws of Genetics

Reference Book:
1. Introduction to Biology , Tata Mc Graw Hills Publications
2. Gardner book of Genetics
3. Stryer : Book of Biochemistry

Course Title/ Code	WIRELESS SENSOR NETWORK (ECH403B)
Course Type:	Elective (Departmental)
Course Nature:	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	Students will be able to implement communication network using wireless sensors.

Syllabus	Sections	Weightage
	A	25%
	B	25%
	C	25%

	D	25%
	TOTAL	**100%**

Section A

Introduction and Overview of WSN: Definitions and Background Sensing and Sensors - Challenges and Constraints-Energy, Self-Management, Wireless Networking, Decentralized Management, Design Constraints, Security, Other Challenges Applications: Structural Health Monitoring, Traffic Control

Section B

Architecture: Basic sensor network architectural elements, Single node architecture, Hardware components, Energy consumption of sensor nodes, Operating systems and execution environments, Network architecture, Sensor network scenarios, Optimization goals and figures of merit, Gateway concepts.

Section C

NODE AND NETWORK MANAGEMENT: Power Management, Local Power Management Aspects, Dynamic Power Management Time Synchronization, Time Synchronization Protocols, Localization, Security

Section D

ADHOC NETWORKS AND ROUTING PROTOCOLS: Elements of Ad hoc Wireless Networks, Issues in Ad hoc wireless networks, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classifications of Routing Protocols, Table Driven Routing Protocols - Destination Sequenced Distance Vector (DSDV), On–Demand Routing protocols –Ad hoc On–Demand Distance Vector Routing (AODV).

List of Experiments:

1. Applications and its simulation.

2. Network Simulator installation of wireless sensor network.

3. Write TCL script for transmission between mobile nodes.

4. Write TCL script for sensor nodes with different parameters.

5. Generate TCL script for udp and CBR traffic in WSN nodes.

6. Generate tcl script for TCP and CBR traffic in WSN nodes.

7. Implementation of routing protocol in NS2 for AODV protocol.

8. Implementation of routing protocol in NS2 for DSDV protocol.

9. Study other wireless sensor network simulators (Mannasim. Contiki.)

Text Books:

1. Kazem Sohraby,Daniel Minoli,Taieb Znati, "Wireless Sensor Networks: Technology, Protocols, and Applications", John wiley & Sons.

2. Holger Karl, Andreas Willig, "Protocols and architectures for wireless sensor networks", John wiley & Sons.

Reference Books:

1. Feng Zhao, Leonidas Guibas, "Wireless Sensor Networks; An Information Processing Approach", Elsevier.

2. C. S. Raghavendra, Krishna M. Shivalingam, Taieb Znati, "Wireless sensor networks", Springer Verlag.

3.   H. Edgar, Jr. Callaway, "Wireless Sensor networks, Architectures and Protocols", CRC Pressess

Course Title/ Code	OPERATION RESEARCH BY OPTIMIZATION TECHNIQUES (MEH403B)
Course Type	OPEN ELECTIVE
Course Nature	HARD
L-T-P-O Structure	3-1-2-0
Prerequisite	NIL

SECTION A

Engineering Economy and Costing: Elementary cost accounting and methods of depreciation; break-even analysis, techniques for evaluation of capital investments, financial statements.

Facility Design: Facility location factors and evaluation of alternate locations; types of plant layout and their evaluation; assembly line balancing; materials handling systems.

Production Planning and Inventory Control: Forecasting techniques – causal and time series models, moving average, exponential smoothing, trend and seasonality; concept of JIT manufacturing system;

SECTION B

Inventory: functions, costs, classifications, deterministic and probabilistic inventory models, quantity discount; perpetual and periodic inventory control systems.

Linear programming: problem formulation, simplex method, duality and sensitivity analysis;

SECTION C

Transportation and assignment models; network flow models, simple queuing models; dynamic programming; simulation – manufacturing applications; PERT and CPM, time-cost trade-off, resource leveling.

SECTION D

Quality Management: Quality – concept and costs, quality circles, quality assurance; statistical quality control, acceptance sampling, zero defects, six sigma; total quality management; ISO 9000; design of experiments – Taguchi method.

Management Information System: Value of information; information storage and retrieval system database and data structures; knowledge based systems.

TEXT BOOK & REFERENCES:
1. Production Systems: Planning, Analysis and Control by J.L. Riggs
2. Production, Planning and Inventory Control by S. Narasimhan, D. W. McLeavey, and P. J. Billington
3. Operation Research by D.S.Heera, S. Chand Publication

LIST OF EXPERIMENTS:
1. To prepare a case study for producing a product on shop floor covering areas of PPC, design, Methods Engineering, Operations and Quality Control.

2. To prepare a project report for calculating the total cost (direct and indirect cost) of a product being developed for manufacturing.

3, To prepare a flow chart identifying main steps to be followed by methods engineering in manufacturing a product.

4. To prepare a bar chart for producing a generator/turbine identifying the main sub-assemblies along with their completion schedule.

5. To prepare a document for quality policy, quality systems and procedures required to be followed in the manufacture of a turbine/generator.

Course Title/ Code	Information Retrieval(CSH414B) T & P
Course Type	Elective (Departmental)
Course Nature	Hard
L-T-P-O Structure	(3-0-2-0)
Objectives	Student will be able to Model, Represent and Retrieve the information from web.

Syllabus	Sections	Weightage
	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

Section-A

Knowledge representation - Basics of Prepositional logic- Predicate logic-reasoning using first order logic-unification-forward chaining-backward chaining-resolution- -Production rules-frames-semantic networks- scripts. Information retrieval problem, an inverted index, Processing Boolean queries, The extended Boolean model versus ranked retrieval, an inverted index, Bi-word indexes, Positional indexes, Combination schemes

Section-B

Information Retrieval Modeling- Information retrieval – taxonomy-formal characterization classic information retrieval-set theoretic model-algebraic model-probabilistic model structured text retrieval models-models for browsing-.retrieval performance evaluation keyword based querying-pattern matching-structural queries-Query operations.

Section-C

 Index construction : Hardware basics, Blocked sort-based indexing, Single-pass in-memory indexing, Distributed indexing, Dynamic indexing, Other types of indexes **Index compression:** Statistical properties of terms in information retrieval, Heaps' law: Estimating the number of terms, Zipf's law: Modeling the distribution of terms, Dictionary compression, Dictionary as a string, Blocked storage, Postings file compression.

Ontology Development- Description logic-taxonomies-Topic maps-Ontology-Definition expressing ontology logically-ontology representations-XML-RDF-RDFS-OWL-OIL ontology development for specific domain-ontology engineering-Semantic web services

Parallel and distributed IR- multimedia IR- data modeling-query languages-.Web Searching Basics-Characterizing the Web-Search Engines-Web crawling and in dexex-link analysis

Section-D

Language models, Finite automata and language models, Types of language models, Multinomial distributions over words, The query likelihood model, Using query likelihood language models in IR, Estimating the query generation probability, Language modelling versus other approaches in IR, Naïve bayes-vector space classification-support vector machines and machine learning on documents-flat clustering hirarchical clustering

List of Experiments:

1. Rapid Miner tool will be explorer in the lab.

Text Books:

1. Elain Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill, 3rd Edition, 2003.

Reference Books:

1. Stuart Russell-Peter Norvig, "Artificial Intelligence – A modern Approach", Pearson Education, 2nd Edition, 2003. (Unit I)
2. Michael c.Daconta,leo J. Obart and Kevin J Smith,"Semantic Web – A guide to the future of XML,Web Services and Knowledge Management",Wiley Publishers 2003.
3. Christopher D. Manning,PrabhakarRaghavan and HinrichSchutze, "Introduction to Information Retrieval", Cambridge University press, 2008.

Course Title/ Code	Mobile App Analytics(CSH408B) T & P
Course Type	Hard (Departmental)
Course Nature	Domain Elective
L-T-P-O Structure	(3-0-2-0)
Objectives	Students would be able to analyze market for the mobile application and calculating revenue.

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

Section-A

Introduction to Mobile App Analytics: Defining Web Analytics :- Quantitative and Qualitative Data ,The Continuous Improvement Process ,Measuring Outcomes ; Marketing and analysis tools, App revenue models, Starting with a measurement plan:- Gather Business Requirements , Analyze and Document Website Architecture, Create an Account and Configure Your Profile , Configure the Tracking Code and Tag Pages ,Tools to set up tracking- The Mobile Tracking Code , App Tracking , The (Very) Old Tracking Code: urchin.js.

Section-B

Attracting New Users: Create Additional User Accounts and Configure Reporting Features, Creating a Google Analytics Account :-Creating Additional Profiles ,Access Levels , All About Profiles :- Basic Profile Settings, Profile Name, Website URL, Time Zone, Default Page; Acquisition channels, Acquisition reports, High-value users, Segmentation and user attributes.

Section-C

Measuring behavior: Behavior reports overview, Reporting and Analysis Tools ,Juice Concentrate , Google Analytics Report Enhancer , Keyword Trends in Google Analytics, Screen tracking, Event tracking:- Getting Started with Event Tracking , Pulling It All Together , Implementation , Reporting ,Tracking a Distributed Object, Tracking Email - Email Messages to Complete Conversion Activities, Custom dimensions and metrics tracking:- Custom Variable Implementation ,Custom Variable Reporting ,Segmenting Members from Nonmembers , Custom Variables for E-Commerce , Custom Variables for Publishers, Enhanced Ecommerce tracking:- How It Works , Implementation , Common E-Commerce Problems ,Using E-Commerce Tracking on Non-E-Commerce Sites.

Section-D

Increasing revenue: Identifying roadblocks to revenue, Re-engaging existing users, Remarketing to new and existing users

List of Experiments

1. Study of various tools for analytics research
2. Introduction to Google Analytics tool
3. Setting up web tracking code.
4. Decide how to add tracking
5. Add tracking using Google Tag Manager
6. Add the tracking code directly to the site

Text Books:

1. Google Analytics by Jerri L. Ledford, Joe Teixeira, Mary E. Tyler, Wiley.
2. Google Analytics by Justin Cutroni, O'Reilly.

Reference Book:

1. Sams Teach Yourself Google Analytics in 10 Minutes by Michael Miller.

Course Title/ Code	Basics of Economics (MCS231)

Course Type:	Elective (Allied)
Course Nature:	Soft
L-T-P-O Structure	(1-0-2-0)

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

SECTION-A

Definition of Economics - various definitions, Nature of Economic problem, Production possibility curve, Concepts and measurement of utility, Law of Diminishing Marginal Utility, Law of equi-marginal utility - its practical application and importance.

SECTION-B

Meaning of Demand, Individual and Market demand schedule, Law of demand, shape of demand curve, Elasticity of demand, degrees of Price elasticity of demand, factors effecting elasticity of demand, practical importance & applications of the concept of elasticity of demand.

SECTION-C

Meaning of production and factors of production, laws of production, various concepts of cost - Fixed cost, variable cost, average cost, marginal cost, money cost, real cost and opportunity cost. Shape of short run cost curves.

SECTION-D

Meaning of Market, Types of Market -Perfect Competition, Monopoly, Oligopoly, Monopolistic Competition (Main features of these markets). Supply and Law of Supply, Role of Demand & Supply in Price Determination and effect of changes in demand and supply on prices.

TEXT BOOKS:

1. Principles of Economics: P.N. Chopra (Kalyani Publishers).
2. Economics for Engineers- T R Jain & O P Khanna
3. Micro Economic Theory – M.L. Jhingan (S.Chand).
4. Micro Economic Theory - H.L. Ahuja (S.Chand).
5. Modern Micro Economics: S.K. Mishra (Pragati Publications).
6. Economic Theory - A.B.N. Kulkarni & A.B. Kalkundrikar (R.Chand & Co.).
7. Indian Economy: Rudar Dutt & K.P.M. Sundhram

Course Title/ Code	Fundamentals of Finance (MCS232)
Course Type:	Elective (Allied)
Course Nature:	Soft
L-T-P-O Structure	(1-0-2-0)

Syllabus	Sections	Weightage
	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

SECTION-A

Introduction to Finance ; Forms of Business Organization ; Overview to financial statements , Balance Sheet, Profit and Loss Account , Cash Flow Statement.

SECTION-B

Financial Analysis and Planning; Financial Ratios, Break Even Analysis Sources of Long term Finance – Equity Capital, Preference Capital, Terms Loans, Debentures; Raising Long term Finance.

SECTION-C

Time Value of Money, Capital Budgeting- Techniques of Capital Budgeting, Net Present Value and Payback Period; Capital Structure and Cost of Capital.

SECTION-D

Working Capital: Introduction, Components of Current Assets and Current Liabilities, Operating Cycle, Estimation of Working Capital; Operating Income , Earning Before Interest and Tax (EBIT).

Suggested Readings:

1. Pandy, I.M., Financial Management, Vikas Publishing House, New Delhi
2. Khan M.Y, and Jain P.K., Financial Management, Tata McGraw Hill, New Delhi
3. Keown, Arthur J., Martin, John D., Petty, J. William and Scott, David F, Financial Management, Pearson Education
4. Chandra, Prasanna, Financial Management, TMH, New Delhi
5. Van Horne, James C., Financial Management and Policy, Prentice Hall of India
6. Brigham & Houston, Fundamentals of Financial Management, Thomson Learning, Bombay.
7. Kishore, R., Financial Management, Taxman's Publishing House, New Delhi

Course Title/ Code	Software Project Management(CSH307B) T & P

Course Type:	Elective (Department)
Course Nature:	Hard
L-T-P-O Structure	(3-0-2-0)
Objectives	Student would be able to define and develop a software product from requirement gathering to implementation. The course focuses on the fundamentals of management of a software project.

	Sections	Weightage
Syllabus	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	**100%**

Section-A

Introduction to Software Project Management (SPM): Definition of a Software Project (SP), SP Vs. other types of projects activities covered by SPM, categorizing SPs, project as a system, management control, requirement specification, information and control in organization, Project Management Tools & Techniques, Project success factors, role of project manager.

Stepwise Project planning: Introduction, selecting a project, identifying project scope and objectives, identifying project infrastructure, analyzing project characteristics, identifying project products and activities, estimate efforts each activity, identifying activity risk, allocate resources, review/ publicize plan.

Section-B

Project Evaluation & Estimation: Cost benefit analysis, cash flow forecasting, cost benefit evaluation techniques, risk evaluation. Selection of an appropriate project; Choosing technologies, choice of process model, structured methods, rapid application development, water fall-, V-process-, spiral- models. Prototyping, delivery.Albrecht function point analysis, COCOMO Model.

Activity planning & Risk Management: Objectives of activity planning, project schedule, projects and activities, sequencing and scheduling activities, activity recourse estimation, activity duration estimation, , Gantt Charts,network planning model, representation of lagged activities, adding the time dimension, backward and forward pass, identifying critical path, activity throat, shortening project , precedence networks, Programme evaluation & review technique (PERT) and CPM, concept of slack time, schedule control.

Risk Management: Introduction, the nature of risk, managing risk, risk identification, risk analysis, reducing the risks, evaluating risks to the schedule, calculating the z values , qualitative risk analysis, using probability impact matrixes, expert judgement, qualitative risk analysis, decision trees & expected monetary value, simulation, sensitivity analysis, risk response planning,, risk monitoring & control.

Section-C

Resource allocation & Monitoring the control: Introduction, the nature of resources, identifying resource requirements, scheduling resources creating critical paths, counting the cost, being specific, publishing the resource schedule, cost schedules, the scheduling sequence.

Monitoring the control: Introduction, creating the frame work, collecting the data, visualizing progress, getting the project back to target, change control, cost monitoring,Basis principles of cost management, Cost estimating, type of cost estimate, cost estimate tools & techniques, COCOMO, Putnam/ SLIM model Estimating by Analogy, cost budgeting, cost control, earned value management, project portfolio management.

Managing contracts and people: Introduction, types of contract, stages in contract, placement, typical terms of a contract, contract management, acceptance, Procurement management plans,Managing people and organizing terms: Introduction, understanding behavior, organizational behavior: a back ground, selecting the right person for the job, instruction in the best methods, motivation, working in groups, becoming a team, decision making, leadership, organizational structures, conclusion, further exercises.

Section-D

Software quality: Introduction, the place of software quality in project planning, the importance of software quality, defining software quality, ISO 9126, Practical software quality measures, product versus process quality management, Quality Planning, quality Assurance, Quality control,external standards, techniques to help enhance software quality,Tool & techniques for quality control, Pareto Analysis, Six Sigma, CMM, Juran Methodology
Study of Any Software Project Management software: viz Project 2000 or equivalent.

LAB: SOFTWARE TOOLS USED:-PROJECT LIBRE (OPEN SOFTWARE)

With the help of this software we will draw

1. Work Breakdown Structure
2. Resource Breakdown Structure
3. Activity Networks
4. Gantt chart
5. PERT chart
6. Precedence Network Diagram (Activity on Arrow)
7. Precedence Network Diagram (Activity on Node)
8. Network after the Forward pass and Backward pass.
9. **Calculate** Albrecht function point
10. Calculating Costs-Development costs, Setup costs, Operational costs.

Text Books:
1. Kathy Schwalbe; Information Technology Project Management fourth edition, Thomson Course Technology.
2. Bob Hughes and Mike Cotterell, Software Project Management, Third Edition, Tata McGraw-Hill.
3. Software Project Management, Walker Royce, 1998, Addison Wesley.

Reference Books:
4. Project Management Body Of Knowledge. [PMBOK].
5. Pankaj Jalote, Software Project Management in Practice, Pearson Education.
6. Software Engineering – A Practitioner's approach, Roger S. Pressman (5th edi), 2001, MGH.

Course Title/ Code	Cloud Security (CSH411B)T&P
Course Type:	**Domain Elective (Departmental)**
Course Nature:	Hard
L-T-P-O Structure	(3-0-2-0)
Objectives	Students will be able to learn in the course the ground-up coverage on the high-level concepts of cloud landscape, architectural principles, techniques, design patterns and real-world best practices applied to Cloud service providers and consumers and delivering secure Cloud based services. Design security architectures that assures secure isolation of physical and logical

infrastructures including compute, network and storage, comprehensive data protection at all layers, end-to-end identity and access management, monitoring and auditing processes and compliance with industry and regulatory mandates

Syllabus	Sections	Weightage
	A	25%
	B	25%
	C	25%
	D	25%
	TOTAL	100%

Section-A

Fundamentals of Cloud Computing and Architectural Characteristics: Understand what is Cloud computing. Architectural and Technological Influences of Cloud Computing✐ Understand the Cloud deployment models   Public, Private, Community and Hybrid models✐ Scope of Control✐ Software as a Service (SaaS)✐ Platform as a Service (PaaS)✐ Infrastructure as a Service (IaaS), Cloud Computing Roles, Risks and Security Concerns.

Security Design and Architecture for Cloud Computing: Guiding Security design principles for Cloud Computing, Secure Isolation, Comprehensive data protection, End-to-end access control, Monitoring and auditing, Quick look at CSA, NIST and ENISA guidelines for Cloud Security, Common attack vectors and threats.

Secure Isolation of Physical & Logical Infrastructure: Isolation✐ Compute, Network and Storage✐ Common attack vectors and threats✐ Secure Isolation Strategies✐ Multitenancy, Virtualization strategies✐ Inter-tenant network segmentation strategies✐ Storage isolation strategies

Section-B

Data Protection for Cloud Infrastructure and Services: Understand the Cloud based Information Life Cycle✐ Data protection for Confidentiality and Integrity✐ Common attack vectors and threats✐ Encryption, Data Redaction, Tokenization, Obfuscation, PKI and Key Management, Assuring data deletion✐ Data retention, deletion and archiving procedures for tenant data✐ Data Protection Strategies.

Enforcing Access Control for Cloud Infrastructure based Services: Understand the access control requirements for Cloud infrastructure✐ Common attack vectors and threats✐ Enforcing Access Control Strategies✐ Compute, Network and Storage✐ Authentication and Authorization, Roles-based Access Control, Multi-factor authentication✐ Host, storage and network access control options. OS Hardening and minimization, securing remote access, Verified and measured boot.

Monitoring, Auditing and Management: Proactive activity monitoring, Incident Response✐ Monitoring for unauthorized access, malicious traffic, abuse of system privileges, intrusion detection, events and alerts✐ Auditing – Record generation, Reporting and Management✐ Tamper-proofing audit logs✐ Quality of Services✐ Secure Management✐ User management✐ Identity management✐ Security Information and Event Management.

Section-C

Introduction to Cloud Design Patterns: Introduction to Design Patterns, Understanding Design Patterns Template, Architectural patterns for Cloud Computing, Platform-to-Virtualization & Virtualization-to-Cloud, Cloud bursting

Introduction to Identity Management in Cloud Computing: User Identification, Authentication, and Authorization in Cloud Infrastructure, Be able to understand the concepts of Identity & Access Management, Single Sign-on, Identity Federation, Identity providers and service consumers, the role of Identity provisioning.

Cloud Computing Security Design Patterns – I: Security Patterns for Cloud Computing✍ Trusted Platform, Geo-tagging✍ Cloud VM Platform Encryption, Trusted Cloud Resource Pools, Secure Cloud Interfaces✍ Cloud Resource Access Control, Cloud Data Breach Protection, Permanent Data Loss Protection, In-Transit Cloud Data Encryption.

<div align="center">

Section-D

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Cloud Computing Security Design Patterns – II: Security Patterns for Cloud Computing – Network Security, Identity & Access Management & Trust, Secure On-Premise Internet Access , Secure External Cloud Connection, Cloud Denial-of-Service Protection, Cloud Traffic Hijacking Protection, Automatically Defined Perimeter, Cloud Authentication Gateway, Federated Cloud Authentication, Cloud Key Management, Trust Attestation Service, Collaborative Monitoring and Logging, Independent Cloud Auditing.

Policy, Compliance & Risk Management in Cloud Computing: Be able to understand the legal, security, forensics, personal & data privacy issues within Cloud environment, Cloud security assessment & audit reports, Laws & regulatory mandates, Personal Identifiable Information & Data Privacy, Privacy requirements for Cloud computing (ISO 27018), Metrics for Service Level Agreements (SLA), Metrics for Risk Management, ENISA, NIST SP 800, PCI DSS, SAS 70, CSA Security, Trust, and Assurance Registry (STAR), HIPAA compliance Case Study - Protecting PHI in Cloud

List of Experiments:

1. Build a threat model for migrating to cloud.
2. Create a basic cloud instance on public cloud infrastructure and a security baseline
3. Encrypt public cloud data: learn about cloud storage options and encrypt the data for the public cloud deployment.
4. Identity Management for the cloud: Create a basic federated identity infrastructure to support their cloud application and learn additional details on standards like SAML and Oauth.
5. Private Cloud Analysis Risk
6. Create and Secure Private Cloud.

Text Books:

1. Securing The Cloud: Cloud Computing Security Techniques and Tactics by Vic (J.R.) Winkler (Syngress/Elsevier) - 978-1-59749-592-9
2. Cloud Computing Design Patterns by Thomas Erl (Prentice Hall) - 978-0133858563

Reference Book:

1. Cloud computing: Implementation, management and security By Rittinghouse, John, W.
2. Cloud Computing Bible, By Barrie Sosinsky, Wiley, 2011.
3. Cloud Computing Architected: Solution Design Handbook by Rhoton, John.
4. Cloud Security, A comprehensive Guide to Secure Cloud Com puting by Krutz, Ronald L.; Vines, Russell Dean
5. Cloud Computing: Principles and paradigms By Raj Kumar Buyya, James Broberg, AndrezeiM.Goscinski, 2011

Course Title/ Code	Essentials of Peace and Sustainability
Course Type:	Elective (Allied)

Course Nature:	Soft
L-T-P-O Structure	(1-0-2-0)

Syllabus	Sections	Weightage
	A	15%
	B	20%
	C	25%
	D	40%
	TOTAL	**100%**

Course Objective

To make participants understand the philosophical underpinnings of "Peace" at Self, Society, Nation and Global level. The course aims at sensitizing participants on aspects of building and maintaining Peace in World through Sustainable Development and creating a mindset to acknowledge the importance of Peace through Collaborative and sustained efforts in personal, social, economic and governance. The course develops sound concepts which participants are made to apply through a series of Projects, Assignments, Group Work and Seminars and helps participants' growth into "Ambassadors of World Peace as Digital Professionals and sensitive Global Social beings".

<p align="center">Course Structure (Overall Outline)</p>

Blended mode:

·   **Online mode: 30%**

·   **Classroom work: 30%**

·   **Field work:40%**

Course 1: Essentials of Peace and Sustainability

Learning outcomes

After completing this course, the students will be able to

1. Comprehend concept of "Peace and sustainability" and inter linkages

2. Discuss relevance of sustainable development goals to attain Peace

3. Recognize how peace addresses sustainable development goals

4. Construct thoughts and philosophies of Peace Advocacies

5. Compare various Perspectives on Peace

6. Be able to Choose appropriate strategy to face challenges to peace

7. Appreciate different kinds of thoughts in different contexts with reference to peace

8. Summarize understanding of peace based on various perspectives

9. Make decisions in personal, social and professional life aligning to inner peace

10. Envision impact of individual action on society and nation and globe as a whole

11. Develop culture of following netiquettes of a peace loving citizen in digital era

12. Understand the political, economic, socio-cultural conflict & ecological conflict

Section A: Basic understanding of Peace and Sustainability

i. Concept of Peace and Approaches to Peace

ii. Understanding peace from different perspective: Self, Local Community, National and Global.

iii. Concept of Sustainability and Sustainable Development Goals (2030) as drivers of sustainable, health and social initiatives

iv. Why Sustainability

Assignment:

· Document analysis of Sustainable development goals agenda

· Creative expression based on sustainable development goals

Section B:

i. Understanding thoughts on Peace
  a) Study of relevant extracts from the writings of Indian thinkers: Gandhi, Tagore, Sri

Aurobindo, Vivekananda
  b) Western thinkers: Russell, Iqbal, Dalai Lama, Nelson Mandela
  (Please follow Annexure A-reading references)

Assignment:
  · *Panel discussion by students*
  · *Discussion forums on different aspects of Peace*

Section C: Understanding challenges to peace

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i.   Challenges to peace-stress, conflicts, crimes, terrorism, violence and wars

ii.   Ongoing conflicts in the political, economic, socio-cultural and ecological sphere at national and international level

iii.   Impact of media- The use of perspective, symbols, stereotypes, and rhetoric in analyzing communication and representation of contentious issues in television and other modern media.

Assignment:

·   Case study analysis

Section D: Peaceful and Sustainability conscious individual

Being "Peace Ambassador"

i. Role of self in reducing prejudices, biases and stereotypes, nurturing positivity, making choices in response to crises in personal, social and professional life

(These topics should be covered through games and activities)

1. Developing Core competencies and life skills: Negotiation Rational thinking, System thinking, conflict resolution

(These topics should be covered through workshops)

2. Cultivating the skills necessary for peace: Introspection and reflective thinking, Mediation, Dialogue

(These topics should be covered through experiential learning through training and practices)

Assignment

·   *Reflective journaling*

Being Sustainability conscious individual

- 3As of Sustainable development goals oriented initiatives: Awareness, Appreciation, Action
- Power of One
- Role of Organizations, NGO and Government
- Role of technology –Digital literacy and media literacy

Assignment

·   Project -Students will choose one of the sustainable development goals. Decide the initiative to achieve the goal, execute the initiative. Write a summary report on it and present in symposium.

Some of the suggested areas (But not limited to)

- *Gender stereotyping*
- *Gender equality*
- *Quality education*
- *Carbon footprints*
- *Ecological footprints*
- *Water crisis*

- *Waste water management*
- *Climate change*
- *Biodiversity*

Annexure A: Reading material

- Mahatma Gandhi (Brute Force and Passive resistance)

https://www.mkgandhi.org/hindswaraj/chap16_bruteforce.htm

https://www.mkgandhi.org/hindswaraj/chap17_passiveresistance.htm

Tagore ('Civilization and Progress' and 'Nationalism in India')

http://tagoreweb.in/Render/ShowContent.aspx?ct=Essays&bi=72EE92F5-BE50-40D7-8E6E-0F7410664DA3&ti=72EE92F5-BE50-4A47-2E6E-0F7410664DA3

http://www.swaraj.org/tagorecivilization.htm

Sri Aurobindo ('The Ideal of Human Unity')

http://www.collectedworksofsriaurobindo.com/index.php/readbook/03-the-turn-towards-unity-its-necessity-and-dangers-vol-the-ideal-of-human-unity

Russell ('Knowledge and Wisdom')

https://russell-j.com/1073-KW.HTM

Iqbal ('Is Religion Possible')

http://www.allamaiqbal.com/works/prose/english/reconstruction/07.htm

Dalai Lama ('Universal Responsibility')

https://www.lamayeshe.com/article/global-community-and-need-universal-responsibility

Nelson Mandela ('Alternative politics truth and reconciliation')

http://www.africa.upenn.edu/Govern_Political/Mandel_100.html

Work of Swami Vivekananda

Sustainable development goals

https://sustainabledevelopment.un.org/sdgs

https://www.un.org/sustainabledevelopment/peace-justice/

Sustainable development goals in action by countries, groups and individuals

https://undg.org/wp-content/uploads/2016/12/SDGs-are-Coming-to-Life-UNDG-1.pdf

https://www.un.org/sustainabledevelopment/be-the-change/

https://sdgsinaction.com/

https://sustainabledevelopment.un.org/partnerships/goodpractices

SEMESTER - 8													
SUBJECT CODES	SUBJECT NAME	PRE-REQUISITE	OVERLAPPING/EQUIVALENT COURSES	**OFFERING DEPARTMENT	*COURSE NATURE (Hard/Soft/ Workshop / NTCC/Audit)	COURSE TYPE (Core/Elective)		L	T	P	O	NO. OF CONTACT HOURS PER WEEK	NO. OF CREDITS
CSN413B	PROJECT	NIL	NA	CS	NTCC	CORE		320 TO 360 HOURS					8
	TOTAL (L-T-P-O/CONTACT HOURS/CREDITS)							0	0	0	0	0	8