GEETHANJALI INSTITUTE OF SCIENCE & TECHNOLOGY
Unit of USHODAYA EDUCATIONAL SOCIETY
An ISO 9001:2015 certified Institution: Recognized under Sec. 2(f)& 12(B) of UGC Act, 1956
3rd Mile, Bombay Highway, Gangavaram (V), Kovur(M), SPSR Nellore (Dt), Andhra Pradesh, India- 524137
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Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BSC	22A0016T	Probability & Statistics	3	0	0	3
2	PCC	22A0506T	Computer Organization	3	0	0	3
3	PCC	22A0507T	Object Oriented Programming through Java	3	0	0	3
4	ESC	22A0410T	Digital Electronics and Micro Processors	3	0	0	3
5	PCC	22A0508T	Software Engineering	3	0	0	3
6	HSC	22A0021T	Universal Human Values	3	0	0	3
7	PCC(Lab)	22A0509P	Object Oriented Programming through Java Lab	0	0	3	1.5
8	ESC(Lab)	22A0411P	Digital Electronics and Micro Processors Lab	0	0	3	1.5
9	PCC(Lab)	22A0510P	Software Engineering Lab	0	0	3	1.5
10	SC	22A0511	**Skill Oriented Course** Basic Web Design	1	0	2	2
11	MC	22A0028T	**Mandatory Course** Environmental Science	2	0	0	0
				Total credits			**24.5**

Semester-3 (Theory-6, Lab-3, SC-1, MC-1)

Category	Credits
Basic Science Course (BSC)	3
Professional Core Courses (PCC)	12
Engineering Science Courses (ESC)	4.5
Humanities and Social Science Course (HSC)	3
Skill Oriented Course (SC)	2
Total	24.5

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PROBABILITY AND STATISTICS
(Common to CSE, AI&ML, DS, CS, CE)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0016T	3:0:0:0	3	CIE: 30 SEE:70	3 Hours	BSC

Course Objectives:

- Summarize the basic concepts of data science and its importance in engineering
- analyze the data quantitatively or categorically ,
- measure of averages, variability, adopt correlation methods and principle of least squares, regression analysis

Course Outcomes(CO):

On completion of this course, student will be able to:

- Define the terms trial, events, sample space, probability, and laws of probability, Make use of probabilities of events in finite sample spaces from experiments,
- Apply Baye's theorem to real time problems and explain the notion of random variable, distribution functions and expected value.
- Apply Binomial and Poisson distributions for real data to compute probabilities, theoretical frequencies, interpret the properties of normal distribution and its applications.
- Explain the concept of estimation, interval estimation and confidence intervals
- Apply the concept of hypothesis testing for large samples.
- Apply the concept of testing hypothesis for small samples to draw the inferences and estimate the goodness of fit.

Syllabus		Total Hours:48
Module – I	**Descriptive Statistics**	**10 Hrs**

Statistics Introduction, Measures of Variability (dispersion) Skewness Kurtosis, correlation, correlation coefficient, rank correlation, principle of least squares, method of least squares, regression lines, regression coefficients and their properties.

Module – II	**Probability**	**9 Hrs**

Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties.

Module – III	**Probability distributions**	**10 Hrs**

Discrete distribution - Binomial, Poisson approximation to the binomial distribution and their properties. Continuous distribution: normal distribution and their properties. Normal approximation to Binomial Distribution. Uniform distribution

Module – IV	**Estimation and Testing of hypothesis, large sample tests**	**9 Hrs**

Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems.

Module – V	Test of Significance	10 Hrs

Student t-distribution (test for single mean, two means and paired t-test), testing of equality of variances (F-test), χ^2 - test for goodness of fit, χ^2 - test for independence of attributes.

Text Books:
1. B.S.Grewal , "Higher Engineering Mathematics", Khanna publishers.
2. Miller and Freunds, Probability and Statistics for Engineers,7/e, Pearson, 2008.

Reference Books:
1. Probability & Statistics by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad S. Chand publication.
2. B.V.Ramana, "Higher Engineering Mathematics", Mc Graw Hill publishers.
3. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.
4. Mathematical Foundations of Statistics by K. C. Kapoor & Gupta, S. Chand Publications.

Web References:
1. https://onlinecourses.nptel.ac.in/noc21_ma74/preview

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COMPUTER ORGANIZATION
(Common to CSE, AI&ML, DS, CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0506T	**3:0:0:0**	**3**	**CIE: 30 SEE:70**	**3 Hours**	**PCC**

Course Objectives:

This course will enable students to:
- Illustrate the fundamental concepts of computer organization.
- Determine the Machine Instructions, develop programs.
- Develop Arithmetic Operations on Integers and Floating Point Numbers.
- Demonstrate types of memories, use of I/O devices.
- Illustrate concepts of Pipelining, Large Computer Systems.

Course Outcomes(CO):

On completion of this course, student will be able to
- Determine the basic concepts of Computer Organization.
- Interpret the Machine Instructions and basic Input / Output Operations.
- Demonstrate Arithmetic Operations on signed and unsigned numbers, design of Control Unit.
- Differentiate types of memories and distinguish I/O Devices.
- Illustrate the concepts of Pipelining.
- Illustrate the concepts of Large Computer Systems

Syllabus		Total Hours:48
Module-I	**Basic Structure of Computers**	**9Hrs**

Basic Structure of Computer: Computer Types, Functional Units, Basic operational Concepts, Bus Structure, Software, Performance, Multiprocessors and Multi computer.

Module-II	**Machine Instructions and Programs**	**10Hrs**

Machine Instructions and Programs: Numbers, Arithmetic Operations and Programs, Instructions and Instruction Sequencing, Addressing Modes, Basic Input/output Operations, Stacks and Queues, Subroutines.

Module-III	**Computer Arithmetic and Micro Programmed Control Unit**	**10Hrs**

Computer Arithmetic: Addition and Subtraction, Multiplication algorithms, Division algorithms, Floating point arithmetic operations.
Micro Programmed Control Unit: Control memory, address sequencing, design of control unit.

Module-IV	**The Memory System and Input / Output Organization**	**10Hrs**

The Memory System: RAM, ROM, Cache Memory, Virtual Memory, And Secondary Storage.
Input / Output Organization: Accessing I/O Devices, Interrupts, Direct Memory Access, Buses, Standard I/O Interfaces.

Module-V	Pipelining, Large Computer Systems	9Hrs

Pipelining: Basic Concepts, Data Hazards, and Instruction Hazards.
Large Computer Systems: Forms of Parallel Processing, The Structure of General-Purpose multiprocessors, Interconnection Networks.

Text Books:
1. Carl Hamacher, Zvonko Vranesic, SafwatZaky, "Computer Organization", 5th Edition, McGraw Hill Education, 2013.
2. M.Morris Mano, RajibMall, "Computer System Architecture", Revised Third Edition, Pearson Education India.

Reference Books:
1. Themes and Variations, Alan Clements, "Computer Organization and Architecture", CENGAGE Learning.
2. Smruti Ranjan Sarangi, "Computer Organization and Architecture", McGraw Hill Education.

Web References:
1. https://archive.nptel.ac.in/courses/106/105/106105163/

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OBJECT ORIENTED PROGRAMMING THROUGH JAVA
(Common to CSE, AI&ML, DS, CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0507T	3:0:0:0	3	CIE: 30 SEE:70	3 Hours	PCC

Course Objectives:

This course will enable students to:
- To understand object-oriented principles like abstraction, encapsulation, inheritance, polymorphism and apply them in solving problems.
- To understand the principles of inheritance and polymorphism and demonstrate how they relate to the design of abstract classes.
- To implement the concept of packages, interfaces, exception handling and concurrency mechanism.
- Demonstrate on the multi-tasking by using multiple threads.
- To understand the design of Graphical User Interface using applets and swing controls.

Course Outcomes(CO):

On completion of this course, student will be able to

- Understand the Object-Oriented Programming Principles to develop java programs.
- Apply code reusability through inheritance, packages and interfaces.
- Inspect Exception Handling and multi-threading mechanisms in real time applications.
- Develop applications by using I/O streams for better performance.
- Construct GUI based applications using applets, AWT and swings for internet and system-based applications.
- Compare AWT and Swing classes for GUI based applications.

Syllabus		Total Hours:48
Module-I	**Introduction**	**10Hrs**

Introduction: History and Evolution of Java, Java Buzzwords, Object Oriented Programming Principles, A first Simple Program, Data types, Variables, Type Conversion and Casting, Arrays, Operators, Control Statements, Classes, Objects, Methods, Constructors this key word, Garbage Collection, Parameter Passing, Method Overloading, Constructor Overloading. String handling methods.

Module-II	**Inheritance, Packages & Interfaces**	**9Hrs**

Inheritance: Basics, Using Super, Creating Multilevel hierarchy, Method overriding, Dynamic Method Dispatch, Using Abstract classes, using final with inheritance.

Packages: Basics, finding packages and CLASSPATH, Access Protection, Importing packages.
Interfaces: Definition, Implementing Interfaces, Extending Interfaces, Applying Interfaces.

Module-III	**Exception handling & Multi threading**	**10Hrs**

Exception handling - Fundamentals, Exception types, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built-in exceptions, creating own exception sub classes.

Multi threading: The Java thread model, creating threads, Thread priorities, Synchronizing threads, Inter thread communication.		
Module-IV	**Stream based I/O & Applet**	**9Hrs**

Stream based I/O (java.io) – The Stream classes-Byte streams and Character streams, reading console Input and Writing Console Output, File class, Reading and Writing Files, Random access file operations Scanner class.

Applet: Basics, Architecture, Applet Skeleton, requesting repainting, using the status window, passing parameters to applets

Module-V	**Introducing AWT & Swings**	**10Hrs**

Introducing AWT: AWT Classes, Window Fundamentals, Working with Frame Windows, Working with Graphics, Working with Color, Event Handling.

GUI Programming with Swings –Swing components and containers, layout managers, using a push button, jtextfield, jlabel.

Text Books:
1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.
2. Core Java: An Integrated Approach – Dr R Nageswara Rao.

Reference Books:
1. Object Oriented Programming through Java, P.Radha Krishna, Universities Press.
2. Java and Object Orientation, an introduction, John Hunt, second edition, Springer.
3. Maurach's Beginning Java2 JDK 5, SPD.
4. Introduction to Java Programming 7/e, Brief version, Y.Daniel Liang, Pearson
5. Java How to Program, 7/E: Paul Deitel, Deitel & Associates, Inc

Web References:
1. https://onlinecourses.nptel.ac.in/noc22_cs47/preview

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DIGITAL ELECTRONICS AND MICRO PROCESSORS					
(Common to CSE, AI&ML, DS, CS)					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0410T	**3:0:0:0**	**3**	**CIE: 30 SEE:70**	**3 Hours**	**ESC**

Course Objectives:

This course will enable students to:
- To understand all the concepts of Logic Gates and Boolean Functions.
- To learn about Combinational Logic and Sequential Logic Circuits.
- To design logic circuits using Programmable Logic Devices.
- To understand basics of 8086 Microprocessor and 8051 Microcontroller.
- To understand architecture of 8086 Microprocessor and 8051 Microcontroller.
- To learn Assembly Language Programming of 8086 and 8051.

Course Outcomes(CO):

On completion of this course, student will be able to
- Differentiate various number systems and binary codes.
- Solve the Boolean Expressions using Boolean algebra and k-maps.
- Implement different combinational and Sequential circuits
- Explain the internal architecture and organization of the 8086 microprocessor.
- Demonstrate the assembly level language programming for 8086 and 8051.
- Describe the architecture, hardware details and memory organization of 8051 microcontroller.

Syllabus		Total Hours:48
Module-I	**Number Systems & Code Conversion**	**10Hrs**

Number Systems & Code conversions, Boolean Algebra & Boolean properties, Logic Gates, Truth Tables, Universal Gates, Simplification of Boolean functions using Boolean properties, SOP and POS methods – Simplification of Boolean functions using K-maps, Signed and Unsigned Binary Numbers.

Module-II	**Combinational Circuits**	**9Hrs**

Combinational Logic Circuits: Adders & Subtractors, magnitude Comparators, Multiplexers, De-multiplexers, Encoders, Decoders, Programmable Logic Devices..

Module-III	**Sequential Circuits**	**10Hrs**

Sequential Logic Circuits: Compression between combinational & sequential circuits, Latches, SR Latch , Flipflops , SR FlipFlop, JK Flip Flop , Master Slave JK, T Flip-Flops, D Flip Flop , Shift Registers, Types of Shift Registers, Counters, Synchronous Counters, Asynchronous Counters, Up-Down Counter

Module-IV	**Microprocessors – I**	**9Hrs**

8085 microprocessor, Block Diagram of 8085 Microprocessor, 8086 microprocessor, Functional Diagram, register organization 8086, Flag register of 8086 and its functions, Addressing modes of 8086, Pin diagram of 8086, Minimum mode & Maximum mode operation of 8086, Interrupts in 8086.

Module-V	Microprocessors – II	10Hrs

Instruction set of 8086, Assembler directives, Procedures and Macros, Simple programs involving arithmetic, logical, branch instructions, Ascending, Descending and Block move programs, String Manipulation Instructions. Functional Diagram of 8051, register organization 8051.

Text Books:
1. M. Morris Mano, Michael D. Ciletti, Digital Design, Pearson Education, 5th Edition, 2013
2. Anil K. Maini, Digital Electronics: Principles, Devices and Applications, John Wiley & Sons,Ltd., 2007.

Reference Books:
1. Advanced microprocessors and peripherals-A.K Ray and K.M.Bhurchandani, TMH, 2nd edition, 2006.
2. Thomas L. Floyd, Digital Fundamentals – A Systems Approach, Pearson, 2013.
3. Charles H. Roth, Fundamentals of Logic Design, Cengage Learning, 5th, Edition, 2004.
4. D.V.Hall, Microprocessors and Interfacing. TMGH, 2nd edition, 2006.

Web References:
1. https://onlinecourses.nptel.ac.in/noc22_ee55/preview

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SOFTWARE ENGINEERING
(Common to CSE, AI&ML, DS, CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0508T	**3:0:0:0**	**3**	**CIE: 30 SEE:70**	**3 Hours**	**PCC**

Course Objectives:

This course will enable students to:
- To learn the basic concepts of software engineering and life cycle models.
- To understand the requirements engineering and agile models.
- To interpret the basic concepts of software design
- To understand the basic concepts of black box and white box software testing and enable to design test cases for unit, integration, and system testing
- To understand the basic concepts in risk management and reengineering.

Course Outcomes (CO):

On completion of this course, student will be able to
- Use software life cycle activities for process models (L3).
- Use software requirements specifications for given problems (L3).
- Apply design concepts, component Level and user interface design for a given problems(l3)
- Apply various test cases for a given problems (L3).
- Apply quality management concepts at the application level. (L3)
- Determine risk management plans and implementation(l3)

Syllabus		Total Hours:48
Module-I	**Software ,Software Engineering and Software Process**	**10 Hrs**

Basic concepts: abstraction versus decomposition, evolution of software engineering techniques, Software development life cycle (SDLC) models: Iterative waterfall model, Prototype model, Evolutionary model, Spiral model, RAD model, Agile models, software project management: project planning, project estimation, COCOMO, project scheduling, Organization and team structure, risk management.

Module-II	**Requirements Engineering and Agile Models**	**9 Hrs**

The Nature of software, The unique nature of web apps, The software myths

Requirements Engineering: Functional and non-functional requirements, the software requirements document, Requirements specification, Requirements engineering processes, Requirements elicitation and analysis, Requirements validation, Requirements management

Agile development model: What is agility, what is an agile process, XP, Agile process models, CMMI

Module-III	**Design Concepts, Component Level and User Interface Design**	**9 Hrs**

Design Concepts: Good Software Design, Cohesion and coupling, The design Process, Design concepts, design models

Component Level Design: Introduction to components, designing class-based components

User Interface Design: Golden rules, User Interface analysis and design

Module-IV	Software Testing Strategies, Project Metrics and Quality Management	10 Hrs

Software Testing Strategies: coding standards and guidelines, code review, testing, types of testing.

Process and project metrics: software measurement, A framework for product metrics.

Quality Management: Quality, Software quality, metrics for software quality, software quality assurance.

Module-V	Risk Management and Reengineering	10 Hrs

Risk Management: Risk identification, Risk projection, risk refinement, RMMM

Maintenance and reengineering: Software maintenance, reengineering, reverse engineering and forward engineering

Case Study: Implementation of safe home system using software engineering principles.

Text Books:
1. Pressman R, "Software Engineering- Practioner Approach", McGraw Hill.
2. Somerville, "Software Engineering", Pearson 2.

Reference Books:
1. Rajib Mall, "Fundamentals of Software Engineering", 5th Edition, PHI, 2018.
2. Richard Fairley, "Software Engineering Concepts", Tata McGraw Hill.
3. Jalote Pankaj, "An integrated approach to Software Engineering", Narosa.

Web Resources:
1. https://nptel.ac.in/courses/106/105/106105182/
2. http://peterindia.net/SoftwareDevelopment.html

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<table>
<tr><td colspan="6" align="center">UNIVERSAL HUMAN VALUES
(Common to CSE, AI&ML, DS, CS)</td></tr>
<tr><td>Course Code</td><td>L:T:P:S</td><td>Credits</td><td>Exam Marks</td><td>Exam Duration</td><td>Course Type</td></tr>
<tr><td>22A0021T</td><td>3:0:0:0</td><td>3</td><td>CIE: 30 SEE:70</td><td>3 Hours</td><td>HSC</td></tr>
</table>

Course Objectives:

This course will enable students to:
- Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
- Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
- Strengthening of self-reflection.
- Development of commitment and courage to act.

Course Outcomes(CO):

On completion of this course, student will be able to
- Students are expected to become more aware of themselves, and their surroundings (family, society, nature)
- They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
- They would have better critical ability.
- They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
- It is hoped that they would be able to apply what they have learnt to their own self in differentday-to-day settings in real life, at least a beginning would be made in this direction.

Syllabus		Total Hours:48
Module-I	**Course Introduction - Need, Basic Guidelines, Content and Process for Value Education**	**10Hrs**

Purpose and motivation for the course, recapitulation from Universal Human Values-I
Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration
Continuous Happiness and Prosperity- A look at basic Human Aspirations
Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspirations of every human being with their correct priority
Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
Method to fulfil the above human aspirations: understanding and living in harmony at various level
Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking

Module-II	**Understanding Harmony in the Human Being - Harmony in Myself!**	**9Hrs**

Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
Understanding the needs of Self ('I') and 'Body' - happiness and physical facility Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) Understanding the characteristics and activities of 'I' and harmony in 'I'

Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail

Programs to ensure Sanyam and Health.

Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

Module-III	**Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship**	**10Hrs**

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship

Understanding the meaning of Trust; Difference between intention and competence

Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship

Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals

Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

Module-IV	**Understand the Nature and Existence hole existence as Coexis**	**9Hrs**

Understanding the harmony in the Nature

Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature

Understanding Existence as Co-existence of mutually interacting units in all- pervasive space

Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can beused), pollution, depletion of resources and role of technology etc.

Module-V	**Implications of the above Holistic Understanding of Harmony on Professional Ethics**	**10Hrs**

Natural acceptance of human values Defectiveness of Ethical Human Conduct

Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order

Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco- friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

Case studies of typical holistic technologies, management models and production systems Strategy for transition from the present state to Universal Human Order:

 a. At the level of individual: as socially and ecologically responsible engineers, technologists andmanagers
 b. At the level of society: as mutually enriching institutions and organizationsSum up.

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. Todiscuss the conduct as an engineer or scientist etc.

Text Books:

1. R R Gaur, R Asthana, G P Bagaria, "A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
2. R R Gaur, R Asthana, G P Bagaria, "Teachers' Manual for A Foundation Course in Human Values andProfessional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books:

1. Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.
2. A.N. Tripathi, "Human Values", New Age Intl. Publishers, New Delhi, 2004. The Story of Stuff (Book).
3. Mohandas Karamchand Gandhi "The Story of My Experiments with Truth"
4. E. FSchumacher. "Small is Beautiful"Slow is Beautiful –Cecile Andrews
5. J C Kumarappa "Economy of Permanence" Pandit Sunderlal "Bharat Mein Angreji Raj" Dharampal, "Rediscovering India"
6. Mohandas K. Gandhi, "Hind Swaraj or Indian Home Rule" India Wins Freedom - Maulana Abdul Kalam Azad Vivekananda - Romain Rolland(English) Gandhi - Romain Rolland (English)

Web References:

1. https://archive.nptel.ac.in/noc/courses/noc19/SEM1/noc19-ee24/

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OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB					
(Common to CSE, AI&ML, DS, CS)					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0509P	**0:0:3:0**	**1.5**	**CIE: 30 SEE:70**	**3 Hours**	**PCC**

Course Objectives:

This course will enable students to:
- Practice object-oriented programs and build java applications.
- Implement java programs for establishing interfaces.
- Implement sample programs for developing reusable software components.
- Create database connectivity in java and implement GUI applications.

Course Outcomes(CO):

On completion of this course, student will be able to
- Recognize the Java programming environment.
- Develop efficient programs using multi threading.
- Design reliable programs using Java exception handling features.
- Extend the programming functionality supported by Java.
- Select appropriate programming constructs to solve a problem.
- Develop the programs in swings and mouse events.

Syllabus	Total Hours:48

List of Experiments

Experiment-1

a. Installation of Java software, study of any Integrated development environment, Use Eclipse or NetBeans platform and acquaint with the various menus. Create a test project, add a test class and run it.

See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods and classes. Try debug step by step with java program to find prime numbers between 1 to n.

b. Write a to Java program that prints all real solutions to the quadratic equation $ax^2+bx+c=0$. Read in a, b, c and use the quadratic formula.

Experiment- 2
a. Write a Java program find the factorial of given number
b. Write a Java program to find whether given number is prime or not
c. The Fibonacci sequence is defined by the following rule. The first two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a java program that uses both recursive and non-recursive functions.

Experiment-3
a. Write a Java program to find the sum of individual digits of a number
b. Write a java program for Arithmetic calculator using switch case menu

Experiment-4
a. Write a java program to multiply two given matrices.
b. Write a java program to implement method overloading and constructors overloading.
c. Write a java program to implement method overriding.

Experiment-5
a. Create a Java class called Student with the following details as variables within it.USN, Name, Branch, Phone. Write a Java program to create n Student objects and print the USN, Name, Branch, and Phone of these objects with suitable headings.
b. Write Java program on use of inheritance, preventing inheritance using final, abstract classes

Experiment-6
a. Write a Java program to implement exception handling.
b. Write a java program to split a given text file into n parts. Name each part as the name of the original file followed by .part where n is the sequence number of the part file.

Experiment-7
a. Write a java program that displays the number of characters, lines and words in a text file.
b. Write a java program that reads a file and displays the file on the screen with line number before each line

Experiment-8
Write a program that creates a user interface to perform integer division. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 and Num2 were not integers, the program would throw a Number Format Exception. If Num2 were zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box
`
Experiment-9
a. Write a Java program that implements a multi-thread application that has three threads. First thread generates a random integer every 1 second and if the value is even, the second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of the cube of the number.
b. Write a java program that implements inter thread communication.

Experiment-10
a. Develop an applet in Java that displays a simple message.
b. Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named "Compute" is clicked.

Experiment-11
a. Develop a Java application to implement the opening of a door while opening man should present before hut and closing man should disappear.
b. Develop a java application for simple calculator.

Experiment-12
a. Develop a Java application to demonstrate the mouse event handlers.
b. Develop a Java application by using Swings.

Reference Books:
1. P. J. Deitel, H. M. Deitel, "Java for Programmers", Pearson Education, PHI, 4th Edition, 2007.
2. P. Radha Krishna, "Object Oriented Programming through Java", Universities Press, 2nd Edition, 2007
3. Bruce Eckel, "Thinking in Java", Pearson Education, 4th Edition, 2006.
4. 4. Sachin Malhotra, Saurabh Chaudhary, "Programming in Java", Oxford University Press, 5th Edition, 2010

Web References:
1. www.niecdelhi.ac.in
2. https://www.linkedin.com/in/achin-jain-85061412
3. www.rank1infotech.com

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DIGITAL ELECTRONICS AND MICRO PROCESSORS LAB					
(Common to CSE, AI&ML, DS, CS)					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0411P	**0:0:3:0**	**1.5**	**CIE: 30 SEE:70**	**3 Hours**	**ESC**

Course Objectives:

This course will enable students to:
- To understand all the concepts of Logic Gates and Boolean Functions.
- To learn about Combinational Logic and Sequential Logic Circuits.
- To design logic circuits using Programmable Logic Devices.
- To understand basics of 8086 Microprocessor
- To understand architecture of 8085 & 8086 Microprocessor
- To learn Assembly Language Programming of 8086.

Course Outcomes(CO):

On completion of this course, student will be able to
- Identify the various digital ICs and understand their operation.
- Use Boolean laws and K-map to simplify the digital circuits.
- Demonstrate the basic digital circuits and verify their operation.
- Interpret the hardware architecture and assembly language programming using MASM.
- Execute arithmetic and data transfer operations using MASM in 8086.
- Implement some basic operations using Aurdino on IoT development trainer kit.

Syllabus	**Total Hours:48**

List of Experiments

Note: Minimum of 12 (6+6) experiments shall be conducted from both the sections given below:

DIGITAL ELECTRONICS:
Experiment-1
- Verification of Truth Table for AND, OR, NOT, NAND, NOR and EX-OR gates.

Experiment-2
- Realization of NOT, AND, OR, EX-OR gates with only NAND and only NOR gates.

Experiment-3
- Karnaugh map Reduction and Logic Circuit Implementation.

Experiment-4
- Verification of DeMorgan's Laws.

Experiment-5
- Implementation of Half-Adder and Half-Subtractor.
- Implementation of Full-Adder and Full-Subtractor.

Experiment-6
- Four Bit Binary Adder
- Four Bit Binary Subtractor using 1's and 2's Complement.

MICROPROCESSORS (8086 Assembly Language Programming)
Experiment-7
- 8 Bit Addition and Subtraction.
- 16 Bit Addition.

Experiment-8
- BCD Addition.
- BCD Subtraction.

Experiment-9
- 8 Bit Multiplication.
- 8 Bit Division.

Experiment-10
- Searching for an Element in an Array.
- Sorting in Ascending and Descending Orders.
- Finding Largest and Smallest Elements from an Array.

Text Books:
1. M. Morris Mano, Michael D. Ciletti, Digital Design, Pearson Education, 5th Edition, 2013.
2. Anil K. Maini, Digital Electronics: Principles, Devices and Applications, John Wiley & Sons, Ltd., 2007.

Reference Books:
1. N. Senthil Kumar, M. Saravanan, S. Jeevanathan, Microprocessor and Microcontrollers, Oxford Publishers, 2010.
2. Advanced microprocessors and peripherals-A.K ray and K.M.Bhurchandani, TMH, 2nd edition, 2006.
3. Thomas L. Floyd, Digital Fundamentals – A Systems Approach, Pearson, 2013.
4. Charles H. Roth, Fundamentals of Logic Design, Cengage Learning, 5th, Edition, 2004.
5. D.V.Hall, Microprocessors and Interfacing. TMGH, 2nd edition, 2006.
6. Kenneth. J. Ayala, The 8051 microcontroller, 3rd edition, Cengage Learning, 2010

Web References:
1. https://www.vlab.co.in/

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SOFTWARE ENGINEERING LAB (Common to CSE, AI&ML, DS, CS)					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0510P	**0:0:3:0**	**1.5**	**CIE: 30 SEE:70**	**3 Hours**	**PCC**

Course Objectives:

This course will enable students to:
- To learn and implement the fundamental concepts of Software Engineering.
- To explore functional and non-functional requirements through SRS.
- To practice the various design diagrams.
- To learn to implement various software testing strategies.

Course Outcomes(CO):

On completion of this course, student will be able to
- Familiarize with historical and modern software methodologies(L3)
- Apply the phases of software projects and practice the activities of each phase(L3)
- Determine SRS document(L3)
- Apply cohesion, coupling and metrics in project management(L3)
- Sketch UML diagrams for various applications(L3)
- Apply various test cases and determine quality attributes for a given problems(L 3)

Syllabus	Total Hours:48

Experiment-1

Draw the Work Breakdown Structure for the system to be automated

Experiment-2

Schedule all the activities and sub-activities Using the PERT/CPM charts

Experiment-3

Define use cases and represent them in use-case document for all the stakeholders of the system to be automated

Experiment-4

Identify and analyze all the possible risks and its risk mitigation plan for the system to be Automated

Experiment-5

Diagnose any risk using Ishikawa Diagram (Can be called as Fish Bone Diagram or Cause & Effect Diagram)

Experiment-6

Define Complete Project plan for the system to be automated using Microsoft Project Tool

Experiment-7

Define the Features, Vision, Business objectives, Business rules and stakeholders in the vision document

Experiment-8

Define the functional and non-functional requirements of the system to be automated by using Use cases and document in SRS document

Experiment-9

Define the following traceability matrices :
1. Use case Vs. Features
2. Functional requirements Vs. Usecases

Experiment-10

Estimate the effort using the following methods for the system to be automated:
1. Function point metric
2. Use case point metric

Experiment-11

Develop a tool which can be used for quantification of all the non-functional requirements

Experiment-12

Write C/C++/Java/Python program for classifying the various types of coupling.

Experiment-13

Write a C/C++/Java/Python program for classifying the various types of cohesion.

Experiment-14

Write a C/C++/Java/Python program for object oriented metrics for design proposed by Chidamber and Kremer. (Popularly called CK metrics)

Experiment-15

Convert the DFD into appropriate architecture styles.

Experiment-16

Draw a complete class diagram and object diagrams using Rational tools

Experiment-17

Define the design activities along with necessary artifacts using Design Document.

Experiment-18

Reverse Engineer any object-oriented code to an appropriate class and object diagrams.

Experiment-19

Test a piece of code that executes a specific functionality in the code to be tested and asserts a certain behavior or state using Junit.

Experiment-20

Test the percentage of code to be tested by unit test using any code coverage tools

Experiment-21

Define appropriate metrics for at least 3 quality attributes for any software application of your interest.

Experiment-22

Define a complete call graph for any C/C++ code. (Note: The student may use any tool that generates call graph for source code)

Reference Books:
1. Software Engineering? A Practitioner‟s Approach, Roger S. Pressman, 1996, MGH.
2. Software Engineering by Ian Sommerville, Pearson Edu, 5th edition, 1999
3. 3. An Integrated Approach to software engineering by Pankaj Jalote , 1991 Narosa

Web References:
1. http://vlabs.iitkgp.ac.in/se/

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Basic Web Design (SKILL)					
(Common to CSE, AI&ML, DS, CS)					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0511	**1:0:2:0**	**2**	**CIE: 30 SEE:70**	**3 Hours**	**SC**

Course Objectives:

This course will enable students to:
- Learn website development using HTML, CSS, and JavaScript.
- Understand the concepts of responsive web development using the bootstrap framework
- Learn the frame concepts to the websites and interactive websites.
- Discover how development process to use Google Charts to provide a better way to visualize data on a website
- Learn Content Management Systems to speed the development process

Course Outcomes(CO):

On completion of this course, student will be able to
- Construct websites with valid HTML,CSS.
- Create responsive monitors.
- Develop websites using jQuery and bootstrap to provide interactivity and engaging user experiences
- Design and Develop JavaScript applications.
- Embed Google chart tools in a website for better visualization of data.
- Design and develop web applications using Content Management Systems like Word Press

Syllabus	Total Hours:48

List of Experiments

Module -1:
HTML: What is a browser, Internet concepts, Introduction to HTML, Basic structure of HTML document, Creating an HTML document, Mark up Tags, Heading-Paragraphs, and Line Breaks HTML Tags.

Experiment-1

Design HTML page to display different heading tags and scroll college name as a message.

Module-2:
Introduction to elements of HTML, Working with Text, Lists, Hyperlinks, Images, Multimedia.

Experiment-2

Design HTML page to display the list of departments in college by using ordered and unordered list.

Module-3:
HTML(continued):HTML Tables

Experiment-3

Design HTML page to display Class Timetable

Module-4:
HTML Frames and Frameset.

Experiment-4 Design college website.

Module-5:
HTML Form Elements.

Experiment-5

Design a Student Registration web page using forms.

Module-6:
Cascading Style Sheets(CSS):CSS Properties, Types of CSS, Selectors, box model ,Pseudo-elements, z-index

 Experiment-6

 Apply CSS on student registration form.

Module - 7:
Bootstrap - CSS Framework: Layouts (Containers, Grid system), Forms, Other Components

Experiment-7

Style the student registration Form designed in Module-5still more beautiful using Bootstrap CSS (Re-size browser and check how the webpage displays in mobile resolution).

Module - 8:
HTTP & Browser Developer Tools: Understand HTTP Headers (Request & Response Headers), URL & its Anatomy, Developer Tools: Elements/Inspector, Console, Network, Sources, performance, Application Storage.

Experiment-8

Analyze various HTTP requests (initiators, timing diagrams, responses) and identify problems

Module-9:
JavaScript: Variables, Data Types, Operators.

Experiment-9

Design a simple JavaScript program to perform arithmetic operations.

Module-10:
JavaScript objects, conditions, loops and functions.

Experiment-10

Write JavaScript to find the factorial of a given number and generate the Fibonacci series (Recursive and non-Recursive).

Module-11:
JavaScript arrays and pop-up box.

Experiment-11

Validate all Fields and Submit the student registration Form designed in Module-5

Reference Books:
1. Deitel and Deitel and Nieto, ―Internet and World Wide Web-How to Program, Prentice Hall, 5th Edition,2011.
2. Web Technologies, Uttam K.Roy, Oxford Higher Education., 1st edition, 10th impression, 2015.
3. Stephen Wynkoop and John Burke―Running a Perfect Website‖,QUE,2nd Edition,1999.
4. Jeffrey C and Jackson, ―Web Technologies A Computer Science Perspective Pearson Education, 2011.
5. Gopalan N.P. and Akilandeswari J.,―WebTechnology, PrenticeHall of India,2011.

Web References:
1. HTML:https://html.spec.whatwg.org/multipage/
2. HTML:https://developer.mozilla.org/en-US/docs/Glossary/HTML5
3. CSS:https://www.w3.org/Style/CSS/
4. Bootstrap-CSSFramework:https://getbootstrap.com/
5. Browser Developer Tools:https://developer.mozilla.org/enUS/docs/Learn/Common_questions/What_are_browser_developer_tools
6. Javascript:https://developer.mozilla.org/en-US/docs/Web/JavaScript
7. JQuery:https://jquery.com
8. GoogleCharts:https://developers.google.com/chart
9. Wordpress:https://wordpress.com

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ENVIRONMENTAL STUDIES
(Common **to CSE, AI&ML, CS, DS, ECE, EEE, ME**)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0028T	**2:0:0:0**	**0**	**CIE: 30**	**-**	**MC**

Course Objectives:

This course will enable students to:

- To make the students to get awareness on environment.
- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life.
- To save earth from the inventions by the engineers.

Course Outcomes(CO):

On completion of this course, student will be able to

- Recognize the knowledge about environment, natural resources and different techniques involved in its conservation.
- Describe the information about different eco-systems and its functions.
- Explain the different types of bio-diversity along with values and conservation methods.
- Predict various environmental pollutions and able to design the environmental friendly process in engineering.
- Apply the sustainable development concepts in life, society and industry.

Syllabus		Total Hours:48
Module-I		**10Hrs**
	Definitions , components of Environment, Scope and Importance –Need for Public Awareness Renewable and non-renewable resources –Forest resources – Use and over – exploitation, deforestation,–Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.	
Module-II	**Ecosystems**	**9Hrs**
	Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers– Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem a. Grassland ecosystem. b. Desert ecosystem	
Module-III	**Biodiversity And Its Conservation**	**10Hrs**
	Introduction Definition: genetic, species and ecosystem diversity – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values — India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching ,Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity	
Module-IV	**Environmental Pollution**	**9Hrs**
	Definition, Cause, effects and control measures of : Air pollution 2. Water pollution 3. Noise pollution Solid Waste Management : Causes, effects and control measures of urban and industrial wastes	

Module-V	Social Issues and The Environment	10Hrs

From Unsustainable to Sustainable development – Urban problems related to energy –Environment Protection Act. – Air (Prevention and Control of Pollution) act

Definition, Cause, effects and control measures of : Global warming, Acid rain, Ozone layer depletion

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, and birds – river, hill slopes, etc.

Text Books:
1. Text book of Environmental Studies for Undergraduate Courses- Erach Bharucha for University Grants Commission, Universities Press.
2. Environmental Studies- Kaushik & kaushik, New Age Pubilishers.

Reference Books:
1. Environmental studies- R.Rajagopalan, Oxford University Press
2. Comprehensive Environmental studies- J.P.Sharma, Laxmi publications.

Web References:
1. https://onlinecourses.nptel.ac.in/noc23_hs155/preview