GEETHANJALI INSTITUTE OF SCIENCE & TECHNOLOGY: NELLORE

(AUTONOMOUS)

NELLORE–524317 (A.P) INDIA

B.TECH IN COMPUTER SCIENCE & ENGINEERING (CYBER SECURITY)

COURSE STRUCTURE AND SYLLABIUNDER RG 22 REGULATIONS

Vision & Mission

VISION

- Producing competent graduates to provide modern IT security standards to successfully address the challenges faced by private and public sectors

MISSION

- **M1**: Implementing innovative teaching and learning methodologies consistent with the latest trends related to cyber security.
- **M2**: Enhancing the technical capability of the learners to handle the cyber risks.
- **M3**: Imparting practical learning in the latest technologies.
- **M4**: Creating a conducive environment that fosters creativity and team work.

B. Tech CSE (CS) - PROGRAM OUTCOMES (PO's)	
A graduate of the Computer Science and Engineering (Cyber Security) Program will demonstrate:	
PO1:	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2:	**Problem analysis**: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3:	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4:	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5:	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6:	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7:	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8:	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9:	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10:	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11:	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12:	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

B. Tech CSE (CS) - PROGRAM EDUCATIONAL OBJECTIVES (PEO's)	
A graduate of Computer Science and Engineering (Cyber Security) will be able to:	
PEO 1	Function as effective professionals with their applied skills, problem solving capabilities and professional skills in the domain of cyber security.
PEO 2	Emerge as effective communicators with relevant employable skills in the spheres of cyber security and related domains.
PEO 3	Offer sustainable solutions equipped with cyber security skills to complex social problems.
PEO 4	Engage themselves in the continuous development of their computing and cyber security skills with deep commitment.

B. Tech CSE (CS) - PROGRAM SPECIFIC OUTCOMES (PSO's)	
A graduate of Computer Science and Engineering (Cyber Security) acquires ability to:	
PSO1:	Develop secure software for the protection of digital applications.
PSO2:	Evaluate the function of cyber security to minimize the risks of an organization's cyberspace.

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Unit of USHODAYA EDUCATIONAL SOCIETY

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3rd Mile, Bombay Highway, Gangavaram (V), Kovur(M), SPSR Nellore (Dt), Andhra Pradesh, India- 524137

Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

Semester-3 (Theory-6, Lab-3, SC-1, MC-1)							
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	22A0520T	Computer Networks	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)	22A0523P	Computer Networks Lab	0	0	3	1.5
10	SC	22A0518	**Skill Oriented Course** Linux Programming	1	0	2	2
11	MC	22A0028T	**Mandatory Course** Environmental Studies	2	0	0	0
			Total credits				**24.5**

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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Semester-4 (Theory-5, Lab-3, SC-1, MC-1)							
Sl. No.	**Category**	**Course Code**	**Course Title**	**Hours per week**			**Credits**
				L	**T**	**P**	**C**
1	BSC	22A0017T	Discrete Mathematical Structures	3	0	0	3
2	PCC	22A0512T	Database Management Systems	3	0	0	3
3	PCC	22A0513T	Operating Systems	3	0	0	3
4	PCC	22A0530a	Cryptography and Network Security	3	0	0	3
5	HSC	22A0022T	Managerial Economics & Financial Analysis	3	0	0	3
6	PCC(LAB)	22A0515P	Database Management Systems Lab	0	0	3	1.5
7	PCC(LAB)	22A0516P	Operating Systems Lab	0	0	3	1.5
8	PCC(LAB)	22A3701P	Cryptography and Network Security Lab	0	0	3	1.5
9	SC	22A3203	**Skill Oriented Course** Python Programming	1	0	2	2
10	MC	22A0030T	**Mandatory Course** Constitution of India	2	0	0	0
						Total credits	**21.5**

Category	**Credits**
Basic Science Course (BSC)	3
Humanities and Social Sciences Course (HSC)	3
Professional Core Courses (PCC)	13.5
Skill oriented Course (SC)	2
Total	21.5

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Semester-5 (Theory-5, Lab-2, SC-1, MC-1)							
Sl. No.	**Category**	**Course Code**	**Course Title**	**Hours per week**			**Credits**
				L	**T**	**P**	**C**
1	PCC	22A3303T	Automata and Compiler Design	3	0	0	3
2	PCC	22A0534a	Cyber Security	3	0	0	3
3	PCC	22A0528T	Machine Learning	3	0	0	3
4	PEC	22A3702T 22A3305T 22A0508T	**Professional Elective-I:** 1. Cyber Laws and IT Security 2. Mobile Computing 3. Software Engineering	3	0	0	3
5	OEC	22A0430T 22A0214Ta 22A0149T 22A0321Ta	**Open Elective-I:** 1. Principles of Communication Systems 2. Power Electronics 3. Building Materials 4. Automobile Engineering	3	0	0	3
6	PCC(Lab)	22A3703P	Cyber Security Lab	0	0	3	1.5
7	PCC(Lab)	22A0532P	Machine Learning Lab	0	0	3	1.5
8	SC	22A0029P	**Skill Advanced Course:** Soft Skills	1	0	2	2
9	MC	22A0526	**Mandatory Course:** Design Thinking and Innovation	2	0	0	0
Community Service Project 2 Months (Mandatory) after second year(to be evaluated during V semester)				0	0	0	1.5
			Total credits				**21.5**

Category	**Credits**
Professional Core Courses (PCC)	12
Professional Elective Courses (PEC)	3
Open Elective Courses (OEC)	3
Skill Advanced Course (SC)	2
Summer Internship	1.5
Total	21.5

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Semester-6 (Theory-5, Lab-3, SC-1 MC-1)							
Sl. No.	**Category**	**Course Code**	**Course Title**	**Hours per week**			**Credits**
				L	**T**	**P**	**C**
1	PCC	22A3304T	Natural Language Processing	3	0	0	3
2	PCC	22A3704T	Penetration Testing and Cyber Operations	3	0	0	3
3	PCC	22A0529T	Cloud Computing	3	0	0	3
4	PEC	22A0522c 22A0530b 22A3705T	**Professional Elective-II:** 1. No SQL Databases 2. Soft Computing 3. Computer Forensics	3	0	0	3
5	OEC	22A0431T 22A0213Ta 22A0150T 22A0327Tb	**Open Elective-II:** 1. Micro Controllers and Applications 2. Control Systems 3. Environmental Economics 4. Introduction to Composite Materials	3	0	0	3
6	PCC(Lab)	22A3306T	Natural Language Processing Lab	0	0	3	1.5
7	PCC(Lab)	22A3706P	Penetration Testing and Cyber Operations Lab	0	0	3	1.5
8	PCC(Lab)	22A0533P	Cloud Computing Lab	0	0	3	1.5
9	SC	22A0511	**Skill Oriented Course:** Basic Web Design	1	0	2	2
10	MC	22A0032T	**Mandatory Course:** Research Methodology	2	0	0	0
				Total credits			**21.5**

Category	**Credits**
Professional Core Courses (PCC)	13.5
Professional Elective Courses (PEC)	3
Open Elective Courses (OEC)	3
Skill Oriented Course (SC)	2
Industrial / Research Internship (Mandatory) 2 Months	-
Total	21.5

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Semester-7 (Theory-6, SC-1)							
Sl. No.	**Category**	**Course Code**	**Course Title**	**Hours per week**			**Credits**
				L	**T**	**P**	**C**
1	HSC	22A0023T 22A0024T 22A0025T	**Humanity Science Elective - I** 1. Management Science 2. Entrepreneurship and Innovation 3. Business Environment	3	0	0	3
2	PEC	22A3707T 22A0534b 22A0534c	**Professional Elective-III** 1. Digital Forensics 2. High Performance computing 3. Big Data Analytics	3	0	0	3
3	PEC	22A0535a 22A3708T 22A0535c	**Professional Elective-IV** 1. Block Chain Technology 2. Ethical Hacking **3.** Deep Learning	3	0	0	3
4	PEC	22A0536a 22A3709T 22A0536c	**Professional Elective-V:** 1. Image Processing 2. Data Base Security 3. Full Stack Web Development	3	0	0	3
5	OEC	22A0241Ta 22A0432T 22A0151T 22A0327Tc	**Open Elective-III:** 1. Smart Grid 2. Basic VLSI Design 3. Disaster management 4. Measurements and Mechatronics	3	0	0	3
6	OEC	22A0232Ta 22A0433T 22A0152T 22A0331Tc	**Open Elective-IV:** 1. Electric Vehicles 2. Industrial Electronics 3. Construction Management 4. Introduction to Robotics	3	0	0	3
7	SC	22A0525	**Skill Advanced Course:** R Programming	1	0	2	2
Industrial / Research Internship 2 Months (Mandatory) afterThird year (to be evaluated during VII semester)				0	0	0	3
						Total credits	**23**

Category	Credits
Professional Elective Courses (PEC)	9
Humanities and Social Science Course (HSC)	3
Open Elective Courses (OEC)	6
Skill Advanced Course (SC)	2
Industrial / Research Internship	3
Total	23

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Semester-8 (Project)							
Sl. No.	**Category**	**Course Code**	**Course Title**	**Hours per week**			**Credits**
				L	**T**	**P**	**C**
1	Major Project	22A3710	Project work/Internship in Industry	0	0	24	12
						Total credits	12

Types of Courses

Types of Courses	Course Category	Code	Department
Foundation	Engineering Sciences	ESC	24
	Basic Sciences	BSC	21
	Humanities & Social Sciences and Management	HSMC	13.5
Core	Professional Core	PCC	51
Project	Project & Internship (12)	PROJ	16.5
	Internship (4.5)		
Elective Courses	Professional Elective	PEC	15
	Open Elective (including 2 MOOCs)	OEC	12
Mandatory Courses	Mandatory	MC	-
	Skill Oriented Courses	SC	10
		Total Credits	163

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COURSES OFFERED FOR HONOURS DEGREE IN CSE (Cyber Security)

Sl. No.	Semester	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	IV	22A05H01a	Secure Software Engineering	3	1	0	4
2	IV	22A05H01b	Agile Software Development Approaches	3	1	0	4
3	V	22A05H02a	Introduction to IOT	3	1	0	4
4	V	22A05H02b	Computer Vision	3	1	0	4
5	VI	22A05H03a	Visual Programming	3	1	0	4
6	VI	22A05H03b	Network Management Systems	3	1	0	4
7	VII	22A05H04a	Artificial Neural Networks	3	1	0	4
8	VII	22A05H04b	Distributed Systems	3	1	0	4
9	VIII	22A05H05	MOOC-I	-	-	-	4

Suggested MOOCs:

1. Multicore Computer Architecture
2. Secure Computation
3. Privacy and Security in Online Social Media
4. Advanced Distributed Systems

Note: As of now the above MOOCs courses are specified and the list of courses will be updated in the corresponding Semesters

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COURSES OFFERED FOR MINORS DEGREE IN CSE (Cyber Security) to OTHER DEPARTMENTS

Sl. No.	Semester	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	IV	22A05M01a	Computer Organization	3	1	0	4
2	IV	22A05M01b	Operating Systems	3	1	0	4
3	IV	22A05M01c	Software Engineering	3	1	0	4
4	V	22A05M02a	Design and Analysis of Algorithms	3	1	0	4
5	V	22A05M02b	Computer Networks	3	1	0	4
6	V	22A05M02c	Software Testing	3	1	0	4
7	VI	22A05M03a	Object Oriented Analysis & Design	3	1	0	4
8	VI	22A05M03b	Cryptography and Network Security	3	1	0	4
9	VI	22A05M03c	Deep Learning	3	1	0	4
10	VII	22A05M04	MOOC-I	-	-	-	4
11	VIII	22A05M05	MOOC-II	-	-	-	4

Suggested MOOCs:

1. Foundations and Appling of Machine Learning
2. Introduction to IOT
3. Software Conceptual Design
4. Computer Architecture
5. Artificial Intelligence
6. Ethical Hacking

Note: As of now the above MOOCs courses are specified and the list of courses will be updated in the corresponding Semesters

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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 Terrestrial, Events, Sample Space, Probability, And Laws Of Probability, Make Use Of Probabilities Of Events Infinite 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 To 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**	**9Hrs**

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**	**10Hrs**

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 hypothesis , large sample tests**	**9Hrs**

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	10Hrs
Student-Distribution(Test For Single Mean, Two Means And Pairedt-Test),Testing Of Equality Of Variances(F-Test), X2-Testforgoodnessoffit, X2-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.KrishnaGandhi, S.Ranganatham and M.V.S.S.N.Prasad S. Chand publication.
2. B.V.Ramana,"HigherEngineeringMathematics",McGrawHillpublishers.
3. W.Feller,an Introductionto Probability Theory and its Applications,1/e,Wiley,1968.
4. Mathematical Foundations of Statistics by K.C.Kapoor & Gupta, S.ChandPublications.

Web references:

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. CarlHamacher, ZvonkoVranesic, 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:

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.

Multithreading: 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, j text field, j label.

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:

https://onlinecourses.nptel.ac.in/noc22_cs47/preview

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3rd Mile, Bombay Highway, Gangavaram (V), Kovur(M), SPSR Nellore (Dt), Andhra Pradesh, India- 524137

Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

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 Flip Flop, 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:

https://onlinecourses.nptel.ac.in/noc22_ee55/preview

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Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

COMPUTER NETWORKS

(Common **to CSE, AI&ML, CS, DS**)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0520T	**3: 0:0:0**	**3**	**CIE:30 SEE:70**	**3 Hours**	**PCC**

Course Objectives:

This course will enable students :

- Determine the basic concepts of Computer Networks.
- Determine the layered approach for design of computer networks
- Distinguish OSI and TCP/IP reference models
- Predict the network path used in Internet environment
- Use the format of headers of IP, TCP and UDP
- Illustrate the concepts of application layer, network security fundamentals.

Course Outcomes(CO):

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

- Use the software and hardware components of a computer network
- Apply the reference model of a computer network
- Solve the error correction and detection in existing protocols
- Predict path for routing, and congestion control algorithms
- Determine the functionality of TCP and UDP
- Use the appropriate application layer applications

Syllabus		**Total Hours:48**
Module-I	**The Internet and the Reference Models**	**10Hrs**

Introduction: Computer Network, Network Topologies, types of networks, Reference models- The OSI Reference Model the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models.

Physical Layer –Introduction to physical layer, Guided Media- Twisted-pair cable, Coaxial cable, Fiber optic cable, Unguided media: Wireless-Radio waves, microwaves, infrared..

Module-II	**The Data Link Layer**	**9Hrs**

The Data Link Layer :Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols

Module-III	**The Network Layer**	**10Hrs**

The Network Layer: Network Layer design issues, Routing algorithms, Congestion control and Internetworking, Network layer in internet.

Module-IV	**Transport Layer**	**9Hrs**

Transport Layer: Transport layer services, service primitives, Elements of transport protocols**,** The Internet Transport Protocols: TCP/IP, UDP.

Module-V	**The Application Layer and Network security**	**10Hrs**

The Application Layer :DNS, SMTP, FTP, Email and security, network security.

Text Books:

1. Andrew S.Tanenbaum, David j.wetherall, Computer Networks, 5th Edition, PEARSON.
1. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach", 6th edition, Pearson, 2019.

Reference Books:

1. Forouzan, Data communications and Networking, 5th Edition, McGraw Hill Publication.
2. Youlu Zheng, Shakil Akthar, "Networks for Computer Scientists and Engineers", Oxford Publishers, 2016.

Web References:

- https://nptel.ac.in/courses/106105183/25
- http://www.nptelvideos.in/2012/11/computer-networks.html
- https://nptel.ac.in/courses/106105183/3

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UNIVERSAL HUMAN VALUES

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

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0021T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	HSC

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 a ware 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 indifferent day-to-day setting sin 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-Acritical appraisal of the current scenario
- Method to fulfil the above human aspirations: understanding and living in harmony at variou levels.
- 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 eco-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 fulfillment 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 reflection 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 Co axis**	**9Hrs**

- Understanding the harmony in the Nature
- Inter connectedness and mutual fulfillment among the four orders of nature-recyclability and self-regulation in nature
- Understanding Existence as Co-existence of mutually interacting unit sin 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 be used),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 Definitiveness of Ethical Human Conduct
- Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
- Competenceinprofessionalethics:a.Abilitytoutilizetheprofessionalcompetenceforaugmentingu niversalhumanorderb.Ability toidentifythescopeandcharacteristicsofpeoplefriendlyandeco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
- Casestudiesoftypicalholistictechnologies,managementmodelsandproductionsystemsStrategyfo rtransitionfromthepresentstatetoUniversalHumanOrder:
- Atthelevelofindividual:associallyandecologicallyresponsibleengineers,technologistsandmanag ers
- Atthelevelofsociety:asmutuallyenrichinginstitutionsandorganizationsSumup.
- IncludepracticeExercisesandCaseStudieswillbetakenupinPractice(tutorial)Sessionseg.Todiscu sstheconductasanengineerorscientistetc.

Text Books:

1. RRGaur,RAsthana,GPBagaria,"AFoundationCourseinHumanValuesandProfessionalEthics",2nd RevisedEdition,ExcelBooks,NewDelhi,2019.ISBN978-93-87034-47-1
2. R RGaur,RAsthana,GPBagaria,"Teachers'ManualforAFoundationCourseinHumanValues andProfessionalEthics",2nd RevisedEdition,ExcelBooks,NewDelhi,2019.ISBN978-93-87034-53-2

Reference Books:

- JeevanVidya:EkParichaya,ANagaraj,JeevanVidyaPrakashan, Amar kantak,1999.
- A.N.Tripathi,"HumanValues",NewAgeIntl.Publishers,NewDelhi,2004.TheStoryofStuff(Book).
- MohandasKaramchandGandhi"TheStoryofMyExperimentswithTruth"
- E.FSchumacher."SmallisBeautiful"SlowisBeautiful–CecileAndrews
- J C Kumarappa"Economy of Permanence"Pandit Sunderlal "Bharat Mein Angreji Raj"Dharampal,"RediscoveringIndia"
- MohandasK.Gandhi,"HindSwarajorIndianHomeRule"IndiaWinsFreedom-MaulanaAbdulKalamAzadVivekananda-RomainRolland(English)Gandhi-RomainRolland(English)

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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 ax2+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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DIGITALELECTRONICSANDMICRO PROCESSORSLAB
(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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COMPUTERNETWORKSLAB
(Common to CSE,AI&ML,DS,CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0523P	0:0:3:0	1.5	CIE:30 SEE:70	3 Hours	PCC

Course Objectives:

This course will enable students to:

- Understand the basic concepts of Computer Networks
- Understand the functionalities of various layers of OSI model
- Apply the data link layer framing mechanisms
- Apply the error detection mechanisms
- Implement the routing protocols.

Course Outcomes(CO):

On completion of this course, student will be able to

- Use the basic components of a Computer Networks (L3)
- Determine different hardware devices in computer networks(L3)
- Determine the data link layer framing mechanisms(L3)
- Use the error detection mechanisms(L3)
- Apply the shortest routing protocols to transmit data(L3)
- Determine spanning tree for a subnet(L3)

Syllabus | **Total Hours:48**

List of Experiments

Experiment-1:

- Explain the basic networking commands.

Experiment-2:

- Study of network devices such as repeaters, hub, switch, bridge, router and gateway

Experiment-3:

- Implement the data link layer framing method as character count

Experiment-4:

- Implement the data link layer framing method as character stuffing

Experiment-5:

- Implement the data link layer framing method as bit stuffing

Experiment-6:

- Implement on a data set of characters the CRC polynomials CRC 12

Experiment-7:

- Implement Dijkstra's algorithm to compute the shortest path through a graph

Experiment-8:

- Obtain hierarchical table by taking an example subnet graph with weights indicating delay between nodes

Experiment-9:

- Obtain Routing table at each node using distance vector routing algorithm

Experiment-10:

- Find minimum cost and minimum spanning tree for a given subnet of hosts

Text Books:

1. Andrew S.Tanenbaum, David j.wetherall, Computer Networks, 5th Edition, PEARSON.
2. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach", 6th edition, Pearson, 2019.

Reference Books:

1. Forouzan, Datacommunications and Networking, 5th Edition, McGraw Hill Publication.
2. Youlu Zheng, Shakil Akthar, "Networks for Computer Scientists and Engineers", Oxford Publishers, 2016.

Web References:

1. https://nptel.ac.in/courses/106105183/25
2. http://www.nptelvideos.in/2012/11/computer-networks.html
3. https://nptel.ac.in/courses/106105183/3

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LINUX PROGRAMMING (SKILL)
(Common to CSE, AIML, DS,CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0518	1:0:2:0	2	CIE:30 SEE:70	3 Hours	SC

Course Objectives:

This course will enable students to:

- Analyze the Linux utilities and Linux environment.
- Learn the fundamentals of shell scripting/programming.
- Understand system administration processes by providing a hands-on experience.

Course Outcomes (CO):

On completion of this course, student will be able to

- Understand the Basic commands and utilities in Linux Environment.
- Identify and use Linux utilities to create and manage simple file processing operations, organize directory structures with appropriate security.
- Analyze the Linux utilities and Linux environment.
- Use shell script to automate different tasks as Linux.
- Illustrate file processing operations such as standard I/O and formatted I/O.
- Develop various client server applications using TCP or UDP protocols.

Syllabus | **Total Hours:48**

Introduction to Linux/Unix:- Architecture of Unix, Features of Unix , Unix Commands – man, echo, printf, script, passwd, uname, who, date, stty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip, : User and session management commands: user add, groupadd, userdel, groupdel.

Linux/Unix Utilities:- Introduction to unix file system, file handling utilities, vi editor, Text processing utilities and backup utilities: commands to be covered are tail, head, sort, nl, uniq, sed, grep, egrep, fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr and awk.
Unix Session, Standard Streams, Redirection, Pipes.

Filters and Pipes, Concatenating files, Display Beginning and End of files, Cut and Paste, Sorting, Translating Characters, Files with Duplicate Lines, Count characters, Words or Lines, Comparing Files

Shell Programming:
Introduction to shells, Variables, input and output, Environment variables, Basic script concepts, Expressions, Decision making and repetition etc.

Socket programming: Client Sever Implementation Using Sockets and Shared Memory

Experiment 1: Study and Practice on various commands like man, echo, printf, clear, script, passwd, cal,uname, who, date, tty, stty, pwd, who,.

Experiment 2: Study and Practice on various commands like cd, mkdir, rmdir cp, mv, ln, rm, unlink, du, df, mount, umount, find, unmask, ulimit, ps.

Experiment 3: Study and Practice on various commands like tail, head, sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr

Experiment 4:

Session-1

a) Log into the system
b) Use vi editor to create a file called myfile.txt which contains some text.
c) Correct typing errors during creation.
d) Save the file
e) logout of the system

Session-2

a) Log into the system
b) open the file created in session 1
c) Add some text
d) Change some text
e) Delete some text
f) Save the Changes
g) Logout of the system

Experiment 5:

a) Login to the system
b) Use the appropriate command to determine your login shell
c) Use the /etc/passwd file to verify the result of step b.
d) Use the who command and redirect the result to a file called myfile1. Use the more command to see the contents of myfile1.
e) Use the date and who commands in sequence (in one line) such that the output of date will display on the screen and the output of who will be redirected to a file called myfile2. Use the more command to check the contents of myfile2.

Experiment 6:

a) Log into the system
b) Use the cat command to create a file containing the following data. Call it mytable use tabs to separate the fields.

1425	Ravi	15.65
4320	Ramu	26.27
6830	Sita	36.15
1450	Raju	21.86

c) Use the cat command to display the file, mytable.
d) Use the vi command to correct any errors in the file, mytable.
e) Use the sort command to sort the file mytable according to the first field. Call the sorted file my table (same name)
f) Print the file mytable
g) Use the cut and paste commands to swap fields 2 and 3 of mytable. Call it my table (same name)
h) Print the new file, mytable
i) Logout of the system.

Experiment 7:

a) Write a sed command that deletes the first character in each line in a file.
b) Write a sed command that deletes the character before the last character in each line in a file.
c) Write a sed command that swaps the first and second words in each line in a file.

Experiment 8:

1. Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.
2. Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments toit.

Experiment 9:

1. Write a program to generate Fibonacci series
2. Write a program to check whether given string is palindrome or not
3. Write a shell script to find factorial of a given integer.

Experiment 10:

1. Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file, the number of lines on it is also reported.
2. Write a shell script to list all of the directory files in a directory

Experiment 11:

1. Write an awk script to count the number of lines in a file that do not contain vowels.
2. Write an awk script to find the number of characters, words and lines in a file.
3. Write an awk script to calculate average marks of each student.
4. Write an awk script to replace a string in a file.

Experiment12:

Simulate the following commands

a) Simulate cat command b) Simulate cp command

Experiment 13:

1. Write client and server programs (using java) for interaction between server and client processes using Unix domain sockets.
2. Write client and server programs (using java) for interaction between server and client processes using Internet domain sockets.

Reference Books:

1. Sumitabha Das, "Your Unix The Ultimate Guide", Tata McGraw-Hill, New Delhi, India, 2007.
2. B. A. Forouzan and R. F. Gilberg, "Unix and Shell Programming", Cengage Learning.
3. Robert Love, "Linux System Programming", O'Reilly, SPD. Stephen G. Kochan, Patrick Wood, "Unix Shell Programming", Sams publications, 3rd Edition, 2007.
4. T. Chan, "Unix System Programming using C++", Prentice Hall India, 1999.

Web References:

1. https://nptel.ac.in/courses/117106113
2. https://archive.nptel.ac.in/courses/117/106/117106113/

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3rd Mile, Bombay Highway, Gangavaram (V), Kovur(M), SPSR Nellore (Dt), Andhra Pradesh, India- 524137

Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

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 followingecosystem

a. Grassland ecosystem. b. Desertecosystem

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 :

1. 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:

https://onlinecourses.nptel.ac.in/noc23_hs155/preview

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Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

DISCRETE MATHEMATICAL STRUCTURES

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

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0017T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	BSC

Course Objectives:

- Introduce the concepts of mathematical logic and gain knowledge in sets, relations and functions
- Solve problems using counting techniques and combinatorics
- Introduce generating function sand recurrence relations.
- Use Graph Theory for solving real world problems

Course Outcomes (CO):

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

- Apply mathematical logic to solve problems.
- Understand the concepts and perform the operations related to sets, relations and functions.
- Gain the conceptual background needed and identify structures of algebraic nature.
- Apply basic counting techniques to solve combinatorial problems.
- Formulate problems and solve recurrence relations.
- Apply Graph Theory in solving computer science problems.

Syllabus		Total Hours:48
Module–I	**Mathematical Logic**	**10 Hrs**

Introduction, Statements and Notation, Connectives, Well-formed formulas, Tautology, Duality law, Equivalence, Implication, Normal Forms, functionally complete set of connectives, Mathematical Induction.

Module–II	Set Theory	10Hrs

Basic Concepts of Set Theory, Relations and Ordering, The Principle of Inclusion-Exclusion, Pigeon hole principle and its application, Functions composition of functions, Inverse Functions, Recursive Functions, Lattices and its properties.

Algebraic structures: Algebraic Systems-Examples and General Properties, Semi groups and Monoids, groups, sub groups, homomorphism, Isomorphism.

Module–III	Elementary Combinatorics	9Hrs

Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutations with Constrained Repetitions, Binomial Coefficients, The Binomial and Multinomial Theorems.

Module–IV	Recurrence Relations	9Hrs

Calculating Coefficients of Generating Functions, Recurrence relations, Solving Recurrence Relations by Substitution, The Method of Characteristic roots, Solutions of homogeneous Recurrence Relations.

Module–V	Graph Theory	10Hrs

Basic Concepts, Isomorphism and Sub graphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multi graphs and Euler Circuits, Hamiltonian Graphs, Chromatic Numbers, The Four-Color Problem.

Text Books:

1. Joel. Mott, Abraham Kandel and Theodore P. Baker, Discrete Mathematics for Computer Scientists &Mathematicians, 2nd Edition, Pearson Education.
2. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw Hill, 2002.

Reference Books:

1. Kenneth H. Rosen, Discrete Mathematics and its Applications with Combinatorics and Graph Theory, 7th Edition, McGraw Hill Education (India) Private Limited.
2. Graph Theory with Applications to Engineering and Computer Science by Narsingh Deo.

Web Resource :

http://www.cs.yale.edu/homes/aspnes/classes/202/notes.pdf

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DATA BASE MANAGEMENT SYSTEMS
(Common to CSE,AI&ML,DS,CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0512T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	PCC

Course Objectives:

This course will enable students to:

- To teach the role of database management system in an organization.
- To design databases using data modeling and Logical database design techniques.
- To construct database queries using relational algebra and calculus and SQL.
- To explore implementation issues in database transaction.
- To familiarize database security mechanisms.

Course Outcomes (CO):

On completion of this course, student will be able to

- Understand the Basic Concepts of Database languages, Relational model, SQL.
- Choose the specific Data models for large enterprise database design.
- Analyze the data efficiently through SQL instructions.
- Apply Normal forms on database for eliminating the redundancy.
- Demonstrate the Basic Concepts of transaction management techniques.
- Apply concurrency control techniques for Database recovery.

Syllabus		Total Hours:48
Module-I	**Introduction to Database concepts and Modeling**	**10Hrs**

Conceptual Modeling Introduction: Introduction to Data bases, Purpose of Database Systems, View of Data, Data Models, Database Languages, Database Users, Database Systems architecture.

The Entity-Relationship Model: Overview of Database Design, Beyond ER Design, Entities, Attributes and Entity sets, Relationships and Relationship sets, Conceptual Design with the ER Model.

Module-II	Relational Model, Relational Algebra	9Hrs

Relational Model: Introduction to the Relational Model – Integrity Constraints over Relations, Enforcing Integrity constraints, querying relational data, Logical data base Design, Views.

Relational Algebra: Introduction to Relational algebra, selection and projection, set operations, renaming, joins, division.

Module-III	SQL	10Hrs

SQL: Basic form of SQL Query, DDL, DML queries, Views in SQL, Joins, Nested & Correlated queries, Operators, predefined functions, Aggregate Functions.

PL/SQL: Introduction, Functions & Procedures, Triggers, Cursors.

Module-IV	Normalization	9Hrs

Relational database design: Introduction, Functional Dependencies (FDs), Normalization for relational databases: 1NF, 2NF, 3NF and BCNF, Basic definitions of Multi Valued Dependencies, 4NF and 5NF.

Module-V	Transaction Management &Concurrency	10Hrs

	Control and Recovery	

Transaction Management: Transaction processing, Transaction Concept, Transaction States, Implementation of Atomicity and Durability, Concurrent Executions.

Concurrency Control: Lock-Based Protocols, Timestamp- Based Protocols, Validation-Based Protocols, Multiple Granularity.

Recovery: Failure Classification, Recovery and Atomicity, Log-Based Recovery.

Text Books:

1. Abraham Silbers chatz, Henry F. Korth, S. Sudarshan, Database System Concepts, 6th Edition, Tata McGraw-Hill Publishing Company,2017.
2. Raghu Ramakrishnan, Database Management System, 3rd Edition, Tata McGraw-Hill Publishing Company, 2014.

Reference Books:

1. Peter Rob, A.Ananda Rao, Corlos Coronel, Database Management Systems (for JNTU), Cengage Learning, 2011.
2. Hector Garcia Molina, Jeffrey D. Ullman, Jennifer Wisdom, Database System Implementation, 1st Edition, Pearson Education, United States, 2000.
3. E. Ramez and Navathe, Fundamental of Database Systems, 7th Edition, Pearson Education
4. R.P. Mahapatra & Govind Verma, Database Management Systems, Khanna Publishing House, 2016.
5. Carlos Coronel and Steven Morris, Database Systems: Design, Implementation, and Management, 12th edition, Cengage Learning,2016.
6. John V. ,Absolute beginner's guide to databases, Petersen, QUE

Web References:

1. https://www.coursera.org/learn/database-management
2. https://www.coursera.org/learn/sql-data-science
3. https://www.w3schools.com/sql/
4. https://www.youtube.com/watch?v=fHAfc7Hjq28&list=PLWPirh4EWFpGrpcMfZ6UcdI786QdtSxV8
5. https://www.youtube.com/watch?v=HwmEcudlv44&list=PL4OCRJojkV1jN-Ed6RkQpWfBvqe0utRd6
6. http://www.w3schools.in/dbms/
7. https://www.geeksforgeeks.org/dbms/
8. https://www.javatpoint.com/dbms-tutorial
9. https://www.edureka.co/blog/dbms-tutorial/

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Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

OPERATING SYSTEMS
(Common to CSE,AI&ML,DS,CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0513T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	PCC

Course Objectives:

This course will enable students to:

- Choose different Scheduling Algorithms.
- Solve Classic problems of synchronization.
- Apply various memory management techniques.
- Analyzing disk management functions and techniques.
- Implement files and directories.
- Analyze the Protection and Security mechanisms.

Course Outcomes (CO):

On completion of this course, student will be able to

- Illustrate the overall view of operating system structure. (L3)
- Analyze process scheduling algorithms and Synchronization methods. (L4)
- Solve Deadlock problems using various synchronization techniques. (L3)
- Apply memory management techniques in the design of operating systems (L3).
- Identify efficient file allocation methods for optimal disk utilization. (L3).
- Analyze Security and Protection Mechanism in Operating System (L4).

Syllabus		Total Hours:48
Module-I	**Operating Systems Overview and Structures**	**10 Hrs**

Introduction, Operating System Operations, Types of Operating Systems, functions of Operating Systems, Operating System Services, System Calls, System Programs, Operating System Structure.

Module-II	Process Management and Synchronization	10 Hrs

Process Management: Process Concepts, Process Scheduling, Operations on Processes, Inter-process Communication, Thread Models, Implementing Threads in User Space and the Kernel

Process Synchronization: Critical - Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization.

Module-III	Deadlocks and Memory Management	10 Hrs

Deadlocks: System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Deadlock Detection, Recovery from Deadlock.

Memory Management: Introduction, Swapping, Contiguous memory allocation, Paging, Segmentation, Virtual Memory Management, Page-Replacement Algorithms, Thrashing, Kernel memory allocation.

Module-IV	Mass – Storage Structure and File Systems	9Hrs

Mass – Storage Structure: Disk Structure, Disk Scheduling, RAID Structure.

File Systems: Files, Directory, File System Structure, File- System Implementation, Directory Implementation.

Module-V	System Protection, System Security	9 Hrs

System Protection: Goals of protection, Principles and domain of protection, Access matrix, Access control, Revocation of access rights.

System Security: Introduction, Program threats, System and network threats.

Text Books:

1. Silberschatz A, Galvin P B, and Gagne G, Operating System Concepts, 9th edition, Wiley, 2016.
2. Tanenbaum A S, Modern Operating Systems, 3rd edition, Pearson Education, 2008. (Topics: Distributed Systems)

Reference Books:

1. Tanenbaum A S, Woodhull A S, Operating Systems Design and Implementation, 3rd edition, PHI, 2006.
2. Dhamdhere D M, Operating Systems A Concept Based Approach, 3rd edition, Tata McGraw Hill, 2012.
3. Stallings W, Operating Systems -Internals and Design Principles, 6th edition, Pearson Education, 2009.
4. Nutt G, Operating Systems, 3rd edition, Pearson Education, 2004.

Web Refercnces:

1. https://nptel.ac.in/courses/106/106/106106144/
2. http://peterindia.net/OperatingSystems.html

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CRYPTOGRAPHY AND NETWORK SECURITY
(Common to CSE, AIML, CS, DS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0530a	3:0:0:0	3	CIE:30 SEE:70	3 Hours	PEC

Course Objectives:

This course will enable students to:

- Introduce the basic categories of threats to computers and networks
- Illustrate various crypto graphical algorithms.
- Demonstrate public-key cryptosystem.
- Discuss the fundamental ideas of public-key cryptography.
- Explore Web security threats and protection mechanisms.

Course Outcomes(CO):

On completion of this course, student will be able to

- Understand and apply the cryptographic algorithms to safe guard from intruders
- Compare and contrast symmetric and asymmetric encryption systems and their vulnerability to attack
- Implement the various key distribution, management and message authentication Schemes to send the messages with security
- Identify information system requirements for Transport level, wireless network, E-Mail and IP
- Design a network security system by implementing all the concepts of encryption and decryption algorithms
- Design a web security system by implementing all the concepts

Syllabus		Total Hours:48
Module-I	**Attacks on Computers and Computer Security**	**10Hrs**

Introduction, The need for security, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security Cryptography, plain text and cipher text, encryption and decryption, substitution techniques, transposition techniques, symmetric and asymmetric key cryptography, Steganography

Module-II	Symmetric key Ciphers & Asymmetric key Ciphers	9Hrs

Symmetric key Ciphers: Block Cipher principles, Block cipher modes of operation, Stream ciphers, DES, AES, Blowfish, Key distribution.

Asymmetric key Ciphers: Principles of public key cryptosystems, RSA, DiffieHellman Key Exchange, and Elliptic Curve Cryptography, Key Distribution.

Module-III	Message Authentication and Hash Functions	10Hrs

Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, Whirlpool, HMAC, CMAC, Digital signatures.

Module-IV	E-Mail Security	9Hrs

Pretty Good Privacy, S/MIME, IP Security: IP Security overview, IPSecurity architecture, Authentication Header, Encapsulating Security Payload (ESP), Security Associations, Key-Management.

Module-V	Web Security	10Hrs

Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction Intruders, Virus and Firewalls: Intruders, Intrusion detection, password management, Virus and related threats, Firewall design principles, Types of firewalls.

Case Studies on Cryptography and security: Secure Inter-branch Payment Transactions, Virtual Elections.

Text Books:

1. William Stallings, "Cryptography and Network Security", 5th Edition, Pearson Education, 2011.
2. Bernard Menezes "Network Security and Cryptography",1st Edition, CENGAGE Learning, 2010.

Reference Books:

1. C K Shyamala, N Harini, Dr T R Padmanabhan,WileyIndia,"Cryptography and Network Security",1st Edition, Wiley India Pvt Ltd,2011.
2. Forouzan Mukhopadhyay "Cryptography and Network Security", 2nd Edition, McGrawHill, 2010.
3. Mark Stamp, Wiley India, "Information Security, Principles and Practice", 2ndEdition,Wiley, 2011.

Web References:

1. https://www.tutorialspoint.com/cryptography/index.htm
2. https://www.gatevidyalay.com/tag/cryptography-and-network-security-tutorial/
3. https://www.youtube.com/watch?v=C7vmouDOJYM

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Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

(Common to All Branches)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0022T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	HSC

Course Objectives:

This course will enable students to:

- To understand the concepts of managerial economics and financial analysis this helps in optimal decision making in business environment.
- To have a thorough knowledge on the production theories and cost while dealing with the production and factors of production.
- To have a thorough knowledge regarding market structure and forms of business organizations in the market.
- To understand the concept of capital and capital budgeting in selecting the proposals.
- To have a thorough knowledge on recording, classifying and summarizing of transactions in preparing of final accounts.

Course Outcomes (CO):

On completion of this course, student will be able to

- Outline the Managerial Economic concepts for decision making and forward planning. Also know law of demand and its exceptions, to use different forecasting methods for predicting demand for various products and services.
- Assess the functional relationship between Production and factors of production and list out various costs associated with production
- Compute breakeven point to illustrate the various uses of breakeven analysis.
- Outline the different types of business organizations and provide a framework for analyzing money in its functions as a medium of exchange.
- Interpret various techniques for assessing the proposals of project for financial position of the business.
- Identify the principles of accounting to record, classify and summarize various transactions in books of accounts for preparation of final accounts.

Syllabus		Total Hours:48
Module-I	**INTRODUCTION TO MANAGERIAL ECONOMICS &DEMAND**	**9Hrs**

Managerial Economics – Definition – Nature & Scope - Contemporary importance of Managerial Economics - Demand Analysis - Concept of Demand - Demand Function - Law of Demand - Elasticity of Demand - Significance - Types of Elasticity - Measurement of Elasticity of Demand - Demand Forecasting - Factors governing Demand Forecasting - Methods of Demand Forecasting - Relationship of Managerial Economics with Financial Accounting and Management.

Module-II	**THEORY OF PRODUCTION AND COST ANALYSIS**	**9Hrs**

Production Function – Least-cost combination - Short-run and Long-run Production Function - Isoquants and Iso costs, MRTS - Cobb-Douglas Production Function - Laws of Returns - Internal and External Economies of scale - Cost concepts and Cost behavior - Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems) - Managerial significance and limitations of Break-Even Analysis.

Module-III	**INTRODUCTION TO MARKETS ANDFORMS**	**10Hrs**

	OF BUSINESS ORGANIZTIONS	
Market structures - Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition – Monopoly - Monopolistic Competition – Oligopoly - Price-Output Determination - Pricing Methods and Strategies - Forms of Business Organizations - Sole Proprietorship - Partnership - Joint Stock Companies - Public Sector Enterprises.		
Module-IV	**CAPITAL AND CAPITAL BUDGETING**	**10Hrs**
Concept of Capital - Significance - Types of Capital - Components of Working Capital Sources of Short-term and Long-term Capital - Estimating Working capital requirements – Capital Budgeting – Features of Capital Budgeting Proposals – Methods and Evaluation of Capital Budgeting Projects – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)		
Module-V	**INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS**	**10Hrs**
Accounting Concepts and Conventions - Introduction Double-Entry Book Keeping, Journal, Ledger, and Trial Balance - Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.		

Text Books:

1. Managerial Economics, PL Mehata, Sulthan Chand Publications

Reference Books:

1. Ahuja Hl “Managerial economics” 3 rd edition, Schand, ,2013
2. S.A. Siddiqui and A.S. Siddiqui: “Managerial Economics and Financial Analysis”, New Age International,. 2013.
3. Joseph G. Nellis and David Parker: “Principles of Business Economics”, 2nd edition, Pearson, New Delhi.
4. Domnick Salvatore: “Managerial Economics in a Global Economy”, Cengage, 2013.
5. Managerial Economics, Varshney &Maheswari, Sultan Chand, 2013.
6. Managerial Economics and Financial Analysis, Aryasri, 4th edition, MGH, 2019

Web References:

https://nptel.ac.in/courses/110101005

https://onlinecourses.nptel.ac.in/noc23_mg65/preview

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3rd Mile, Bombay Highway, Gangavaram (V), Kovur(M), SPSR Nellore (Dt), Andhra Pradesh, India- 524137
Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

DATABASE MANAGEMENT SYSTEMSLAB
(Common to CSE,AI&ML, CS, DS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0515P	0:0:3:0	1.5	CIE:30 SEE:70	3 Hours	PCC

Course Objectives:

This course will enable students to:

- Illustratethedifferentissuesinvolvedinthedesignandimplementationofadatabasesystem.
- Use data manipulation language to query, update, and manage a database.
- Designandbuildasimpledatabasesystemanddemonstratecompetencewiththefundamentaltasksinvolved with modeling, designing, and implementing a DBMS.

Course Outcomes (CO):

On completion of this course, student will be able to

- Apply database tools to perform various operations for the given database.
- Design database and retrieve information from database
- Develop ER diagrams and normalize the solution of a database.
- Implement the integrity constraints and PL/SQL programs to build efficient databases.
- Develop solutions for database applications using procedures and functions.
- Develop solutions for database applications using cursors and triggers.

Syllabus | **Total Hours: 48**

Experiment 1: Practice session: Students should be allowed to choose appropriate DBMS software, install it, configure it and start working on it. Create sample tables, execute some queries, use SQLPLUS features, and use PL/SQL features like cursors on sample database.
Experiment 2: Draw E-R diagram for library management system
Experiment 3: Draw E-R diagram for university management system
Experiment 4: Draw E-R diagram for hospital management system
Experiment 5: Implement all DDL Commands
Experiment 6: Implement all DML Commands
Experiment 7: Implement all TCLand DCL Commands
Experiment 8: a) Create relationship between the tables using Nested Queries
b) Implement different types of joins on tables
Experiment 9: Implement set operations on tables
Experiment 10: Create a table and applyvariouskey constraints.
Experiment 11: Views–Create a Virtual table based on the result set of anSQLstatement.
Experiment 12: a) Write a PL/SQL program to swap two numbers.
b) Write a PL/SQL program to find the largest of three numbers.
Experiment 13: a) Write a PL/SQL program to find the total and average of 6 subjects and display the grade.
b) Write a PL/SQL program to find the sum of digits in a given number.
Experiment 14: a) Write a PL/SQL program to display the number in reverse order.
b) Write a PL/SQL program to check whether the given number is prime or not.
c) Write a PL/SQL program to find the factorial of a given number.
Experiment 15: WritePL/SQLprogramsto implement proceduresand functions.
Experiment 16: Write a PL/SQL Program on cursors
Experiment 17: Write a PL/SQL Program to implement triggers

Text Books:

1. Raghu Ramakrishnan, Johannes Gehrke, Jeff Derstadt, Scott Selikoff and Lin Zhu,Database Management Systems solutions manual, third Edition, 2013.

References Books:

1. RamezElmasri, Shamkant, B. Navathe, “Database Systems”, Pearson Education, 6th Edition, 2013.
2. Peter Rob, Carles Coronel, “Database System Concepts”, Cengage Learning, 7th Edition, 2008.

Web References:

1. http://www.scoopworld.in
2. http://vlabs.iitb.ac.in/vlabs-dev/labs/dblab/index.php

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Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

OPERATING SYSTEMSLAB
(Common to CSE,AI&ML,DS,CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0516P	0:0:3:0	1.5	CIE:30 SEE:70	3 Hours	PCC

Course Objectives:

This course will enable students to:

Design and implement the concepts of operating systems such as

- CPU scheduling
- Process Management
- Memory Management
- File systems and deadlock handling using C language.

Course Outcomes (CO):

On completion of this course, student will be able to

- Analyze and simulate CPU Scheduling Algorithms.
- Solve process Synchronization problems using different algorithms.
- Apply algorithms to avoid deadlock problems.
- Implement memory management schemes and page replacement schemes.
- Analyze and simulate Disk Scheduling Algorithms.
- Simulate file allocation and organization techniques.

Syllabus — **Total Hours: 48**

Experiment 1: Write a C program to simulate the following non-pre-emptive CPU scheduling algorithms to find turnaround time and waiting time.
a) FCFS b) SJF

Experiment 2: Write a C program to simulate the following pre-emptive CPU scheduling algorithms to find turnaround time and waiting time.
a) Round Robin b) Priority

Experiment 3: Write a C program to simulate producer-consumer problem using semaphores

Experiment 4: Write a C program to simulate the concept of Dining-Philosophers problem

Experiment 5: Write a C program to simulate Banker's algorithm for the purpose of deadlock avoidance.

Experiment 6: Write a C program to simulate page replacement algorithms
a) FIFO b) LRU

Experiment 7: Write a C program to simulate the following contiguous memory allocation techniques
a) Worst-fit b) Best-fit c) First-fit

Experiment 8: Write a C program to simulate page replacement algorithms
a) Optimal b) LFU

Experiment 9: Write a C program to simulate paging technique of memory management

Experiment 10: Write a C program to simulate disk scheduling algorithms
a) FCFS b) SCAN

Experiment 11: Write a C program to simulate the following file organization techniques
a) Single level directory b) Two level directory c) Hierarchical

Experiment 12: Write a C program to simulate the following file allocation strategies.
a) Sequential b) Indexed

Reference Books:

1. "Operating System Concepts", Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Eighth Edition, John Wiley.
2. "Operating Systems: Internals and Design Principles", Stallings, Sixth Edition–2009, Pearson Education
3. "Modern Operating Systems", Andrew S Tanenbaum, Second Edition, PHI.
4. "Operating Systems", S. Haldar, A. A. Aravind, Pearson Education.
5. "Principles of Operating Systems", B. L. Stuart, Cengage learning, India Edition.2013-2014
6. "Operating Systems", A. S. Godbole, Second Edition, TMH.
7. "An Introduction to Operating Systems", P.C.P. Bhatt, PHI

Web References:

1. https://www.cse.iitb.ac.in/~mythili/os/
2. http://peterindia.net/OperatingSystems.html

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CYRPTOGRAPHY AND NETWORK SECURITY LAB
(Cyber Security)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A3701P	0:0:3:0	1.5	CIE:30 SEE:70	3 Hours	PCC

Course Objectives:

This course will enable students to:

- To learn different cipher techniques
- To implement the algorithms DES, RSA, MD5, SHA-1
- To use network security tools and vulnerability assessment tools

Course Outcomes(CO):

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

- Develop code for classical Encryption Techniques to solve the problems
- Build cryptosystems by applying symmetric and public key encryption algorithms
- Construct code for authentication algorithms
- Develop code for classical Encryption Techniques to solve the problems.
- Develop a signature scheme using Digital signature standard
- Demonstrate the network security system using open source tools

Syllabus | **Total Hours:48**

List of Experiments:

Experiment 1:

Perform encryption, decryption using the following substitution techniques

(i) Ceaser cipher, (ii) Play fair cipher iii) Hill Cipher iv) Vigenère cipher.

Experiment 2: .

Perform encryption and decryption using following transposition techniques

i) Rail fence

Experiment 3:
Apply DES algorithm for practical applications

Experiment 4:
Apply AES algorithm for practical applications

Experiment 5:
Implement RSA Algorithm using HTML and JavaScript

Experiment 6:
Implement the Diffie-Hellman Key Exchange algorithm for a given problem.

Experiment 7:
Calculate the message digest of a text using the SHA-1 algorithm.

Experiment 8:
Implement the SIGNATURE SCHEME – Digital Signature Standard.

Experiment 9:
Demonstrate intrusion detection system (ids) using any tool eg. Snort or any other s/w.

Experiment 10:

Automated Attack and Penetration Tools Exploring N-Stalker, a Vulnerability Assessment Tool

Experiment 11:

Defeating Malware i) Building Trojans ii) Rootkit Hunter

Reference Books:

1. Andrew S.Tanenbaum, David j.wetherall, Computer Networks, 5th Edition, PEARSON.
2. **Build Your Own Security Lab, Michael Gregg, Wiley India**

Web References:

1. https://nptel.ac.in/courses/106105183/25
2. http://www.nptelvideos.in/2012/11/computer-networks.html

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PYTHON PROGRAMMING (SKILL)
(Common to DS and CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A3203	1:0:2:0	2	CIE:30 SEE:70	3 Hours	SC

Course Objectives:

This course will enable students to:

- Acquire programming skills in core Python
- To understand the importance of Object-oriented Programming
- Develop the skill of designing graphical-user interfaces (GUI) in Python.
- Develop the ability to write database applications in Python.

Course Outcomes (CO):

On completion of this course, student will be able to

- Understand various data types like lists, tuples, strings etc.
- Able to create practical and contemporary applications using Functions
- Explore the use of Object-oriented concepts to solve Real-life problems
- Utilize Python packages in developing software applications
- Solve mathematical problems using Python programming language

Syllabus | **Total Hours:48**

Introduction to Python: Features of Python, Data types,Operators,Inputandoutput,ControlStatements,Loopingstatements

Python Data Structures: Lists, Dictionaries, Tuples.

Strings: Creating strings and basic operations on strings, string testing methods.

Functions: Definingafunction-Callingafunction-Typesoffunctions-FunctionArguments-Anonymousfunctions-Globaland local variables

OOPS Concepts;Classesandobjects-Attributes-Inheritance-Overloading-Overriding-Datahiding

Modules and Packages: Standard modules-Importing own module as well as external modules Understanding Packages Powerful Lambda function in python Programming using functions, modules and external packages

WorkingwithDatainPython: Printingonscreen-Readingdatafromkeyboard-Openingandclosingfile-Reading and writing files-Functions-Loading Data with Pandas-Numpy

Tasks:

1. OPERATORS

a. Readalistofnumbersandwriteaprogramtocheckwhetheraparticularelementispresentornotusingmembership operators.
b. Readyournameandageandwriteaprogramtodisplaytheyearinwhichyouwillturn100yearsold.
c. Read radius and height of a cone and write a program to find the volume of a cone.
d. Write a program to compute distance between two points taking input from the user

2. CONTROLSTRUCTURES

a. Read your email id and write a program to display the no of vowels, consonants, digits and white spaces in it using if…el if…else statement.
b. Write a program to create and display a dictionary by storing the antonyms of words. Find the antonym of a particular word given by the user from the dictionary using while loop.
c. Write a Program to find the sum of a Series 1/1! + 2/2! + 3/3! + 4/4! +…….+ n/n!. (Input :n = 5,Output:2.70833)
d. In number theory, an abundant number or excessive number is a number for which the sum of its
e. proper divisors is greater than the number itself. Write a program to find out, if the given number is a bundant. (Input: 12, Sum of divisors of 12 = 1 + 2 + 3 + 4 + 6 = 16, sum of divisors 16 > originalnumber12)

3: LIST
a. Read a list of numbers and print the numbers divisible by x but not by (Assumex =4and y=5).
b. Readalistofnumbersandprintthesumofoddintegersandevenintegersfromthelist.(Ex:[23,10,15,14, 63], odd numbers sum= 101, even numbers sum= 24)
c. Readalistofnumbersandprintnumberspresentinoddindexposition.(Ex:[10,25,30,47,56,84,96],Thenumbers in odd index position:25 47 84).
d. Readalistofnumbersandremovetheduplicatenumbersfromit.(Ex:Enteralistwithduplicateelements: 10 20 40 1050 30 20 10 80,The unique list is:[10,20, 30,40, 50,80])

4:TUPLE
a. Given a list of tuples. Write a program to find tuples which have all elements divisible by K from a list of tuples . test _list=[(6,24, 12),(60,12,6), (12,18, 21)],K= 6,Output:[(6,24, 12),(60,12,6)]
b. Given a list of tuples. Write a program to filter all uppercase characters tuples from given list oftuples.(Input:test_list=[(“GFG”,“IS”,“BEST”),(“GFg”,“AVERAGE”),(“GfG”,),(“Gfg”,“CS”)],Output:[(„GFG‟,„IS‟, „BEST‟)]).
c. Given a tuple and a list as input, write a program to count the occurrences of all items of the list in the tuple. (Input :tuple=('a', 'a', 'c','b', 'd'), list =['a', 'b'],Output: 3)

5: SET
a. Write a program to generate and print a dictionary that contains a number(between1andn)In the form (x, x*x).
b. Write a program to perform union ,intersection and difference using Set A and Set B.
c. Write a program to co untnumberofvowelsusingsetsingivenstring(Input:“HelloWorld”,Output:No. ofvowels:3)
d. Write a program to form concatenatedstringbytakinguncommoncharactersfromtwostringsusingsetconcept(Input:S1 ="aacdb", S2 ="gafd", Output:"cbgf").

6:DICTIONARY
a. Write a program to do the following operations:
i. Create a empty dictionary with dict ()method
ii. Add elements one at a time
iii. Up date existing key‟s value
iv. Access an element using a key and alsoget()method
v. Deleting a key value using del()method

b.Write a program to create a dictionary and apply the following methods:
i. pop()method
ii. pop item()method
iii. clear()method
c.Given a dictionary, write a program to find the sum of all items in the dictionary.
d.Write a program to merge two dictionaries using update()method.

7: STRINGS
a. Given a string, write a program to check if the string is symmetrical and palindrome or not. Astringis

said to be symmetrical if both the halves of the string are the same and a string is said to be a palindrome string if one half of the string is the reverse of the other half or if a string appears same when read forward or backward.
b. Write a program to read a string and count the number of vowel letters and print all letters except 'e'and 's'.
c. Writeaprogramtoreadalineoftextandremovetheinitialwordfromgiventext.(Hint:Usesplit()method,Input :Indiaismycountry. Output :is my country)
d. Write a program to read a string and count how many times each letter appears.(Histogram).

8:USER DEFINED FUNCTIONS

a. A generator is a function that produces a sequence of results instead of a single value. Write a generate or function for Fibonacci numbers upto n.
b. Write a function merge_dict(dict1,dict2)to merge two Python dictionaries.
c. Write a fact()function to compute the factorial of a given positive number.
d. Given a list of an elements, write a linear_search()function to search a given element xinalist.

9:BUILT-INFUNCTIONS

a. Write a program to demonstrate the working of built-in statistical functions mean(),mode(),median()by importing statistics library.
b. Write a program to demonstrate the working of built-in trigonometric functions in(),cos(),tan(),hypot(),degrees(),radians() by importing math module.
c. Writeaprogramtodemonstratetheworkingofbuilt-inLogarithmicandPowerfunctionsexp(),log(),log2(),log10(),pow() by importing math module.
d. Writeaprogramtodemonstratetheworkingofbuilt-innumericfunctionsceil(),floor(),fabs(),factorial(),gcd()by importing math module.

10.CLASSANDOBJECTS

a.WriteaprogramtocreateaBankAccountclass.Yourclassshouldsupportthefollowingmethodsfor
i) Deposit
ii) Withdraw
iii) Get Balance
iv) Pin Change

b. Create a Savings Account class that behaves just like a Bank Account, but also has an interest rate and a method that increases the balance by the appropriate amount of interest(Hint :use Inheritance).
c.Write a program to create an employee class and store the employee name, id, age, and salary using the constructor. Display the employee details by invoking employee_info() method and also using dictionary(dict).
d. Access modifiers in Python are used to modify the default scope of variables. Write a program to demonstrate the 3typesofaccessmodifiers: public, private and protected.

11.FILEHANDLING

a. .Write a program to read a file name from the user, open the file(say first File.txt) and the nperform the following operations:
i. Count the sentences in the file.
ii. Count the words in the file.
iii. Count the characters in the file.

b. .Create an ew file(Hello.txt)and copy the text to another file called target. txt. The target.txt file should store only lower-case alphabets and display the number of lines copied.
c. Write a Python program to store Nstudent’srecordscontainingname,rollnumberandbranch.Printthegivenbranch student’s details only.

Reference Books:

1. Reema Thareja, “Python Programming - Using Problem Solving Approach”, Oxford Press, 1stEdition, 2017.
2. Michael H Goldwasser, David Letscher, “Object Oriented Programming in Python”, Prentice Hall, 1st Edition, 2007.
3. YashavantKanetkar, Aditya Kanetkar, “Let us Python”, BPB publication, 1st Edition, 2019.
4. Ashok Kamthane, Amit Kamthane, “Programming and Problem Solving with Python”, McGraw Hill Education (India) Private Limited, 2018.
5. Taneja Sheetal, Kumar Naveen, “Python Programming – A modular approach”, Pearson, 2017

Web Reference:

1. https://realpython.com/python3-object-oriented-programming/
2. https://python.swaroopch.com/oop.html
3. https://python-textbok.readthedocs.io/en/1.0/Object_Oriented_Programming.html
4. https://www.programiz.com/python-programming/
5. https://www.geeksforgeeks.org/python-programming-language/

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CONSTITUTION OF INDIA

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

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0030T	2:0:0:0	0	CIE:30	-	MC

Course Objectives:

This course will enable students to:

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and Election Commission of India.
- To understand the central-state relation in financial and administrative control

Course Outcomes (CO):

- On completion of this course, student will be able to
- Understand historical background of the constitution making and its importance for building a democratic India.
- Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
- Understand the value of the fundamental rights and duties for becoming good citizen of India.
- Analyze the decentralization of power between central, state and local self-government
- Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

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

Introduction to Indian Constitution – Constitution -Meaning of the term - Indian Constitution Sources and constitutional history - Features– Citizenship – Preamble - Fundamental Rights and Duties - Directive Principles of State Policy..

Module-II	**Union Government and its Administration Structure of the Indian Union**	**9Hrs**

Union Government and its Administration Structure of the Indian Union - Federalism – Centre State relationship – President's Role, power and position - PM and Council of ministers - Cabinet and Central Secretariat –Lok Sabha - Rajya Sabha - The Supreme Court and High Court - Powers and Functions

Module-III	**State Government and its Administration**	**10Hrs**

State Government and its Administration - Governor - Role and Position -CM and Council of ministers - State Secretariat-Organization Structure and Functions.

Module-IV	Local Administration	10Hrs
Local Administration - District's Administration Head - Role and Importance - Municipalities - Mayor and role of Elected Representatives -CEO of Municipal Corporation Pachayati Raj - Functions– PRI –Zilla Parishath - Elected officials and their roles – CEO,ZillaParishath - Block level Organizational Hierarchy - (Different departments) - Village level - Role of Elected and Appointed officials - Importance of grass root democracy		
Module-V	**Election Commission**	**9Hrs**
Election Commission - Election Commission- Role of Chief Election Commissioner and Election Commissionerate - State Election Commission -Functions of Commissions for the welfare of SC/ST/OBC and Women		

Text Books:

1. Durga Das Basu, "Introduction to the Constitution of India", Prentice – Hall of India Pvt. Ltd.. New Delhi
2. Subash Kashyap, "Indian Constitution", National Book Trust3. R RGaur,RAsthana,GP

Reference Books:

1. H.M.Sreevai, "Constitutional Law of India", 4th edition in 3 volumes
2. J.A. Siwach, "Dynamics of Indian Government & Politics"
3. M.V. Pylee, "Indian Constitution", Durga Das Basu, Human Rights in ConstitutionalLaw, Prentice – Hall of India Pvt. Ltd.. New Delhi
4. J.C. Johri, Indian Government and Politics Hans
5. M.V. Pylee, "Indian Constitution)

Web References:

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

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AUTOMATA AND COMPILER DESIGN
(Common **to CSE, AI&ML, CS, DS**)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A3303T	3: 0:0:0	3	CIE:30 SEE:70	3 Hours	PCC

Course Objectives:

This course will enable students :

- Understand formal definitions of machine models
- To illustrate finite state machines to solve problems in computing
- Understanding of formal grammars
- To learn the various phases of compiler.
- To learn the various parsing techniques.

Course Outcomes(CO):

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

- Understand the fundamental concepts of Formal Languages and Automata
- Apply the knowledge of Automata Theory, Grammars & Regular Expressions for solving various problems.
- Design of Context Free Grammar for formal language
- Discuss the major phases of compilers and use the knowledge of the Lex tool
- Develop the parsers and experiment with the knowledge of different parsers design
- Summarize various optimization techniques and examine the design issues of code generator

Syllabus		Total Hours:48
Module-I	**Finite Automata**	**10Hrs**

Why Study Automata Theory? The Central Concepts of Automata Theory, Automation, Finite Automation, Transition Systems, Acceptance of a String by a Finite Automaton, DFA, Design of DFAs, NFA, Design of NFA, Equivalence of DFA and NFA, Conversion of NFA into DFA, Finite Automata with Є-Transition, Minimization of Finite Automata, Mealy and Moore Machines, Applications and Limitation of Finite Automata.

Module-II	**Regular Expressions**	**9Hrs**

Regular Expressions, Equivalence of two Regular Expressions, Finite Automata and Regular Expressions, Inter Conversion, Equivalence between Finite Automata and Regular Expressions, Pumping Lemma, Closers Properties, Applications of Regular Expressions, Grammars, Classification of Grammars-Chomsky Hierarchy, Finite Automata and Regular Grammars, Regular Expressions and Regular Grammars.

Module-III	**Context Free Grammars**	**10Hrs**

Context Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars-Elimination of Useless Symbols, E-Productions and Unit Productions, Normal Forms for Context Free Grammars-Chomsky Normal Form and Greibach Normal Form, Pumping Lemma, Closure Properties, Applications of Context Free Grammars.

Module-IV	**Introduction To Compiling**	**9Hrs**

Introduction To Compiling: Overview of Compilers, Phases of a Compiler.

Lexical Analysis: The Role of Lexical Analyzer, Input Buffering, Specification of Tokens,

Recognition of Tokens, The lexical analyzer generator Lex, Design of a Lexical Analyzer generator

Module-V	**Syntax Analysis**	**10Hrs**

Syntax Analysis: The role of the Parser, First and Follow, Predictive Parsing, LR Parsers-SLR, Canonical LR, LALR, Parser Generator(YACC).

Syntax-Directed Definition, S-Attributed SDD, L-Attributed SDD, Translation Schemes, three address code,

Principle Sources Of Code Optimizations, Issues Code generation

Text Books:

3. Introduction to Automata Theory, Languages and Computation, J.E.Hopcroft, R.Motwani and J.D.Ullman, 3rd Edition, Pearson, 2008.
4. Compilers Principles, Techniques and Tools‖, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman., Pearson,2014.

Reference Books:

1. Theory of Computer Science-Automata, Languages and Computation, K.L.P.Mishra and N.Chandrasekaran, 3rd Edition, PHI, 2007.
2. Introduction to Automata Theory, Formal Languages and Computation, Shyamalendu Kandar, Pearson, 2013.
3. Compilers Principles and Practice‖, Parag H. Dave, Himanshu B. Dave, PEARSON.
4. Lex &Yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly .

Web References:

https://onlinecourses.nptel.ac.in/noc21_cs07/preview

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3rd Mile, Bombay Highway, Gangavaram (V), Kovur(M), SPSR Nellore (Dt), Andhra Pradesh, India- 524137

Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

CYBER SECURITY
(Common to CSE and CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0534a	3: 0:0:0	3	CIE:30 SEE:70	3Hours	PCC

Course Objectives:

This course will enable students :

- The Cyber security Course will provide the students with foundational Cyber Security principles, Security architecture, risk management, attacks, incidents, and emerging IT and IS technologies.
- Students will gain insight into the importance of Cyber Security and the integral role of Cyber Security professionals.
- Evaluate the trends and patterns that will determine the future state of cyber security.

Course Outcomes(CO):

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

- Cyber Security architecture principles
- Identifying System and application security threats and vulnerabilities
- Identifying different classes of attacks
- Cyber Security incidents to apply appropriate response
- Identifying different tools in cyber crime
- Describing risk management processes and practices

Syllabus		Total Hours:48
Module-I	**Introduction to Cybercrime**	**9Hrs**
Introduction to Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals, Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens		
Module-II	**Cyber Offenses**	**10Hrs**
How Criminals Plan Them –Introduction, How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cyber Cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector Backdoors-Steganography-SQL Injection.		
Module-III	**Cybercrime Mobile and Wireless Devices**	**9Hrs**
Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile.		
Module-IV	**Tools and Methods Used in Cybercrime**	**10Hrs**
Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, DoS and DDoS Attacks, Buffer Overflow, Attacks on Wireless Networks, Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ID Theft).		
Module-V	**Cyber Crimes and security**	**10Hrs**
Cyber Security –Organizational implications-cost of cybercrimes and IPR issues Web threats for organizations: the evils and Perils-Social media marketing Security and privacy Implications-Protecting people privacy in the organizations Forensic best practices for organizations. Cases.		

Text Books:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole, SunitBelapure, Wiley.

2. Principles of Information Security, MichealE.Whitman and Herbert J.Mattord, Cengage Learning

Reference Books:

1.Information Security, Mark Rhodes, Ousley, MGH.

Web Resource :

https://www.tutorialspoint.com/fundamentals of science and technology/cyber crime and cyber security.htm

https://www.javatpoint.com/cyber-security-tutorial
https://www.youtube.com/watch?v=lpa8uy4DyMo&list=PL9ooVrP1hQOGPQVeapGsJCktzIO4DtI4_

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MACHINE LEARNING

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

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0528T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	PCC

Course Objectives:

This course will enable students to:

- Understand basic concepts of Machine Learning
- Study different learning algorithms
- Illustrate evaluation of learning algorithms

Course Outcomes(CO):

On completion of this course, student will be able to

- Interpret the basic concepts of Human Learning, Machine Learning, Building and Evaluating a Model, Classification, Regression and Clustering
- Building, training and evaluating a Model
- Apply different Classification algorithms to real world problems
- Apply different Regression techniques to real world problems
- Apply Partitioning Methods of Clustering to real world problems
- Apply Density-based methods of Clustering to real world Scenarios

Syllabus		Total Hours:48
Module-I	**Introduction – Human Learning & Machine Learning**	**10Hrs**

Human Learning, Types of Human Learning, Machine Learning, Types of Machine Learning, Applications of Machine Learning, Issues in Machine Learning.

Basic types of Data in Machine Learning, Data Preprocessing : Data Cleaning, Data transformation and Data Reduction

Module-II	Modeling and Evaluation	9Hrs

Introduction, selecting a Model, training a Model, Model Representation and Interpretability, Evaluating Performance of a Model, Improving Performance of a Model

Module-III	Supervised Learning :Classification	10Hrs

Classification – Methods of Classification : Classification model, Classification Learning Steps, Classification by Decision tree Induction, Classification by Back propagation, K-Nearest Neighbor Classification, Random Forest Algorithm, Naïve Baye's Classification

Module-IV	Supervised Learning : Regression	10Hrs

Regression – Assumptions in Regression Analysis, Types of Regression: Simple Linear Regression, Multiple Linear Regression, Polynomial Regression, Logistic Regression, Curve Fitting- Method of Least Squares.

Module-V	Unsupervised Learning : Clustering	9Hrs

Clustering- Different types of clustering techniques, Partitioning Methods: K-Means Algorithm, K-Medoid's algorithm, Hierarchical Clustering Methods, Density based Clustering Methods-

DBSCAN, DENCLUE, OPTICS

Text Books:

1. Machine Learning, Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, Pearson, 2019..

Reference Books:

1. EthernAlpaydin, “Introduction to Machine Learning”, MIT Press, 2004.
2. Stephen Marsland, “Machine Learning -An Algorithmic Perspective”, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series,2014.
3. Andreas C. Müller and Sarah Guido “Introduction to Machine Learning with Python: A Guide for Data Scientists”, Oreilly.

Web References:

1. Andrew Ng, “Machine Learning Yearning”
2. https://www.deeplearning.ai/machine-learning-
3. https://www.cse.huji.ac.il/~shais/UnderstandingMachineLearning/index.html

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Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

CYBER LAWS AND IT SECURITY
(Cyber Security)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A3702T	4: 0:0:0	4	CIE: 30 SEE:70	3 Hours	Honor's

Course Objectives:

To learn the Study the performance of.

- To learn the Cyber Law.
- To learn the E- Governance and E – Commerce
- To learn the Cyber Crimes Investigation.
- Study the performance of Overview of Information Security.
- Study the performance of Risk Analysis & Risk Management.

Course Outcomes (COS):

After completion of the course, students will be able to:

- Understand the basic concepts of Cyber Law.
- Determine the E- Governance and E – Commerce.
- Outline the Cyber Crimes Investigation.
- Analyze the Threats - Frauds, Thefts, and Malicious Hackers in Information Security.
- Analyze the Risk Analysis and Risk Management.
- Analyze the Access Control in User Identity and Access Management.

Syllabus	Total Hours:48

Module- I	Fundamentals of Cyber Law	12 Hrs

Fundamentals of Cyber Law, Introduction on cyber space , Jurisprudence of Cyber Law , Scope of Cyber Law , Cyber law in India with special reference to Information Technology Act, 2000 (as amended) and Information TechnologyAct,2008

Module-II	E- Governance and E – Commerce	9 Hrs

E- Governance and E – Commerce, Electronic Governance, Procedures in India, Essentials & System of Digital Signatures , The Role and Function of Certifying Authorities ,Digital contracts , UNCITRAL Model law on Electronic Commerce ,Cryptography–Encryption and decryption 19.

Module-III	Cyber Crimes Investigation	9 Hrs

Cyber Crimes Investigation, Investigation related issues, Issues relating to Jurisdiction, Relevant provisions under Information Technology Act, Evidence Act, Indian Penal Code, Cyber forensics-Case studies.

Module-IV	Overview of Information Security	9 Hrs

Overview of Information Security - What is Information and why should be protect it? - Information Security - Threats - Frauds, Thefts, Malicious Hackers, Malicious Code, Denial-of-Services Attacks and Social Engineering– Vulnerability –Types-Risk.

Information Asset Classification - Why should we classify information? - Information Asset – Owner, Custodian, User - Information Classification - Secret, Confidential, Private and Public.

Module-V	Risk Analysis & Risk Management	9 Hrs

Risk Analysis & Risk Management - Risk Analysis Process - Asset Definition - Threat

Identification - Determine Probability of Occurrence - Determine the Impact of the Threat . Access Control - User Identity and Access Management - Account Authorization- Access and Privilege Management - System and Network Access Control.

Textbooks:

1. Cyber Attacks & Cyber law Kindle Edition By Dr.PavanDuggal
2. KumarK-CyberLaws:IntellectualProperty&ECommerce,Security,DominantPublisher

Reference Books:

1. MarkStamp,InformationSecurity:PrinciplesandPractice,JohnWileyandSons
2. MarineR.C.-CyberCrimeImpactintheNewMillennium,AutherPress
3. JonathanRosenoer,"CyberLaw:ThelawoftheInternet",SpringerVerylag1997
4. InformationSecurityPolicy&ImplementationIssues,NIIT,PHI
5. SunitBelapureandNinaGodbole,CyberSecurity:UnderstandingCyberCrimes, Computer Forensics And Legal Perspectives, Wiley India Pvt. Ltd,2011.
6. Mark F Grady, FransescoParisi, "The Law and Economics of Cyber Security",CambridgeUniversityPress,2006

Web References:

1. https://www.tutorialspoint.com/information_security_cyber_law/information_security_cyber_law_tutorial.pdf
2. https://www.javatpoint.com/what-is-cyber-law

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MOBILE COMPUTING
(Common to CSE,AI&ML,DS,CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A3305T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	PEC

Course Objectives:

- Introduction to mobile computing and mobile communication.
- Coverage mobile systems will include 2G, 2.5G, 3G, 3G+, and 4G communication systems, mobile satellite communication networks, mobile IP, mobile TCP, digital audio-video broadcasting, and mobile TV.
- This course will also provide a systematic explanation of mobile computing as a discrete discipline and will provide an in-depth coverage of mobile systems and devices, mobile operating systems used for application development, mobile databases, client-server computing agents, application servers, security protocols, mobile Internet, and ad-hoc and sensor networks.

Course Outcomes(CO):

On completion of this course, student will be able to

- Understand the Basics concepts of WLAN standards over internet, Adhoc, Protocols.
- Identify efficient medium access control protocol for wireless networks
- Apply dynamic routing protocols for Ad hoc Networks.
- Illustrate quality of any service in Ad hoc Networks using QoS strategies
- Choose appropriate wireless sensor network model for real-time applications
- Analyze security, energy efficiency, mobility, scalability, and their unique characteristics in wireless networks.

Syllabus		Total Hours:48
Module-I	**Wireless LANS and PANS**	**9Hrs**

Introduction, Fundamentals of WLANS, IEEE 802.11 Standards, HIPERLAN Standard, Bluetooth, Home RF. Wireless Internet: Wireless Internet, Mobile IP, TCP in Wireless Domain, WAP, Optimizing Web over Wireless.

Module-II	AD HOC Wireless Networks	10Hrs

Introduction, Issues in Ad Hoc Wireless Networks, Ad Hoc Wireless Internet. MAC Protocols for Ad Hoc Wireless Networks: Introduction, Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols.

Module-III	Routing Protocols	9Hrs

Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, On – Demand Routing Protocols, Hybrid Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms, Hierarchical Routing Protocols, Power – Aware Routing Protocols. Transport Layer and Security Protocols, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks.

Module-IV	Quality of Service	10Hrs
Introduction, Issues and Challenges in Providing QoS in Ad Hoc Wireless Networks, Classification of QoS Solutions, MAC Layer Solutions, Network Layer Solutions, QoS Frameworks for Ad Hoc Wireless Networks. Energy Management: Introduction, Need for Energy Management in Ad Hoc Wireless Networks, Classification of Ad Hoc Wireless Networks.		
Module-V	**Wireless Sensor Networks**	**10Hrs**
Introduction, Sensor Network Architecture, Data Dissemination, Data Gathering, MAC Protocols for Sensor Networks, Location Discovery, Quality of a Sensor Network, Evolving Standards, Other Issues.		

Text Books:

1. 'Fundamentals of mobile Computing' Published by Asoke K. Ghosh, PHI Learning Private Limited, M-97, Connaught Circus,. New Delhi-110001 and Printed by Raj Press.
2. Mobile Computing: Talukdar , TMH 2nd Edition

Reference Books:

1. Pervasive Computing: Burkhardt, Pearson Education.
2. The wireless application Protocol: Sandeep Singhal, Pearson Education

Web References:

https://www.youtube.com/watch?v=GT-tYP8RGIs&list=PLV8vIYTIdSnZMKTQSTxWbx4NGNfxyZq_N

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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 References:

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

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PRINCIPLES OF COMMUNICATION SYSTEMS
(Common to CSE,AI&ML,DS,CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0430T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	OEC

Course Objectives:

This course will enable students to:

- To understand the concept of various modulation schemes and multiplexing.
- To apply the concept of various modulation schemes to solve engineering problems.
- To analyze various modulation schemes.
- To evaluate various modulation scheme in real time applications.

Course Outcomes(CO):

On completion of this course, student will be able to

- Understand the concept of various modulation schemes.
- Understand the concept of Different multiplexing techniques.
- Apply the concept of various modulation schemes to solve engineering problems.
- Analyse various modulation schemes.
- Evaluate various modulation schemes in real time applications.
- Understand the concept of various Communication systems.

Syllabus		Total Hours:48
Module-I	**Amplitude Modulation**	**10Hrs**

Amplitude Modulation: Introduction to Noise and Fourier Transform. An overview of Electronic Communication Systems. Need for Frequency Translation
Amplitude Modulation: DSB-FC, DSB-SC, SSB-SC and VSB, Radio Transmitter and Receiver. Theta notation (Θ), Mathematical analysis of Non-Recursive and recursive Algorithms with Examples.

Module-II	Frequency Modulation	9Hrs

Frequency Modulation: Introduction to Angle Modulation, Tone modulated FM Signal, Arbitrary Modulated FM Signal, FM Modulation and Demodulation. Stereophonic FM Broadcasting..

Module-III	Pulse Modulation	10Hrs

Pulse Modulation: Sampling Theorem- Low pass and Band pass Signals. Pulse Amplitude Modulation and Concept of Time Division Multiplexing and Frequency Division Multiplexing. Pulse Width Modulation. Digital Representation of Analog Signals

Module-IV	Digital Modulation	9Hrs

Digital Modulation: Binary Amplitude Shift Keying, Binary Phase Shift Keying and Quadrature Phase Shift Keying, Binary Frequency Shift Keying. Regenerative Repeater, M-ary and comparison

Module-V	NP-Complete and NP-Hard problems	10Hrs

Communication Systems: Satellite, RADAR, Optical, Micro wave communication, Mobile and Computer Communication (Block diagram approach only).

Text Books:

1. Herbert Taub, Donald L Schilling and Goutam Saha, "Principles of Communication Systems", 3 rd Edition, Tata McGraw-Hill Publishing Company Ltd., 2008.

Reference Books:

1. B. P. Lathi, Zhi Ding and Hari M. Gupta, "Modern Digital and Analog Communication Systems", 4th Edition, Oxford University Press, 2017.
2. K. Sam Shanmugam "Digital and Analog Communication Systems", Wiley India Edition, 2008.

Web References:

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POWER ELECTRONICS
(Common to CSE,AI&ML,DS,CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0214Ta	3:0:0:0	3	CIE:30 SEE:70	3 Hours	OEC

Course Objectives:

The objectives of the course are to make the students learn about:

- Get an overview of semi-conductor devices (such as PN junction diode & Transistor) and their switching characteristics.
- Understand the characteristics of AC to DC converters.
- Understand about the practical applications Electronics in industries

Course Outcomes(CO):

On completion of this course, student will be able to

- basic concepts of diode and transistor and its operation
- basic operating principles of power semiconductor switching devices.
- the operation of power electronic converters, inverters, AC voltage controllers, and cyclo converter
- How to apply the learnt principles and methods to practical applications.

Syllabus		Total Hours:48
Module-I	**POWER SEMI CONDUCTOR DEVICES -I**	**9Hrs**

Classification of Switching Devices Based on Frequency and Power Handling Capacity , Thyristors – Silicon Controlled Rectifiers (SCR's) – TRIACs, GTOs - Characteristics and Principles of Operation and other Thyristors.

Module-II	POWER SEMI CONDUCTOR DEVICES-II	10Hrs

BJT – Power Transistor - Power MOSFET – Power IGBT – Static Characteristics – Turn On and Turn Off Methods SCR- Dynamic Characteristics of SCR - Two Transistor Analogy – Triggering Circuits- Series and Parallel Connections of SCR's – Specifications and Ratings of SCR's, BJT, IGBT

Module-III	PHASE CONTROLLED CONVERTERS	9Hrs

Phase Control Technique – Single Phase Line Commutated Converters – Mid Point and Bridge Connections – Half Controlled Converters, Fully Controlled Converters with Resistive, RL Loads and RLE Load– Derivation of Average Load Voltage and Current – Effect of Source Inductance – Numerical Problems.

Module-IV	INVERTERS	10Hrs

Inverters – Single Phase Inverter – Basic Series Inverter – Basic Parallel Capacitor Inverter Bridge Inverter – Waveforms – Simple Forced Commutation Circuits for Bridge Inverters – Single Phase Half and Full Bridge Inverters-Pulse Width Modulation Control-Harmonic Reduction Techniques-Voltage Control Techniques for Inverters – Numerical Problems,

Module-V	AC VOLTAGE CONTROLLERS & CYCLO	10Hrs

	CONVERTERS	
AC Voltage Controllers – Single Phase Two SCR's in Anti Parallel – With R and RL Loads – Modes of Operation of TRIAC – TRIAC with R– Derivation of RMS Load Voltage, Current and Power Factor Wave Forms – Firing Circuits -Numerical Problems Cyclo Converters – Single Phase Mid Point Cycloconverters with Resistive and Inductive Load (Principle of Operation only) – Bridge Configuration of Single Phase Cycloconverter (Principle of Operation only) – Waveforms		
Text Books: • Power Electronics, M. D. Singh and K. B. Khanchandani, Mc Graw Hill Education (India) Pvt. Ltd., 2nd Edition, 2007, 23rd Reprint 2015. • Power Electronics: Circuits, Devices and Applications, Muhammad H. Rashid, Pearson, 3rdEdition, 2014, 2nd Impression 2015		
Reference Books: • Power Electronics, K. R. Varmah, Chikku Abraham, CENGAGE Learning, 1st Edition, 2016. • Power Electronics, P. S. Bimbhra, Khanna Publishers, 2012. • Power Electronics: Devices, Circuits, and Industrial Applications, V. R. Moorthi, OXFORD University Press, 1st Edition, 2005, 12th Impression 2012		
Web References: https://nptel.ac.in/courses/108105066 https://archive.nptel.ac.in/courses/108/102/108102145/		

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BUILDING MATERIALS
(Common to CSE,AI&ML,DS,CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0149T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	OEC

Course Objectives:

To identify the traditional materials that is used for building constructions.

- To explain basic concepts of building components such as stair case and masonry
- To know the causes of dampness in structures and its preventive measures
- To understand the building rules, building bye laws and acoustics of building

Course Outcomes(CO):

On completion of this course, student will be able to

- To understand the characteristics of different building materials
- Differentiate brick masonry, stone masonry construction and bonds used in construction of walls of buildings
- To know about the causes of dampness in buildings and its ill effects
- To understand the principles of planning in buildings
- Describe capable of understanding building rules and knowledge about, bye-laws and building elements.

Syllabus		Total Hours:48
Module-I	**MATERIALS**	**9Hrs**
Traditional materials: Stones- Types of stone masonry -Brick-types of brick masonry- lime Cement – Timber – Seasoning of timber - their uses in building works		
Module-II	**BUILDING COMPONENTS**	**9Hrs**
Lintels, Arches and Vaults – Staircases, Lifts – Types. Different types of flooring-Concrete, Mosaic, Terrazzo floors; Different types of roofs- Pitched, Flat and Curved Roofs. Lean-to-Roof, Coupled Roofs, Trussed roofs - King and Queen Post Trusses. Doors & Windows- Types and Specifications		
Module-III	**DAMPNESS**	**10Hrs**
Dampness and its prevention: Causes of dampness- ill effects of dampness-requirements of an ideal material for damp proofing-materials for damp proofing –methods of damp proofing.		
Module-IV	**BUILDING PLANNING**	**10Hrs**
Elements of building planning- basic requirements-orientation-planning for energy efficiency-planning based on utility-other requirements		
Module-V	**BUILDING RULES AND BYE-LAWS**	**10Hrs**
Zoning regulations; Regulations regarding layouts or subdivisions; Building regulations; Rules for special type of buildings; Calculation of plinth, floor and carpet area; Floor space index. Building Information System.		

Text Books:

- Building Drawing by M.G. Shah, C.M. Kale and S.Y. Patki, Tata McGraw-Hill, New
- B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, ‚Building Construction' - Laxmi Publications (P) Ltd., New Delhi

Reference Books:

- Building Materials, S. K. Duggal, New Age International Publications.
- N. Kumaraswamy, A. Kameswara Rao, building planning and drawing, 7th Ed, Charotar

Web References:

1. http://nptel.ac.in/courses/105104103/
2. http://www.academicpub.org/jwrhe/
3. http://www.peo.on.ca/index.php/ci_id/21843/la_id/1

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3rd Mile, Bombay Highway, Gangavaram (V), Kovur(M), SPSR Nellore (Dt), Andhra Pradesh, India- 524137
Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

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

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0321Ta	3:0:0:0	3	CIE:30 SEE:70	3 Hours	OEC

Course Objectives:

This course will enable students :

- Impart the knowledge of vehicle structure and its components.
- Demonstrate various components of petrol engines and diesel engines.
- Trains about the various electrical system, circuits, and testing of automobiles.
- Explain the concepts of steering, suspension and braking system in automobile.

Course Outcomes(CO):

On completion of this course, student will be able to

- Identify different parts of automobile
- Explain the working of various parts like engine and brakes
- Describe the working of steering and the suspension systems.
- Summarize the wheels and tires
- Outline the future developments in the automobile industry

Syllabus		Total Hours:48
Module-I	**Introduction to vehicle structure and engine components**	**9Hrs**

Vehicle construction - Chassis and body - Specifications - Engine - Types - Construction - Location of engine - Cylinder arrangement - Construction details - Cylinder block - Cylinder head - Cylinder liners - Piston – piston rings - Piston pin - Connecting rod - Crankshaft - Valves. Lubrication system - Types - Oil pumps - Filters. Crankcase ventilation

Module-II	Ignition and fuel supply systems	10Hrs

Ignition system - Coil and Magneto - Spark plug - Distributor – Electronic ignition system - Fuel system - Carburetor - Fuel pumps - Fuel injection systems - Mono point and Multi point – Unit Injector – Nozzle types - Electronic Fuel Injection system (EFI) – GDI, MPFI, DTSI.

Module-III	Steering and suspension system	9Hrs

Principle of steering - Steering Geometry and wheel alignment - Steering linkages – Steering gearboxes - Power steering - front axle - Suspension system - Independent and Solid axle – coil, leaf spring and air suspensions - torsion bar - shock absorbers.

Module-IV	Wheels, Tyres and Braking System	10Hrs

Wheels and Tyres - Construction - Type and specification - Tyre wear and causes - Brakes - Needs – Classification –Drum and Disc Mechanical - Hydraulic and pneumatic - Vacuum assist – Retarders – Anti-lock Braking System(ABS).

Module-V	Automobile electrical systems and advances in automobile engineering	10Hrs

Battery-General electrical circuits- Active Suspension System (ASS) - Electronic Brake Distribution (EBD) – Electronic Stability Program(ESP), Traction Control System (TCS) - Global Positioning System (GPS), Hybrid vehicle, Fuel Cell.

Text Books:

1. Kirpal Singh, Automobile Engineering, Vol.1&2, Standard Publications, 13/e, 2020.
2. William.H.Crouse, Automotive Mechanics, 10/e , McGraw-Hill, 2006.

Reference Books:

1. Bosch, Automotive Hand Book, 6/e, SAE Publications, 2007.
2. K. Newton and W. Steeds, The motor vehicle, 13/e, Butterworth-Heinemann Publishing Ltd, 1989.
1. Joseph Heitner, Automotive Mechanics Principles and Practices, 2/e, CBS publishing 2004 .
3. David A. Corolla, Automotive Engineering: Powertrain, Chassis System and Vehicle Body, Butterworth-Heinemann Publishing Ltd, 2009.
4. Richard Stone, Jeffrey K. Ball, Automotive Engineering Fundamentals" SAE International, 2004

Web References:

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CYBER SECURITY LAB
(Cyber Security)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A3703P	0:0:3:0	1.5	CIE:30 SEE:70	3Hours	PCC

Course Objectives:

This course will enable students to:

- Student to get the knowledge about audit and information security management, which makes the student to get the real-world experience.
- To learn and implement Data leakage in a website database.

Course Outcomes (COs):

After completion of this course, students will be able to:

- Analyze and implement Audit security policy in windows environment, create a Demilitarized zone creation in Network environment
- Illustrate the Resource harvesting attack and mitigation, Window Patch management policy, Trojans and mitigation strategies
- Apply the knowledge of Metasploit, Access control list creation and content filtering limiting the traffic
- Build an Audit Policy management, Media handling policy and event log analysis and Installation of Trojan, Network DOS attack and proof of bandwidth utilization

Syllabus | **Total Hours: 48**

List of Experiments:

Experiment 1: Audit security policy implementation in windows environment.
Experiment 2: Create a Demilitarized zone creation in Network environment for information security.
Experiment 3: Implement Resource harvesting attack and mitigation.
Experiment 4: Implement Window Patch management policy.
Experiment 5: Knowing the Behavior of Trojans and mitigation strategies.
Experiment 6: Create a Metasploit and make it to implement.
Experiment 7: Access control list creation and content filtering limiting the traffic.
Experiment 8: Data leakage in a website database and preventive measures.
Experiment 9: Password policy implementations and verification.
Experiment 10: Patch management implementation using MBSA tool on windows machine.

Text Books:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole, SunitBelapure, Wiley.
   Principles of Information Security, MichealE.Whitman and Herbert J.Mattord, Cengage Learning

Reference Books:

Information Security, Mark Rhodes, Ousley, MGH

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MACHINE LEARNING LAB

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

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0532P	0:0:3:0	1.5	CIE:30 SEE:70	3 Hours	PCC

Course Objectives:

This course will enable students to:

- Make use of Data sets in implementing the machine learning algorithms
- Implement the machine learning concepts and algorithms in any suitable language of choice.

Course Outcomes(CO):

On completion of this course, student will be able to

- Understand the Mathematical and statistical prospective of machine learning algorithms through python programming
- Appreciate the importance of visualization in the data analytics solution
- Derive insights using Machine learning algorithms

Syllabus | **Total Hours:48**

List of Experiments

Experiment 1: Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.

Experiment 2: For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.

Experiment 3: Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.

Experiment 4: Build an Artificial Neural Network by implementing the Back-propagation algorithm and test the same using appropriate data sets.

Experiment 5: Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

Experiment 6: Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.

Experiment 7: Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.

Experiment 8: Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.

Experiment 9: Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.

Experiment 10: Implement parametric and non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

Reference Book:

1. Python Machine Learning Workbook for beginners, AI Publishing, 2020

Web Reference:

https://www.udemy.com/course/machinelearning/

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SOFT SKILL (SKILL)
(Common to CSE,AI&ML,DS,CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0029P	1:0:2:0	2	CIE:30 SEE:70	3 Hours	SC

Course Objectives:

This course will enable students to:

- To encourage all round development of the students by focusing on soft skills.
- To make the students aware of critical thinking and problem-solving skills.
- To develop leadership skills and organizational skills through group activities.
- To function effectively with heterogeneous teams.

Course Outcomes(CO):

On completion of this course, student will be able to

- Memorize various elements of effective communicative skills.
- Interpret people at the emotional level through emotional intelligence.
- Apply critical thinking skills in problem solving.
- Analyze the needs of an organization for team building.
- Judge the situation and take necessary decisions as a leader.
- Develop social and work-life skills as well as personal and emotional well-being.

Syllabus		Total Hours:48
Module-I	**Soft Skills & Communication Skills**	**10Hrs**

Introduction, meaning, significance of soft skills –Vital Components of communication skills - Inter-personal skills - Verbal and Non-verbal Communication.

Activities: Narration about self- strengths and weaknesses- clarity of thought - Interpersonal Skills- Group Discussion – Debate – Mutual Understanding - Book and film Reviews by groups - Group leader presenting views (non- controversial and secular) on contemporary issues or on a given topic. Verbal Communication- Oral Presentations- Extempore- brief addresses and speeches- Negotiation skills –Role Play- Non-verbal communication – Public speaking – Mock interviews – Anchoring Skills..

Module-II	**Critical Thinking**	**9Hrs**

Active Listening – Observation – Curiosity – Introspection – Analytical Thinking – Open-mindedness – Creative Thinking.

Activities: Gathering information and statistics on a topic - sequencing – assorting – reasoning – critiquing issues – placing the problem – finding the root cause - seeking viable solution – judging with rationale – evaluating the views of others - Case Study, Story Analysis.

Module-III	**Problem Solving & Decision Making**	**10Hrs**

Meaning & features of Problem Solving – Managing Conflict – Conflict resolution – Methods of decision making – Effective decision making in teams – Methods & Styles.

Activities: Placing a problem which involves conflict of interests, choice and views – formulating the problem – exploring solutions by proper reasoning – Discussion on important professional, career and organizational decisions and initiate debate on the appropriateness of the decision. Case Study & Group Discussion.

Module-IV	Emotional Intelligence & Stress Management	9Hrs

Managing Emotions – Thinking before Reacting – Empathy for Others – Self-awareness – Self-Regulation – Stress factors – Controlling Stress – Tips.

Activities: Providing situations for the participants to express emotions such as happiness, enthusiasm, gratitude, and sympathy, and confidence, compassion in the form of written or oral presentations. Providing opportunities for the participants to narrate certain crisis and stress –ridden situations caused by failure, anger, jealousy, resentment and frustration in the form of written and oral presentation, Organizing Debates.

Module-V	Leadership Skills	10Hrs

Team-Building – Decision-Making – Accountability – Planning – Public Speaking – Motivation – Risk Taking - Team Building - Time Management.

Activities: Forming group with a consensus among the participants- choosing a leader- encouraging the group members to express views on leadership- democratic attitude- sense of sacrifice – sense of adjustment – vision – accommodating nature- eliciting views on successes and failures of leadership using the past knowledge and experience of the participants, Public Speaking, Activities on Time Management, Motivation, Decision Making, Group discussion etc.

Text Books:

1. Personality Development and Soft Skills (English, Paperback, MitraBarunK.)Publisher: Oxford University Press; Pap/Cdr edition (July 22, 2012)
2. Personality Development and Soft Skills: Preparing for Tomorrow, Dr Shikha Kapoor Publisher : I K International Publishing House; 0 edition (February 28, 2018)

Reference Books:

1. Soft skills: personality development for life success by Prashant Sharma, BPB publications 2018.
2. Soft Skills By Alex K. Published by S.Chand
3. Soft Skills: An Integrated Approach to Maximize Personality Gajendra Singh Chauhan, Sangeetha Sharma Published by Wiley.
4. Communication Skills and Soft Skills (Hardcover, A. Sharma) Publisher: Yking books
5. SOFT SKILLS for a BIG IMPACT (English, Paperback, RenuShorey) Publisher: Notion Press .
6. Life Skills Paperback English Dr. Rajiv Kumar Jain, Dr. Usha Jain Publisher: Vayu Education of India

Web References:

1. https://youtu.be/DUlsNJtg2L8?list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q
2. https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgj7KlJ
3. https://youtu.be/-Y-R9hDl7lU
4. https://youtu.be/gkLsn4ddmTs
5. https://youtu.be/2bf9K2rRWwo
6. https://youtu.be/FchfE3c2jzc

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Design Thinking and Innovation
(Common to CSE,AI&ML,DS,CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0526	2: 0:0:0	0	CIE:30	-	MC

Course Objectives:

The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.

Course Outcomes(CO):

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

- Define the concepts related to design thinking.
- Explain the fundamentals of Design Thinking and innovation
- Apply the design thinking techniques for solving problems in various sectors.
- Analyse to work in a multidisciplinary environment
- Evaluate the value of creativity
- Formulate specific problem statements of real time issues

Syllabus		Total Hours:48
MODULE-I	**Introduction to Design Thinking**	**9 Hrs**
Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry..		
MODULE -II	**Design Thinking Process**	**9Hrs**
Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brain storming, product development Activity: Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.		
MODULE -III	**Innovation**	**10Hrs**
Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations. Creativity to Innovation. Teams for innovation, Measuring the impact and value of creativity. Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.		
MODULE -IV	**Product Design**	**10Hrs**
Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications. Innovation towards product design Case studies. Activity: Importance of modelling, how to set specifications, Explaining their own product design.		
MODULE -V	**Design Thinking in Business Processes**	**10Hrs**
Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs. Design thinking for Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes. Activity: How to market our own product, About maintenance, Reliability and plan for startup.		

Text Books:

1. Change by design, Tim Brown, Harper Bollins (2009)
2. Design Thinking for Strategic Innovation, Idris Mootee, 2013, John Wiley & Sons

Reference Books:

1. Design Thinking in the Classroom by David Lee, Ulysses press
2. Design the Future, by Shrrutin N Shetty, Norton Press
3. Universal principles of design- William lidwell, kritinaholden, Jill butter.
4. The era of open innovation – chesbrough.H

Web References:

https://nptel.ac.in/courses/110/106/110106124/
https://nptel.ac.in/courses/109/104/109104109/
https://swayam.gov.in/nd1_noc19_mg60/preview

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NATURAL LANGUAGE PROCESSING
(Common to CSE,AI&ML,DS,CS,CE)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A3304T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	PCC

Course Objectives:

This course will enable students :

- Explain and apply fundamental algorithms and techniques in the area of natural language processing (NLP)
- Understand approaches to syntax and semantics in NLP.
- Understand current methods for statistical approaches to machine translation.
- Understand language modeling.
- Understand machine learning techniques used in NLP.

Course Outcomes(CO):

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

- Understand the logic behind Natural languages
- Understand the significance of syntax and semantics of natural languages
- Process the Natural languages
- Verify the syntax and semantics of languages
- Design new natural languages

Syllabus		Total Hours:43
MODULE -I	**INTRODUCTION TO NATURAL LANGUAGE PROCESSING**	**8Hrs**

The Study of Language, Applications of NLP, Evaluating Language Understanding Systems, Different Levels of Language Analysis, Representations and Understanding, Organization of Natural language Understanding Systems, Linguistic Background: An outline of English Syntax.

MODULE -II	GRAMMARS AND PARSING	8Hrs

Grammars and Parsing- Top- Down and Bottom-Up Parsers, Transition Network Grammars, Feature Systems and Augmented Grammars, Morphological Analysis and the Lexicon, Parsing with Features, Augmented Transition Networks, Bayes Rule, Shannon game, Entropy and Cross Entropy

MODULE -III	GRAMMARS FOR NATURAL LANGUAGE PROCESSING	9Hrs

Grammars for Natural Language, Movement Phenomenon in Language, Handling questions in Context Free Grammars, Hold Mechanisms in ATNs, Gap Threading, Human Preferences in Parsing, Shift Reduce Parsers, Deterministic Parsers.

MODULE -IV	INTERPRETATION AND MODELLING	9Hrs

Semantic Interpretation-Semantic & Logical form, Word senses & ambiguity, the basic logical form language, encoding ambiguity in the logical Form, Verbs & States in logical form, Thematic roles, Speech acts &embedded sentences, Defining semantics structure model theory. Language Modelling-Introduction, n-Gram Models, Language model Evaluation, Parameter Estimation, Language Model Adaption, Types of Language Models, Language-Specific Modelling Problems, Multilingual and Cross lingual Language Modelling.

MODULE -V	MACHINE TRANSLATION AND MULTILINGUAL INFORMATION	9Hrs

Machine Translation Survey: Introduction, Problems of Machine Translation, Is Machine Translation Possible, Brief History, Possible Approaches, Current Status. Anusaraka or Language Accessor: Background, Cutting the Gordian Knot, The Problem, Structure of Anusaraka System, User Interface, Linguistic Area, Giving up Agreement in Anusaraka Output, Language Bridges. Multilingual Information Retrieval - Introduction, Document Pre-processing, Monolingual Information Retrieval, CLIR, MLIR, Evaluation in Information Retrieval, Tools, Software and Resources. Multilingual Automatic Summarization - Introduction, Approaches to Summarization, Evaluation, How to Build a Summarizer, Competitions and Datasets

Text Books:

1. James Allen, Natural Language Understanding, 2nd Edition, 2003, Pearson Education.
2. Multilingual Natural Language Processing Applications: From Theory to Practice-Daniel M.Bikel and ImedZitouni, Pearson Publications.

Reference Books:

1. Charniack, Eugene, Statistical Language Learning, MIT Press, 1993.
2. Jurafsky, Dan and Martin, James, Speech and Language Processing, 2nd Edition, Prentice Hall, 2008.
3. Manning, Christopher and Henrich, Schutze, Foundations of Statistical Natural Language Processing, MIT Press,1999.
4. Natural Language Processing, A paninian perspective, Akshar Bharathi, Vineet Chaitanya, Prentice –Hall of India**.**

Web References:

http://peterindia.net/AILinks.html

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PENETRATION TESTING AND CYBER OPERATIONs

(Cyber Security)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A3704T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	

Course Objectives:

This course will enable students :

- This course mainly focuses on port scanning and web application scanning.
- It also give information aboutdifferentattackslikepasswordattacksanddetectionofvulnerabilities.
- This Covers wireless security and penetration tools like Trace routes and Neo trace.
- Information about Database access and security at different levels is also defined

Course Outcomes(CO):

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

- Understand the concepts of Vulnerabilities ,Attacks, Wireless privacy and Application protocols,
- Describe different port and Web scanning techniques
- Analyze Wired vs wireless Privacy Protocols and Encryption Cracking Tools.
- Illustrate the attacking networks that deploy various security protocols in Wireless Security.
- Choose different techniques protocols that can be used to perform the vulnerability Attacks
- List the different types of factors, control measures, mechanisms that defined the database security

Syllabus		Total Hours:4
MODULE -I	**INFORMATIONGATHERING ANDDETECTINGVULNERABILITIES**	**8Hrs**

- Open source intelligence gathering – port scanning – Nessus policies – web application scanning manual analysis-traffic capturing.

MODULE -II	**ATTACKSANDEXPLOITS**	**8Hrs**

- Password AttacksClientsideExploitationSocialEngineering– BypassingAntivirusApplications.MetasploitPayloadsOpenphpMyAdmin-Bufferoverflow:WindowsandLinux,Webscanningexploits,portscanningexploits,SQLexploits.

MODULE -III	**WIRELESSSECURITY**	**9Hrs**

- Wired vs wireless Privacy Protocols – Wireless Frame Generation Encryption Cracking Tools-Wireless DoS Attacks

MODULE -IV	**COMMONVULNERABILITYANALYSISOFAPPLICATIONPROTOCOLS**	**9Hrs**

- Simple Mail Transfer Protocol – File Transfer Protocol – Trivial File Transfer Protocol-Hyper Text Transmission Protocol-ICMPSMURF-UDP-DNS-PING-SYN.

MODULE -V	PENETRATION TOOLSANDDATABASESECURITY	9Hrs

- Traceroutes,Neotrace,Whatweb.DatabaseSecurity:Accesscontrolindatabasesystems–Inferencecontrol-Multileveldatabase security

Text Books:

1.GeorgiaWeidman,"PenetrationTesting:AHandsonIntroductiontoHacking",NoStartchPress,1st Edition,2014.

2. B.Singh,H.JosephandAbhishekSingh,"VulnerabilityAnalysisandDefensefortheInternet",Springer, 2008.

Reference Books:

1. RafayBaloch, "EthicalHackingandPenetrationTestingGuide",CRCPress,2015,

2. Dr.Patrick Engebretson, "The Basics of Hacking and Penetration Testing", Syngress Publications Elseveir, 2013.

3.PrakharPrasad,"MasteringModern WebPenetrationTesting",Packtet Publishing,2016.

Web Reference:

https://www.youtube.com/watch?v=3Kq1MIfTWCE

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CLOUD COMPUTING
(Common to CSE,AI&ML,DS,CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0529T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	PCC

Course Objectives:

This course will enable students to:

- To introduce the broad perceptive of cloud architecture and model
- To understand the concept of Virtualization and familiar with the lead players in cloud.
- To understand the features of cloud simulator and apply different cloud programming model
- To design of cloud Services and explore the trusted cloud Computing system

Course Outcomes(CO):

On completion of this course, student will be able to

- To Understand the basic concepts about cloud computing vision and its developments and gain the **Knowledge** of virtualization technology.
- Analyze the concepts of cloud services and the deployment models.
- Choose among various cloud technologies for implementing applications(GAE, Open stack,etc)
- Construct the virtual machines by using VMware simulator.
- Build scientific applications by using Cloud environment.
- Develop Business and Consumer Applications.

Syllabus		Total Hours:48
Module-I	**Basics of Cloud Computing**	**10Hrs**

Introduction to Cloud: Introduction to Cloud, Cloud Computing Reference Model, Characteristics and Benefits, Challenges Ahead, Elasticity in Cloud, On-demand Provisioning.

Virtualization: Introduction, Characteristics of Virtualized Environment, Taxonomy of Virtualization Techniques, Virtualization, and Cloud computing.

Module-II	Cloud Architecture, Models and Security	9Hrs

Cloud Computing Architecture: Introduction, Cloud Reference Model, Architecture, Infrastructure / Hardware as a Service, Platform as a Service, Software as a Service, Types of Clouds.

Cloud Deployment Model: Public Clouds, Private Clouds, Hybrid Clouds, Community Clouds, Economics of the Cloud.

Module-III	Cloud Technologies and Advancements	10Hrs

Apache Hadoop, Map Reduce, Hadoop Cluster setup, Virtual Box, Google App Engine, Programming Environment for Google App Engine – Open Stack

Module-IV	VMware Simulator	9Hrs

VMWare: Basics of VMWare, Advantages of VMware virtualization, create a new virtual machine on local host, cloning virtual machines, virtualize a physical machine, starting and stopping a virtual machine.

Module-V	Cloud Applications	10Hrs

Cloud Applications: Scientific Applications – Health Care, Geoscience.

Business And Consumer Applications - CRM and ERP, Social Networking, Media Applications, and Multiplayer Online Gaming.

Text Books:

Mastering Cloud Computing by RajkumarBuyya, Christian Vecchiola, S.Thamarai Selvi from TMH 2013.

George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly

Reference Books:

- Cloud computing for dummies- Judith Hurwitz , Robin Bloor , Marcia Kaufman ,Fern Halper, Wiley Publishing, Inc, 2010
- Cloud Computing (Principles and Paradigms), Edited by Rajkumar Buyya, James Broberg, Andrzej Goscinski, John Wiley & Sons, Inc. 2011
- Enterprise Cloud Computing, Gautam Shroff, Cambridge University Press, 2010.
- Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, George Reese, O 'Reilly, SPD, rp2011.
- Essentials of Cloud Computing by K. Chandrasekaran. CRC Press. Cloud computing A Hands-On Approach by ArshdeepBahga and Vijay Madisetti.
- Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010.

Web References:

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https://freevideolectures.com/university/iitm

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Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

NO SQL Databases
(Common to CSE,AI&ML,DS,CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0522c	3:0:0:0	3	CIE:30 SEE:70	3 Hours	PEC

Course Objectives:

- Discuss the history unstructured data
- To know non-relational databases and their importance in Data science.
- Understand the differences between Relational and No SQL databases
- To explore the several types of No SQL databases and understand the role in Big Data

Course Outcomes(CO):

On completion of this course, student will be able to

- Explain and compare different types of No SQL Databases
- Compare and contrast RDBMS with different No SQL databases.
- Demonstrate the detailed architecture and performance tune of Document-oriented No SQL databases.
- Explain performance tune of Key-Value Pair No SQL databases.
- Explain performance tune of Column-oriented and Graph No SQL databases
- Apply No SQL development tools on different types of No SQL Databases.

Syllabus		Total Hours:48
Module-I	**Overview and history of No SQL Databases**	**8Hrs**

Definition of the four types of No SQL databases. The value of Relational Databases, Getting at Persistent Data, Concurrency, Integration, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The emergence of No SQL, Key Points.

Module-II	**RDBMS Vs No SQL**	**8Hrs**

Comparison of relational databases to new No SQL stores, MongoDB, Cassandra, HBASE, Neo4j use and deployment, Application, RDBMS approach, Challenges No SQL approach, Key-Value and Document Data Models, Column-Family Stores, Aggregated-Oriented Databases, Replication and Sharding, MapReduce on databases, Distribution Models, Single Server, Sharding, Master-Slave Replication, Peer-to-Peer Replication, Combining Sharding and Replication

Module-III	**Document Databases**	**8Hrs**

No-SQL Key-Value Databases using MongoDB, Document Databases, Document oriented Database Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Web Analysis or Real Time Analytics.

Module-IV	**Column Oriented Databases**	**12Hrs**

Column-oriented No SQL databases using Apache HBASE, Column-oriented No SQL databases using Apache Cassandra, Architecture of HBASE, Column-Family Data Store Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Counters, Expiring Usage.

Module-V	Key Value Databases	12Hrs

No SQL Key-Value databases using Rika, Key-Value Databases, Key-Value Store, Key-Value Store Features, Consistency, Transactions, Query Features, Consistency, Transactions, Query Features, Structure of Data, Scaling, Suitable Use Cases, Storing Session Information, User Profiles, Preferences, Shopping Cart Data, Relationships among Data, Multi operation Transactions, Query by Data, Operations by Sets, Firebase- Cloud hosted No SQL Database, Graph No SQL databases using Neo4j, No SQL database development tools and programming languages, Graph Databases features, consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases.

Text Books:

1. Sadalage, P. & Fowler, NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Wiley Publications, 1st Edition 2019.

Reference Books:

1. NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence Paperback – Illustrated, 8 August 2012 by Martin Fowler (Author), Pramod Sadalage (Author)

Web **References:**

1. https://www.ibm.com/cloud/learn/nosql-databases
2. https://www.coursera.org/lecture/nosql-databases/introduction-to-nosql-VdRNp
3. https://www.geeksforgeeks.org/introduction-to-nosql/
4. https://www.javatpoint.com/nosql-databa

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Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

SOFT COMPUTING
(Common to CSE,AI&ML,DS,CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0530b	3:0:0:0	3	CIE:30 SEE:70	3 Hours	PEC

Course Objectives:

This course will enable students to:

- Familiarize with soft computing concepts
- Introduce and use the idea of Feed forward Neural Networks
- Learn the concepts of Unsupervised Learning and Associate Models
- Familiarize the Classical Sets and Fuzzy Sets
- Learn the concepts of Genetic algorithm and its applications

Course Outcomes(CO):

On completion of this course, student will be able to

- Show the difference between Conventional Artificial Intelligence to Computational Intelligence
- Illustrate perceptrons of neural networks
- Use unsupervised learning algorithms
- Understand fuzzy logic and reasoning to handle and solve engineering problems
- Apply various operations of genetic algorithms
- Use the soft computing techniques for applications

Syllabus		Total Hours:48
Module-I	**Introduction to soft computing and fundamentals of Artificial Neural Networks**	**10Hrs**

Introduction : Introduction to soft computing, Evolutionary Computing, hard versus soft computing, soft computing methods, Recent trends in soft computing

Fundamentals of Artificial Neural Networks: Model of Biological Neuron, Mathematical Model of Neuron, ANN Architecture, Learning Rules, Learning Paradigms, Perceptron Network.

Module-II	Feed forward Neural Network	9Hrs

Feed forward Neural Network: Introduction, Back Propagation Network, Parameter Selection in BPN, Merits and Demerits of Back Propagation, Variants of Back Propagation, Applications of BPN, Radial Basis Function.

Module-III	Unsupervised Learning and Associate Models	9Hrs

Unsupervised Learning: Introduction, Winner-Takes-All Network, Learning Vector Quantization, Self-organization Map, Adaptive Resonance Theory, Noncognition, Applications of Unsupervised Learning

Associate Models: Hopfield Network, Boltzmann Network, Simulated Annealing, Applications of Networks.

Module-IV	Classical Sets and Fuzzy Sets	10Hrs

Classical Sets and Fuzzy Sets: Crisp Sets, Fuzzy Sets: History and Origin.

Fuzzy Sets: Basic Concepts, Paradigm Shift Representations of Fuzzy Sets, Alpha-cuts, Basic Operations on Fuzzy Sets, Fuzzy Complements, Intersections, and Unions, Extension Principle for Fuzzy Sets, Operations on Intuitionistic Fuzzy Sets, Fuzzy Relations.

Module-V	**Genetic Algorithms and Applications of Soft Computing Techniques**	**10Hrs**

Genetic Algorithms: History of Evolutionary Computing, Crossover and Mutation Properties, Genetic Algorithm Cycle, Fitness Function.

Applications of Soft Computing Techniques: Pattern recognition, Image Processing, Soft Computing in Mobile Ad hoc Network, Soft Computing in Software Engineering.

Text Books:

1. Soft Computing – Advances and Applications - Jan 2015 by B.K. Tripathy and J. Anuradha – Cengage Learning

Reference Books:

1. S. N. Sivanandam& S. N. Deepa, "Principles of Soft Computing", 2nd edition, Wiley India, 2008.
2. David E. Goldberg, "Genetic Algorithms-In Search, optimization and Machine learning", Pearson Education.
3. J. S. R. Jang, C.T. Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", Pearson Education, 2004.
4. G.J. Klir& B. Yuan, "Fuzzy Sets & Fuzzy Logic", PHI, 1995.
5. Melanie Mitchell, "An Introduction to Genetic Algorithm", PHI, 1998.
6. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", McGraw- Hill International editions, 1995

Web References:

1. https://nptel.ac.in/courses/106105173
2. https://elearn.nptel.ac.in/shop/nptel/introduction-to-soft- computing/

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COMPUTER FORENSICS
(Cyber Security)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A3705T	4: 0:0:0	4	CIE: 30 SEE:70	3 Hours	PEC

Course Objectives:

To learn the Study the performance of.

- To understand the basic digital forensics and techniques for conducting the forensic examination on different digital devices.
- To understand how to examine digital evidences such as the data acquisition, identification analysis..

Course Outcomes (COS):

After completion of the course, students will be able to:

- Know how to apply forensic analysis tools to recover important evidence for identifying computer crime.
- To be well-trained as next-generation computer crime investigators.
- Apply digital evidences such as data acquisition for identification purpose.
- To understand the processing crimes and incident scenes through digital evidence.
- Identify current computer forensic tools for understanding various digital usages.
- Organize and prevent the security attacks in different environments

Syllabus		Total Hours:48
Module- I	**Computer Forensics Fundamentals**	**12 Hrs**

Introduction: Computer Forensics Fundamentals – Types of Computer Forensics Technology – Types of Computer Forensics Systems – Vendor and Computer Forensics Services.

Module-II	Computer forensics evidence and capture	9 Hrs

Computer forensics evidence and capture: Data Recovery – Evidence Collection and Data Seizure Duplication and Preservation of Digital Evidence-Computer Image Verification and Authentication.

Module-III	Computer Forensics analysis	9 Hrs

Computer forensic analysis: Discover of Electronic Evidence-Identification of Data – Reconstructing Past Events – Fighting against Macro Threats – Information Warfare Arsenal – Tactics of the Military – Tactics of Terrorist and Rogues – Tactics of Private Companies.

Module-IV	Information warfare	9 Hrs

Information warfare: Arsenal – Surveillance Tools – Hackers and Theft of Components – Contemporary Computer Crime-Identity Theft and Identity Fraud – Organized Crime &Terrorism – Avenues Prosecution and Government Efforts – Applying the First Amendment to Computer Related Crime-The Fourth Amendment and other Legal Issues.

Module-V	**Current computer forensics tools**	**9 Hrs**

Computer forensic cases: Developing Forensic Capabilities – Searching and Seizing Computer Related Evidence –Processing Evidence and Report Preparation – Future Issues.

Textbooks:

1. John R. Vacca, "Computer Forensics: Computer Crime Scene Investigation", Cengage Learning, 2 nd Edition, 2005.
2. Marjie T Britz, "Computer Forensics and Cyber Crime: An Introduction", Pearson Education, 2nd Edition, 2008.

Reference Books:

1. MariE-Helen Maras, "Computer Forensics: Cybercriminals, Laws, and Evidence", Jones & Bartlett Learning; 2nd Edition, 2014.
2. Chad Steel, "Windows Forensics", Wiley, 1st Edition, 2006.
3. Majid Yar, "Cybercrime and Society", SAGE Publications Ltd, Hardcover, 2nd Edition, 2013.

Web References:

Online Course management System: https://esu.desire2learn.com/

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MICRO CONTROLLERS AND APPLICATIONS
(Common to CSE,AI&ML,DS,CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0431T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	OEC

Course Objectives:

This course will enable students to:

- Describe the Architecture of 8051 Microcontroller and Interfacing of 8051 to external memory.
- Write 8051 Assembly level programs using 8051 instruction set.
- Describe the Interrupt system, operation of Timers/Counters and Serial port of 8051.
- Interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to 8051

Course Outcomes(CO):

On completion of this course, student will be able to

- Understand the importance of Microcontroller
- Acquire the knowledge of Architecture of 8051 Microcontroller.
- Apply and Interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to using 8051 I/O ports.
- Develop the 8051 Assembly level programs using 8051 instruction set.
- Design the Interrupt system
- Understand the operation of Timers/Counters and Serial port of 8051.

Syllabus		Total Hours:48
Module-I	**8051 Microcontroller**	**10Hrs**

8051 Microcontroller: Microprocessor Vs Microcontroller, Embedded Systems, Embedded Microcontrollers, 8051 Architecture- Registers, Pin diagram, I/O ports functions, Internal Memory organization. External Memory (ROM & RAM) interfacing..

Module-II	Addressing Modes	9Hrs

Addressing Modes, Data Transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Bit manipulation instructions. Simple Assembly language program examples to use these instructions.

Module-III	8051 Stack, Stack and Subroutine instructions	9Hrs

8051 Stack, Stack and Subroutine instructions: Simple Assembly language program examples to use subroutine instructions.8051 Timers and Counters – Operation and Assembly language programming to generate a pulse using Mode-1 and a square wave using Mode- 2 on a port pin.

Module-IV	8051 Serial Communication	10Hrs

8051 Serial Communication- Basics of Serial Data Communication, RS- 232 standard, 9 pin RS232 signals, Simple Serial Port programming in Assembly and C to transmit a message and to receive

data serially.8051 Interrupts. 8051 Assembly language programming to generate an external interrupt using a switch.

Module-V	8051 C programming	10Hrs

8051 C programming to generate a square waveform on a port pin using a Timer interrupt. Interfacing 8051 to ADC-0804, DAC, LCD and Interfacing with relays and Opto isolators, Stepper Motor Interfacing, DC motor interfacing, PWM generation using 8051.

Text Books:

1. Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay; "The 8051 Microcontroller and Embedded Systems – using assembly and C", PHI, 2006 / Pearson, 2006.
2. Kenneth J. Ayala, "The 8051 Microcontroller", 3rd Edition, Thomson/Cengage Learning

Reference Books:

1. Manish K Patel, "The 8051 Microcontroller Based Embedded Systems", McGraw Hill, 2014, ISBN: 978-93-329-0125-4.
2. Raj Kamal, "Microcontrollers: Architecture, Programming, Interfacing and System Design", Pearson Education, 2005. Wayne Wolf, FPGA based system design, Prentice hall, 2004.

Web References:

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CONTROLSYSTEMS
(Common to CSE,AI&ML,DS,CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0213Ta	3:0:0:0	3	CIE:30 SEE:70	3 Hours	OEC

Course Objectives:

This course will enable students to:

- Merits and demerits of open loop and closed loop systems; the effects of feedback
- The use of block diagram algebra and Mason's gain formula
- Transient and steady state responses , time domain specifications
- Frequency domain specifications, Bode diagrams and Nyquist plots
- The fundamental aspects of modern control

Course Outcomes(CO):

On completion of this course, student will be able to

- Evaluate the effective transfer function of a system from (i) block diagram reduction techniques (ii) Mason's gain formula
- Compute the steady state errors and transient response characteristics
- Determine the absolute stability and relative stability of a system
- Design a compensator to accomplish desired performance
- Derive state space model of a given physical system and solve the state equation

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

Open Loop and closed loop control systems and their differences- Examples of control systems- Classification of control systems, Feedback Characteristics, Effects of positive and negative feedback. Mathematical models – Differential equations of Translational and Rotational mechanical systems, and Electrical Systems, Block diagram reduction methods – Signal flow graph - Reduction using Mason's gain formula. Transfer Function of DC Servo motor - AC Servo motor - Synchro transmitter and Receiver.

Module-II	TIME RESPONSE ANALYSIS	10Hrs

Step Response - Impulse Response - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants

Module-III	STABILITY	9Hrs

The concept of stability – Routh's stability criterion – Stability and conditional stability – limitations of Routh's stability. The root locus concept - construction of root loci effects of adding poles and zeros to G(s)H(s) on the root loci.

Module-IV	FREQUENCY RESPONSE ANALYSIS	10Hrs
Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram Stability Analysis from Bode Plots. Polar Plots- Phase margin and Gain margin-Stability Analysis.		
Module-V	**STATE SPACE ANALYSIS**	**10Hrs**
Concepts of state, state variables and state model, derivation of state models from differential equations. Transfer function models. Block diagrams. Diagonalization. Solving the Time invariant state Equations- State Transition Matrix and it's Properties. System response through State Space models. The concepts of controllability and observability		

Text Books:

- Modern Control Engineering, Katsuhiko Ogata, PEARSON, 1st Impression 2015.
- Control Systems Engineering, I. J. Nagrath and M. Gopal, New Age International Publishers, 5th edition, 2007, Reprint 2012.

Reference Books:

1. Automatic Control Systems, Farid Golnaraghi and Benjamin. C. Kuo, WILEY, 9th Edition, 2010.
2. Control Systems, Dhanesh N. Manik, CENGAGE Learning, 2012.
3. John J D'Azzo and C. H. Houpis , "Linear Control System Analysis and Design: Conventional and Modern", McGraw - Hill Book Company, 1988.

Web References:

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ENVIRONMENTAL ECONOMICS
(Common to CSE,AI&ML,DS,CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0150T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	OEC

Course Objectives:

This course will enable students to:

- To impart knowledge on sustainable development and economics of energy
- To teach regarding environmental degradation and economic analysis of degradation
- To inculcate the knowledge of economics of pollution and their management
- To demonstrate the understanding of cost benefit analysis of environmental resources
- To make the students to understand principles of economics of biodiversity

Course Outcomes(CO):

On completion of this course, student will be able to

- The information on sustainable development and economics of energy
- The information regarding environmental degradation and economic analysis of degradation
- The identification of economics of pollution and their management
- The cost benefit analysis of environmental resources
- The principles of economics of biodiversity

Syllabus		Total Hours:48
Module-I	**SUSTAINABLE DEVELOPMENT**	**9Hrs**

Introduction to sustainable development - Economy-Environment interlinkages - Meaning of sustainable development - Limits to growth and the environmental Kuznets curve – The sustainability debate - Issues of energy and the economics of energy.

Module-II	ENVIRONMENTAL DEGRADATION	9Hrs

Economic significance and causes of environmental degradation - The concepts of policy failure, externality and market failure - Economic analysis of environmental degradation – Equi –marginal principle.

Module-III	ECONOMICS OF POLLUTION	10Hrs

Economics of optimal pollution, regulation, monitoring and enforcement - Managing pollution using existing markets: Bargaining solutions – Managing pollution through market intervention: Taxes, subsidies and permits.

Module-IV	COST – BENEFIT ANALYSIS	10Hrs

Cost – Benefit Analysis: Economic value of environmental resources and environmental damage - Concept of Total Economic Value - Alternative approaches to valuation – Cost-benefit analysis and discounting.

Module-V	ECONOMICS OF BIODIVERSITY	10Hrs

Economics of biodiversity: Economics of biodiversity conservation - Valuing individual species and diversity of species -Policy responses at national and international levels. Economics of Climate Change – stern Report

Text Books:

- An Introduction to Environmental Economics by N. Hanley, J. Shogren and B. White Oxford University Press.(2001)
- Blueprint for a Green Economy by D.W. Pearce, A. Markandya and E.B. Barbier Earthscan, London.(1989)

Reference Books:

- Environmental Economics: An Elementary Introduction by R.K. Turner, D.W. Pearce and I. Bateman Harvester Wheatsheaft, London. (1994),
- Economics of Natural Resources and the Environment by D.W. Pearce and R.K. Turner Harvester Wheat sheaf, London. (1990),

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INTRODUCTION TO COMPOSITE MATERIALS
(Common to CSE,AI&ML,DS,CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0327Tb	3:0:0:0	3	CIE:30 SEE:70	3 Hours	OEC

Course Objectives:

This course will enable students to:

- To be familiar with classification and characteristics of composite material and their applications.
- To gain the knowledge about manufacturing methods of composites.
- To know the testing methods related to composite materials.

Course Outcomes(CO):

To provide knowledge on characteristics of composites

- To get knowledge on manufacturing and testing methods and mechanical behaviour of composites.
- To get the exposure of different materials.

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

Definitions, Composites, Reinforcements and matrices, Types of reinforcements, Types of matrices, Types of composites, Carbon Fibre composites, Properties of composites in comparison with standard materials, Applications of metal, ceramic and polymer matrix composites.

Module-II	**Manufacturing Methods**	**9Hrs**

Hand and spray lay - up, injection molding, resin injection, filament winding, pultrusion, centrifugal casting and prepregs. Fibre/Matrix Interface, mechanical. Measurement of interface strength.

Module-III	**Mechanical Properties**	**9Hrs**

Stiffness and Strength: Geometrical aspects – volume and weight fraction. Unidirectional continuous fibre, discontinuous fibers, Short fiber systems, woven reinforcements –Mechanical Testing: Determination of stiffness and strengths of unidirectional composites; tension, compression, flexure and shear.

Module-IV	**Laminates**	**10Hrs**

Plate Stiffness and Compliance, Assumptions, Strains, Stress Resultants, Plate Stiffness and Compliance, Computation of Stresses, Types of Laminates -, Symmetric Laminates, Anti-symmetric Laminate, Balanced Laminate, Quasi-isotropic Laminates, Crossply Laminate, Angle-ply Laminate. Orthotropic Laminate, Laminate Moduli, Hygrothermal Stresses.

Module-V	**Joining Methods and Failure Theories**	**10Hrs**

Joining –Advantages and disadvantages of adhesive and mechanically fastened joints. Typical bond strengths and test procedures.

Text Books:

1. K.K. Chawla, (1998), Composite Materials, Springer-Verlag, New York 2. B.T. Astrom, (1997),
2. Manufacturing of Polymer Composites, Chapman & Hall

Reference Books:

1. Stuart M Lee, J. Ian Gray, Miltz, (1989), Reference Book for Composites Technology,CRC press
2. Frank L Matthews and R D Rawlings, (2006), Composite Materials: Engineering and Science, Taylor and Francis.
3. Composite materials by J.N.Reddy

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NATURAL LANGUAGE PROCESSING LAB
(Common to CSE,AI&ML,DS,CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A3306T	0: 0:3:0	2	CIE: 30SEE:70	3Hours	PCC

Course Objectives:

This course will enable students:

- To introduce the students with the basics of NLP which will empower them for developing advanced NLP tools
- solving practical problems in the field.
- Understand approaches to syntax and semantics in NLP

Course Outcomes (CO):

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

- Understand approaches to syntax and semantics in NLP.
- Analyze grammar formalism and context free grammars
- Apply the statistical estimation and statistical alignment models
- Apply Rule based Techniques, Statistical Machine translation (SMT), word alignment, phrase based translation
- Have the skills (experience) of solving specific NLP tasks, which may involve programming in Python, as well as running experiments on textual data.

Syllabus	Total Hours:48

List of Experiments:

Experiment 1: Word Analysis

Experiment 2:Word Generation

Experiment 3:Morphology

Experiment 4 N-Grams

Experiment 5: N-Grams Smoothing

Experiment 6: POS Tagging: Hidden Markov Model

Experiment7: POS Tagging: Viterbi Decoding

Experiment 8 : Building POS Tagger

Experiment 9:Chunking

Experiment 10:Building Chunker

Reference Books:

1. James Allen, Natural Language Understanding, 2nd Edition, 2003, Pearson Education.
2. Natural Language Processing, A paninian perspective, Akshar Bharathi, Vineet Chaitanya, Prentice –Hall of India.

Web References:

1. Welcome to Virtual Labs - A MHRD Govt of india Initiative (vlabs.ac.in)
2. Natural Language Processing in TensorFlow | Coursera

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PENETRATION TESTING AND CYBER OPERATIONS LABORATORY
(Cyber Security)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A3706P	0:0:3:0	1.5	CIE:30 SEE:70	3 Hours	

Course Objectives:

The students will Able to learn:

- The different packet crafting techniques using different Networking tools.
- The different network Script programmes to measure the performance of Network.
- The understanding of different Protocols that measure the scope and lifetime of network.

Course Outcomes(CO):

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

- Apply various Google and use tools to gather information about the target specification.
- Identify appropriate tools to encrypt and decrypt passwords in network.
- Apply Nessus tool to identify vulnerability attacks and monitor the networking mechanism.
- Analyze the Crypt and OSINT tools to detailed network information of the target.
- Implement the SQL injection Attacks to detect malware on the network.
- Apply Ettercap tool to scan the network and performing an ARP poisoning attack

Syllabus	Total Hours:48 hrs

LIST OF EXPERIMENTS:

Experiment **-1:**

- Use Google and Whois for Reconnaissance

Experiment **-2:**

- Use CryptTool to encrypt and decrypt passwords using RC4 algorithm.
- Use Cain and Abel for cracking Windows account password using Dictionary attack and to decode wirelessnetwork passwords

Experiment **-3:**

- Use TraceRoute, ping, ifconfig, netstat Command

Experiment **-4:**

- To perform ARP poisoning

Experiment **-5:**

- Use Nmap scanner to perform port scanning of various forms – ACK, SYN, FIN, NULL, XMAS

Experiment **-6:**

- Use Wire Shark sniffer to capture network traffic and analyze.

Experiment **-7:**

- Simulate persistent Cross Site Scripting attack.

Experiment **-8:**

- Session impersonation using Firefox

Experiment **-9:**

- Session impersonation using Tamper Data add-on

Experiment **-10:**

- Perform SQL injection attack.

Experiment **-11:**

- Create a simple key logger using Python

Experiment **-12:**

- Use Metasploit to exploit the data

Text Books:

1. RafayBaloch, "Ethical Hacking and Penetration Testing Guide", CRC Press, 2015.
2. Dr.Patrick Engebretson, "The Basics of Hacking and Penetration Testing", Syngress Publications Elseveir, 2013.

Reference Books:

1.1afayBaloch, "EthicalHackingandPenetrationTestingGuide",CRCPress,2015,

2.Dr.Patrick Engebretson, "The Basics of Hacking and Penetration Testing", Syngress Publications Elseveir, 2013.

3.PrakharPrasad,"MasteringModern Web Penetration Testing",Packtet Publishing,2016.

4. Prakhar Prasad, "Mastering Modern Web Penetration Testing", Packt Publishing, 2016.

5.Gilberto Najera Gutierrez, "Kali Linux Web Penetration Testing", Cookbook, 2016.

6.Robert Svensson, "From Hacking to Report Writing: An Introduction to Security and Penetration Testing",2016.

Web References:

https://www.youtube.com/watch?v=3Kq1MIfTWCE

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3rd Mile, Bombay Highway, Gangavaram (V), Kovur(M), SPSR Nellore (Dt), Andhra Pradesh, India- 524137
Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

CLOUD COMPUTING LAB
(Common to CSE,AI&ML,DS,CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0533P	0:0:3:0	1.5	CIE:30 SEE:70	3 Hours	PCC

Course Objectives:

This course will enable students to:

- To develop web applications in cloud
- To learn the design and development process involved in creating a cloud based application
- Understand transfer of file form one virtual machine to another
- To learn to implement and use parallel programming using Hadoop

Course Outcomes(CO):

On completion of this course, student will be able to

- Configure various virtualization tools such as Virtual Box, VMware workstation.
- Design and deploy a web application in a PaaS environment.
- Simulate a cloud scenario using Cloud Sim
- Learn how to simulate a cloud environment to implement new schedulers.
- Install and use a generic cloud environment that can be used as a private cloud.
- Manipulate large data sets in a parallel environment.

Syllabus | **Total Hours:48**

List of Experiments

- Install Virtual Box/VMware Workstation with different flavours of Linux or windows OS on top of windows operating systems.
- Install a C compiler in the virtual machine created using virtual box and execute Simple Programs
- Install Google App Engine. Create hello world app and other simple web applications using python/java.
- Use GAE launcher to launch the web applications.
- Simulate a cloud scenario using Cloud Sim and run a scheduling algorithm that is not present in Cloud Sim.
- Find a procedure to transfer the files from one virtual machine to another virtual machine.
- Find a procedure to launch virtual machine using try stack (Online Open stack Demo Version)
- Install Hadoop single node cluster and run simple applications like word count

References:

GoogleCloud Computing Foundations Course - Course (nptel.ac.in)

Web References:

1. https://www.vmware.com/products/workstation-pro/workstation-pro-evaluation.html
2. http://code.google.com/appengine/downloads.html
3. http://code.google.com/appengine/downloads.html

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Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

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 AkilandeswariJ.,―WebTechnology,PrenticeHallofIndia,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-CSS Framework: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. J Query: https://jquery.com
8. Google Charts:https://developers.google.com/chart
9. Word press :https://wordpress.com

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Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

RESEARCH METHODOLOGY
(Common **to CSE, AI&ML, CS, DS, ECE, EEE, ME**)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0032T	2:0:0:0	0	CIE:30	-	MC

Course Objectives:

This course will enable students to:

- To understand the basic concepts of research and research problem
- To make the students learn about various types of data collection and sampling
- Design to enable them to know the method of statistical evaluation
- To make the students understand various testing tools in research
- To make the student learn how to write a research report
- To create awareness on ethical issues n research

Course Outcomes(CO):

On completion of this course, student will be able to

- Understand basic concepts and its methodologies
- Understand the concept of sampling and sampling design
- Design survey questionnaires for different kinds of research
- Read. comprehend and explain research articles in their academic discipline
- Analyze various types of testing tools used in research
- Design a research paper without any ethical issues

Syllabus		Total Hours:48
Module-I	**INTRODUCTION TO RESEARCHMETHODOLOGY**	**10Hrs**

Meaning of Research – Objectives of Research – Types of Research – Research Approaches – Guidelines for Selecting and Defining Research Problem – Research Design – Concepts related to Research Design – Basic Principles of Experimental Design.

Module-II	SAMPLING AND DATA COLLECTION METHODS	9Hrs

Sampling Design – steps in Sampling Design –Characteristics of a Good Sample Design – Random Sampling Design. Measurement and Scaling Techniques-Errors in Measurement – Tests of Sound Measurement – Scaling and Scale Construction Techniques – Time Series Analysis – Interpolation and Extrapolation. Data Collection Methods – Primary Data – Secondary data – Questionnaire Survey and Interviews.

Module-III	CORRELATION	10Hrs

Correlation and Regression Analysis – Method of Least Squares – Regression vs Correlation – Correlation vs Determination – Types of Correlations and Their Applications

Module-IV	STATISTICAL INFERENCE	9Hrs

Statistical Inference: Tests of Hypothesis – Parametric vs Non-parametric Tests – Hypothesis Testing Procedure – Sampling Theory – Sampling Distribution – Chi-square Test – Analysis of variance and Co-variance – Multivariate Analysis

Module-V	REPORT WRITING	10Hrs

Report Writing and Professional Ethics: Interpretation of Data – Report Writing – Layout of a Research Paper – Techniques of Interpretation- Making Scientific Presentations in Conferences and Seminars – Professional Ethics in Research

Text Books:

1. C.R.Kothari, "Research Methodology:Methods and Techniques",2nd edition, New Age International Publishers.
2. A Step by Step Guide for Beginners, "Research Methodology": Ranjit Kumar, Sage Publications

Reference Books:

1. P.Narayana Reddy and G.V.R.K.Acharyulu, "Research Methodology and Statistical Tools", 1st Edition, Excel Books,New Delhi.
2. Donald R. "Business Research Methods", Cooper & Pamela S Schindler, 9th edition.
3. 3. S C Gupta, "Fundamentals of Statistics", 7th edition Himalaya Publications

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MANAGEMENT SCIENCE
(Common to CSE,AI&ML,DS,CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0023T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	HSC

Course Objectives:

This course will enable students to:

- To provide fundamental knowledge on Management, Administration, Organization & its concepts.
- To make the students understand the role of management in Production
- To impart the concept of HRM in order to have an idea on Recruitment, Selection, Training & Development, job evaluation and Merit rating concepts.
- To create awareness on identify Strategic Management areas & the PERT/CPM for better Project Management.
- To make the students aware of the contemporary issues in management.

Course Outcomes(CO):

On completion of this course, student will be able to

- Understand the concepts & principles of management and designs of organization in a practical world
- Apply the knowledge of Work-study principles & Quality Control techniques in industry
- Analyze the concepts of HRM in Recruitment, Selection and Training &Development.
- Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time &cost of project & to analyze the business through SWOT.
- Create Modern technology in management science.

Syllabus		Total Hours:48
Module–I	**INTRODUCTION TO MANAGEMENT**	**10 Hrs**

Management - Concept and meaning - Nature-Functions - Management as a Science and Art and both. Schools of Management Thought - Taylor's Scientific Theory-Henry Fayol's principles -Eltan Mayo's Human relations - Systems Theory - Organizational Designs - Line organization – Line&StaffOrganization-FunctionalOrganization-MatrixOrganization-ProjectOrganization-CommitteeformofOrganization-SocialresponsibilitiesofManagement.

Module–II	**OPERATIONS MANAGEMENT**	**10Hrs**

Principles and Types of Plant Layout - Methods of Production (Job, batch and Mass Production),Work Study-Statistical Quality Control-Deming's contribution to Quality. Material Management - Objectives - Inventory-Functions - Types, Inventory Techniques - EOQ-ABC Analysis - Purchase Procedure and Stores Management - Marketing Management - Concept - Meaning-Nature-Functions of Marketing-Marketing Mix-Channels of Distribution-Advertisement and Sales Promotion-Marketing Strategies based on Product Life Cycle.

Module–III	**HUMAN RESOURCES MANAGEMENT**	**10 Hrs**

HRM - Definition and Meaning – Nature - Managerial and Operative functions - Evolution of HRM - Job Analysis - Human Resource Planning(HRP)- Employee Recruitment-Sources of Recruitment-Employee Selection -Process and Tests in Employee Selection –Employee Training and Development-On-the-job & Off-the-job training methods-Performance Appraisal Concept- Methods of Performance Appraisal – Placement- Employee Induction –Wage and Salary Administration.

Module–IV	**STRATEGIC & PROJECTMANAGEMENT**	**10 Hrs**

Definition & Meaning-Setting of Vision -Mission -Goals –Corporate Planning Process-Environmental Scanning - Steps in Strategy Formulation and Implementation - SWOT Analysis – Project Management-Network Analysis-Program Evaluation and Review Technique(PERT) - Critical Path Method (CPM) Identifying Critical Path - Probability of Completing the project with in given time-Project Cost-Analysis-Project Crashing (Simple problems).

Module–V	**CONTEMPORARY ISSUES IN MANAGEMENT**	**8 Hrs**

The concept of Management Information System (MIS)-Materials Requirement Planning (MRP)-Customer Relations Management (CRM)-Total Quality Management (TQM) –Six Sigma Concept-Supply Chain Management (SCM)-Enterprise Resource Planning (ERP)-Performance Management-Business Process Outsourcing (BPO)-Business Process Re-engineering and Bench Marking-Balanced Score Card-Knowledge Management.

Text Books:

1. A. RAryasri, “Management Science”,TMH,2 013
2. Stoner, Freeman, Gilbert, Management, Pearson Education, New Delhi,2012.

Reference Books:

1. Koontz & Weihrich, “Essentials of Management”, 6th edition, TMH, 2005.
2. Thomas N.Duening & John M.Ivancevich, “Management Principles and Guidelines”, Biztantra.
3. Kanishka Bedi, “Production and Operations Management”, Oxford University Press, 2004.
4. Samuel C.Certo, “Modern Management”,9th edition, PHI, 2005

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Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

ENTREPRENEURSHIP AND INNOVATION
(Common to CSE,AI&ML,DS,CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0024T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	HSC

Course Objectives:

This course will enable students to:

- To make the student understand about Entrepreneurship
- To enable the student in knowing various sources of generating new ideas in setting up of New enterprise
- To facilitate the student in knowing various sources of finance in starting up of a business
- To impart knowledge about various government sources which provide financial assistance to entrepreneurs / women entrepreneurs
- To encourage the student in creating and designing business plans

Course Outcomes(CO):

On completion of this course, student will be able to

- Understand the concept of Entrepreneurship and challenges in the world of competition.(L2)
- Apply the Knowledge in generating ideas for New Ventures.(L3)
- Analyze various sources of finance and subsidies to entrepreneur / women Entrepreneurs.(L4)
- Evaluate the role of central government and state government in promoting entrepreneurship.(L3)
- Create and design business plan structure through incubations.(L3)

Syllabus		Total Hours:48
Module–I	**STARTING UP NEW VENTURE**	**10 Hrs**

Entrepreneurship-Concept,knowledgeandskillsrequirement-Characteristicsofsuccessfulentrepreneurs-Entrepreneurshipprocess-Factorsimpactingemergenceofentrepreneurship-DifferencesbetweenEntrepreneurandIntrapreneur-Understandingindividualentrepreneurialmindsetandpersonality-RecenttrendsinEntrepreneurship.

Module–II	**STARTING UP NEW VENTURE**	**10Hrs**

Starting the New Venture - Generating business idea – Sources of new ideas & methods of generating ideas-Opportunity recognition-Feasibility study-Market feasibility, technical / operational feasibility - Financial feasibility - Drawing business plan - Preparing project report – Presenting business plan to investors..

Module–III	**SOURCES OF FINANACE**	**10 Hrs**

Sources of finance - Various sources of Finance available - Long term sources - Short term sources - Institutional Finance – Commercial Banks, SFC's in India- NBFC's in India – their way of financing in India for small and medium business -Entrepreneurship development programs in India – The entrepreneurial journey- Institutions in aid of entrepreneurship development

Module–IV	WOMEN ENTREPRENEURSHIP	10 Hrs

Women Entrepreneurship-Entrepreneurship Development and Government-Role of Central Government and State Government in promoting women Entrepreneurship

Introduction to various incentives, subsidies and grants – Export- oriented Units - Fiscal and Tax concessions available -Women entrepreneurship - Role and importance - Growth of women entrepreneurship in India-Issues & Challenges-Entrepreneurial motivations.

Module–V	INTRODUCTION TO INCUBATION & INNOVATION	8 Hrs

Fundamentals of Business Incubation - Principles and good practices of business incubation- Process of business incubation – Types, Advantages and Disadvantages of incubation.

Innovation Meaning & Definition - Forms of innovation - Innovation, features and characteristics - Factors initiating innovations - Innovation process and its stages.

Text Books:

1. D F Kuratko and T V Rao, "Entrepreneurship**"**- A South-Asian Perspective–Cengage Learning, 2012. (For PPT,Case Solutions Faculty may visit: login.cengage.com)
2. Nandan H, "Fundamentals of Entrepreneurship", PHI, 2013

Reference Books:

1. Vasant Desai, "Small Scale Industries and Entrepreneurship", Himalaya Publishing 2012.
2. Rajeev Roy "Entrepreneurship", 2nd Edition, Oxford, 2012.
3. B.Janakiram and M.Rizwana ‖ "Entrepreneurship Development: Text & Cases", Excel Books, 2011.
4. Stuart Read, Effectual "Entrepreneurship", Routledge, 2013.

Web References:

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BUSINESS ENVIRONMENT
(Common to CSE,AI&ML,DS,CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0025T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	HSC

Course Objectives:

This course will enable students to:

- To make the student understand about the business environment.
- To enable the min knowing the importance of fiscal and monitory policy.
- To facilitate the min understanding the export policy of the country.
- Impart knowledge about the functioning and role of WTO.
- Encourage the student in knowing the structure of stock market..

Course Outcomes(CO):

On completion of this course, student will be able to

- Understand various types of business environment.
- Evaluate fiscal and monitory policy
- Analyze India's Trade Policy
- Understand the role of WTO
- Apply the knowledge of Money markets in future investment

Syllabus		Total Hours:48
Module–I	**AN OVERVIEW OF BUSINESS ENVIRONMENT**	**10 Hrs**

Overview of Business Environment – Types of Environments - Internal & External –Micro and Macro environment- Competitive structure of industries - Environmental analysis - Scope of business-Characteristics of business-Process & limitations of environmental analysis.

Module–II	FISCAL POLICY & MONETARY POLICY	10Hrs

FISCAL POLICY-Public Revenues-Public Expenditure-Public debt Development activities financed by public expenditure - Evaluation of recent fiscal policy of Government of India - Highlights of Budget - MONETARY POLICY - Demand and Supply of Money – RBI –Objectives of monetary and credit policy-Recent trends-Role of Finance Commission.

Module–III	INDIA'S TRADE POLICY & BALANCE OF PAYMENTS	10 Hrs

INDIA'S TRADE POLICY - Magnitude and direction of Indian International Trade – Bilateral and Multilateral Trade Agreements - EXIM policy and role of EXIM bank - BALANCE OF PAYMENTS–Structure & Major components-Causes for Disequilibrium in Balance of Payments-Correction measures–WTO - Nature and Scope - Organization and Structure – Role and functions of WTO in promoting world trade

Module–IV	MONEY MARKETS AND CAPITAL MARKETS	10 Hrs
Features and components of Indian financial systems - Objectives, features and structure of money markets and capital markets -Reforms and recent development– SEBI - Stock Exchanges - Investor protection and role of SEBI.		
Module–V	**INTRODUCTION TO INFLATION**	**8 Hrs**
Inflation – Meaning & Definition – Causes – Effects – Types – Advantages & Disadvantages Deflation – Meaning & Definition - Causes & Effects.		

Text Books:

1. Francis Cherunilam (2009), "International Business": Text and Cases, Prentice Hall of India.
2. K.Aswathappa, "Essentials of Business Environment": Texts and Cases & Exercises 13th Revised Edition. HPH 2016.

Reference Books:

1. K.V.Sivayya,V.B.MDas (2009), Indian Industrial Economy, Sultan Chand Publishers, New Delhi, India.
2. Sundaram, Black (2009), International Business Environment Text and Cases, Prentice Hall of India, New Delhi, India.
3. Chari.S.N (2009), International Business, Wiley India.
4. E.Bhattacharya (2009), International Business, Excel Publications, New Delhi.

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Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

DIGITAL FORENSICS					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A3707T	**3:0:0:0**	**3**	**CIE:30 SEE:70**	**3 Hours**	**PEC**

Course Objectives:

This course will enable students to:

- To understand the basic digital forensics and techniques for conducting the forensic examination on different digital devices.
- To understand how to examine digital evidences such as the data acquisition, identification analysis.

Course Outcomes(CO):

On completion of this course, student will be able to

- Know how to apply forensic analysis tools to recover important evidence for identifying computer crime.
- To be well-trained as next-generation computer crime investigators.
- Apply digital evidences such as data acquisition for identification purpose.
- To understand the processing crimes and incident scenes through digital evidence.
- Identify current computer forensic tools for understanding various digital usages.
- Organize and prevent the security attacks in different environments

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

Computer forensics fundamentals, Benefits of forensics, computer crimes, computer forensics evidence and courts, legal concerns and private issues.

Module-II	**Improving Software Economics**	**10 Hrs**

Reducing Software product size, improving software processes, improving team effectiveness, Improving automation, Achieving required quality, peer inspections.

The old way and the new: The principles of conventional software engineering, principles of modern software management.

Module-III	**Computing Investigations**	**10Hrs**

Understanding Computing Investigations – Procedure for corporate High-Tech investigations, understanding data recovery work station and software, conducting and investigations.

Module-IV	**Data Acquisition**	**9 Hrs**

Data acquisition- understanding storage formats and digital evidence, determining the best acquisition method, acquisition tools, validating data acquisitions, performing RAID data acquisitions, remote network acquisition tools, other forensics acquisitions tools.

Module-V	**Wireless Hacking**	**9Hrs**

Current computer forensics tools- software, hardware tools, validating and testing forensic software, addressing data-hiding techniques, performing remote acquisitions, E-Mail investigations, investigating email crime and

violations, understanding E-Mail servers, specialized E-Mail forensics tool.

Text Books:

1. Mario Dobler, Tim Grobmann, “Data Visualization with Python”, O’Reilly, First Edition, 2019.
2. Samuel Burns, “Python Data Visualization: An Easy Introduction to Data Visualization in Python with Matplotlib, Pandas, and Seaborn”, Kindle Edition, 2019.

Reference Books:

1. Kristen Sosulski, “Data Visualization Made Simple”, Taylor & Francis, 2019.
2. Robert Collins, “Data Visualization: Introduction to Data Visualization with Phyton, R and Tableau”, Kindle Edition, 2018.
3. Robert Grant, “Data Visualization-Charts, Maps, and Interactive Graphs”, CRC Press, 2019.

Web References:

https://www.simplilearn.com/free-data-visualization-course-online-skillup

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High Performance Computing
(Common to CSE,AI&ML,DS,CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0534b	3:0:0:0	3	CIE:30 SEE:70	3 Hours	PEC

Course Objectives:

This course will enable students to:

- Understanding the specific roles within a software organization as related to Project and process management.
- Study the improving software processes and the principles of conventional software engineering.
- Learn the Software Life Cycle Phases and Artifact.
- Understand the Iterative Process Planning and Process Automation.
- Learn the basic steps of project planning, project management, quality assurance, and process management and their relationships..

Course Outcomes(CO):

On completion of this course, student will be able to

- Describe the purpose of project management from the perspectives of planning, tracking and completion of project.
- Determine the conventional software Management and Software Economics.
- Use the improving software processes and modern software management.
- Use the software Life Cycle Phases and artifact sets.
- Determine the Iterative Process Planning and Process Automation.
- Apply the quality indicators and Core Metrics

Syllabus		**Total Hours:50**
Module-I	**Conventional Software Management**	**10 Hrs**
The waterfall model, conventional software Management performance. Evolution of Software Economics: Software Economics, pragmatic software cost estimation.		
Module-II	**Improving Software Economics**	**8 Hrs**
Reducing Software product size, improving software processes, improving team effectiveness, Improving automation, Achieving required quality, peer inspections. The old way and the new: The principles of conventional software engineering, principles of modern software management.		
Module-III	**Life Cycle Phases And Artifacts Of The Process**	**10Hrs**
Engineering and production stages, inception, Elaboration, construction, transition phases. The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts. Model based software architectures: A Management perspective and technical perspective.		
Module-IV	**Work Flows Of The Process , Project Organizations And Responsibilities**	**10 Hrs**
Checkpoints of the Process, Iterative Process Planning, Line-of-Business Organizations, Project Organizations.		

Process Automation: Tools, The Project Environment.

Module-V	Project Control And Process Instrumentation	12 Hrs

The seven core Metrics, Management indicators, quality indicators, life cycle expectations pragmatic Software Metrics, Metrics automation. Tailoring the Process: Process discriminates.
The Command Center Processing and Display System-Replacement (CCPDS-R),Process overview, Core Metrics.

Text Books:

1. Software Project Management, Walker Royce, Pearson Education.
2. 2. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition,Tata McGraw Hill.

Reference Books:

1. Applied Software Project Management, Andrew Stellman & Jennifer Greene, O"Reilly, 2006
2. Head First PMP, Jennifer Greene & Andrew Stellman, O"Reilly,2007
3. Software Engineering Project Managent, Richard H. Thayer & Edward Yourdon, second edition,Wiley India, 2004.
4. Agile Project Management, Jim Highsmith, Pearson education, 2004
5. The art of Project management, Scott Berkun, O"Reilly, 2005.
6. Software Project Management in Practice, Pankaj Jalote, Pearson Education, 2002.

Web References:

https://archive.nptel.ac.in/courses/106/105/106105218/

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3rd Mile, Bombay Highway, Gangavaram (V), Kovur(M), SPSR Nellore (Dt), Andhra Pradesh, India- 524137
Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

BIG DATA ANALYTICS
(Common to CSE,AI&ML,DS,CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0534c	3:0:0:0	3	CIE:30 SEE:70	3 Hours	PEC

Course Objectives:

This course will enable students to:

- Understand the basic concepts and importance of Big Data
- Familiarize with the installation of Hadoop and how to analyze the Big Data
- Understand the design concepts of HDFS
- Provide good insight for developing a MapReduce applications
- Understand Hadoop environment.
- Explore the concepts of Pig, Hive, Spark and HBase

Course Outcomes(CO):

After the completion of the course students will able to

- Understand the concepts and tools of big data.
- Analyzing the Data with Hadoop
- Develop MapReduce application
- Illustrate the Anatomy of MapReduce and Hadoop environment Determine why existing technologies are inadequate to analyze the large data
- Apply large-scale analytic tools to solve some of the open big data problems.
- Analyze analytic tools

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

Introduction to Big Data: Big data fundamentals, importance of big data, Structuring Big Data, Big Data Analytics, Meet Hadoop: Data, Data Storage and Analysis, History of Apache Hadoop, Hadoop Ecosystem, Installation of Hadoop, Analyzing the Data with Hadoop, Scaling Out.

Module-II	HDFS and MapReduce	9Hrs

HDFS: HDFS Concepts, HDFS Architecture, The Command-Line Interface, Data flow: Anatomy of a file read and Anatomy of a file write.

Map Reduce: Developing a Map Reduce application: The Configuration API, setting up the Development Environment, Running Locally on Test Data, Running on a Cluster.

Module-III	How Map Reduce Works and Hadoop Environment	10Hrs

How Map Reduce Works: Anatomy of a Map Reduce Job Run, Failures, Shuffle and Sort.

Hadoop Environment: Setting up a Hadoop Cluster, Cluster specification, Cluster Setup and Installation, Hadoop Configuration.

Module-IV	Data Analyzation using Pig as a tool	9Hrs

Pig: Pig Concepts**,** Apache Pig Architecture, Installing and Running Pig, Comparison with Databases, Pig Latin, User Defined Functions, Data Processing Operators.

Module-V	Open Source tools for Big Data: Hive, Spark and HBase	10Hrs

Hive: Hive concepts, Hive Architecture, Installing Hive, Comparison with traditional Databases, HiveQL, Tables, Querying Data.

Spark: Spark Concepts, Architecture of Spark, Installing Spark, Anatomy of a Spark Job Run.

HBase: Introduction to HBase, HBase Architecture, Installation.

Text Books:

1. Tom White, "Hadoop: The Definitive Guide"Fourth Edition, O'reilly Media, 2015.
2. Big Data Black Book, DT Editorial services ,Dreamtech Press

Reference Books:

1. Big Data, Big Analytics: Emerging business intelligence and analytic trends for today's businesses, Michael Minnelli, Michelle Chambers, and Ambiga Dhiraj, Wiley Cio Series
2. Glenn J. Myatt, Making Sense of Data , John Wiley & Sons, 2007 Pete Warden,Big Data Glossary, O'Reilly, 2011.
3. Michael Berthold, David J.Hand, Intelligent Data Analysis, Spingers, 2007.
4. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos,Uderstanding Big Data : Analytics for Enterprise Class Hadoop and Streaming Data, McGraw Hill Publishing, 2012.
5. Anand Rajaraman and Jeffrey David UIIman, Mining of Massive Datasets Cambridge University Press, 2012

Web References:

https://onlinecourses.swayam2.ac.in/arp19_ap60/preview

https://www.shiksha.com/online-courses/big-data-analytics-courses-certification-training-by-nptel-st601-tg91

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Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

Block Chain Technology

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

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0535a	3:0:0:0	3	CIE:30 SEE:70	3 Hours	PEC

Course Objectives:

This course will enable students to:

- Illustrate the fundamental concepts of black chain.
- Determine the crypto currency primitives.
- Compare and contrast the bit coins and Crypto currency
- Illustrate the different security features

Course Outcomes(CO):

On completion of this course, student will be able to

- Describe the basic concepts and technology used for block chain.
- Describe the primitives of the distributed computing and cryptography related to block chain.
- Illustrate the concepts of Bit coin and their usage.
- Implement Ethereum block chain contract.
- Apply security features in blockchain technologies.
- Use smart contract in real world applications.

Syllabus — **Total Hours:48**

Module-I	Introduction	9Hrs

Need for Distributed Record Keeping, Modeling faults and adversaries, Byzantine Generals problem, Consensus algorithms and their scalability problems, Nakamoto's concept with Block chain based crypto currency, Technologies Borrowed in Block chain – hash pointers, consensus, byzantine fault-tolerant distributed computing, digital cash etc

Module-II	Basic Distributed Computing & Crypto primitives:	10Hrs

Atomic Broadcast, Consensus, Byzantine Models of fault tolerance, Hash functions, Puzzle friendly Hash, Collison resistant hash, digital signatures, public key crypto, verifiable random functions, Zero-knowledge systems

Module-III	Bitcoin basics	10Hrs

Bitcoin blockchain, Challenges and solutions, proof of work, Proof of stake, alternatives to Bitcoin consensus, Bitcoin scripting language and their use

Module-IV	Ethereum basics:	10Hrs

Ethereum and Smart Contracts, The Turing Completeness of Smart Contract Languages and verification challenges, Using smart contracts to enforce legal contracts, comparing Bitcoin scripting vs. Ethereum Smart Contracts, Writing smart contracts using Solidity & JavaScript

Module-V	Privacy, Security issues in Block chain:	9Hrs

Pseudo-anonymity vs. anonymity, Zcash and Zk-SNARKS for anonymity preservation, attacks on Block chains: Sybil attacks, selfish mining, 51% attacks advent of algorand; Sharding based consensus algorithms to prevent these attacks

Text Books:

1. Josh Thompson, 'Block chain: The Block chain for Beginnings, Guild to Block chain Technology and Block chain Programming', Create Space Independent Publishing Platform, 2017.
2. Narayanan, Bonneau, Felten, Miller and Goldfeder, "Bitcoin and Cryptocurrency Technologies – A Comprehensive Introduction", Princeton University Press.

Reference Books:

1. Imran Bashir, "Mastering Block chain: Distributed ledger technology, decentralization, and smart contracts explained", Packt Publishing.

2. Merunas Grincalaitis, "Mastering Ethereum: Implement Advanced Block chain Applications Using Ethereum-supported Tools, Services, and Protocols", Packet Publishing.

Web References:

1. https://onlinecourses.nptel.ac.in/noc22_cs44/preview
2. https://nptel.ac.in/courses/106104220

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Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

ETHICAL HACKING					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A3708T	**3:0:0:0**	**3**	**CIE: 30 SEE:70**	**3 Hours**	**PEC**

Course Objectives:

This course will enable students :

- The ethical hacking covers the theory and practices of finding the vulnerabilities through forming the different attacks.
- Defining the appropriate security policy including the action to detect or prevent the attacks and thus reduce the damages.
- Security of digital infrastructure is an utmost need for an organization.
- The variety of security attacks makes it compulsion to analyze the way newer attacks.

Course Outcomes(CO):

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

- Describe and understand the basics of the ethical hacking
- Perform the foot printing and scanning
- Demonstrate the techniques for system hacking
- Characterize the malware and their attacks and detect and prevent them
- Determine the signature of different attacks and prevent them
- Detect and prevent the security attacks in different environments

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Syllabus		**Total Hours:48**
Module-I	**Introduction To Hacking**	**9Hrs**

Introduction to Hacking – Important Terminologies – Penetration Test – Vulnerability Assessments versus Penetration Test – Pre-Engagement – Rules of Engagement -Penetration Testing Methodologies – OSSTMM – NIST – OWASP – Categories of Penetration Test – Types of Penetration Tests – Vulnerability Assessment Summary –Reports.

Module-II	**Technical Foundations of Hacking**	**10Hrs**

The Technical Foundations of Hacking: The Attacker's Process, The Ethical Hacker's Process, Security and the Stack.

Foot printing and scanning : Information Gathering, Determining the Network Range, Identifying Active Machines, Finding Open Ports and Access Points, OS Fingerprinting Services, Mapping the Network Attack Surface.

Module-III	**Vulnerability Data Resources**	**9Hrs**

Vulnerability Data Resources – Exploit Databases – Network Sniffing – Types of Sniffing -Promiscuous versus Non promiscuous Mode – MITM Attacks – ARP Attacks – Denial of Service Attacks -Hijacking Session with MITM Attack – SSL Strip: Stripping HTTPS Traffic -DNS Spoofing – ARP Spoofing Attack Manipulating the DNS Records – DHCP Spoofing -Remote Exploitation – Attacking Network Remote Services – Overview of Brute Force Attacks – Traditional Brute Force – Attacking SMTP – Attacking SQL Servers – Testing for Weak Authentication.

Module-IV	**Malware Threats**	**10Hrs**

Viruses and Worms, Trojans, Covert Communication, Keystroke Logging and Spyware, Malware Counter measures.

Sniffers, Session Hijacking and Denial of Service:
Sniffers, Session Hijacking, Denial of Service and Distributed Denial of Service.

Module-V	**Wireless Hacking**	**10Hrs**

Introducing Air crack- Cracking the WEP – Cracking a WPA/WPA2 Wireless Network Using Aircrack-ng – Evil Twin Attack – Causing Denial of Service on the Original AP – Web Hacking – Attacking the Authentication – Brute Force and Dictionary Attacks – Types of Authentication – Log-In Protection Mechanisms – Captcha Validation Flaw – Captcha RESET Flaw – Manipulating User-Agents to Bypass Captcha and Other Protection – Authentication Bypass Attacks – Testing for the Vulnerability – Automating It with Burp Suite – Session Attacks – SQL Injection Attacks – XSS (Cross-Site Scripting) -Types of Cross-Site Scripting – Cross-Site Request Forgery (CSRF) – SSRF Attacks.

Text Books:

3. Rafay Baloch, "Ethical Hacking and Penetration Testing Guide", CRC Press, 2014.
4. Certified Ethical Hacker, Version 9, Second Edition, Michael Gregg, Pearson IT Certification.
5. Hacking the Hacker, Roger Grimes, Wiley.

Reference Books:

1. The Unofficial Guide to Ethical Hacking, Ankit Fadia, Premier Press.
2. Kevin Beaver, "Ethical Hacking for Dummies", Sixth Edition, Wiley, 2018.
3. Jon Erickson , "Hacking: The Art of Exploitation", Second Edition, Rogunix, 2007.

E -resources:

1. https://www.tutorialspoint.com/ethical_hacking/index.htm
2. https://www.javatpoint.com/ethical-hacking
3. **https://www.youtube.com/watch?v=dz7Ntp7KQGA**

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Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

DEEP LEARNING
(Common to CSE,AI&ML,DS,CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0535c	3:0:0:0	3	CIE:30 SEE:70	3 Hours	PEC

Course Objectives:

This course will enable students to:

- Demonstrate the major technology trends driving Deep Learning
- Build, train, and apply fully connected deep neural networks
- Implement efficient neural networks
- Analyse the key parameters and hyper parameters in a neural network's architecture

Course Outcomes(CO):

On completion of this course, student will be able to

- Apply Mathematical Operations on Neural Network.
- Choose proper Hyper parameters.
- Examine architecture of Deep Neural Network.
- Apply Convolutional Neural Networks in Image Classifications.
- Use RNN and LSTMs in Real time applications.
- Analyze different types of Auto encoders.

Syllabus		Total Hours:48
Module-I	**Linear Algebra**	**10Hrs**

Scalars, Vectors, Matrices and Tensors, Matrix operations, types of matrices, Norms, Eigen decomposition, Singular Value Decomposition, Principal Components Analysis.

Information Theory. Numerical Computation: Overflow and Underflow, Gradient-Based Optimization, Constrained Optimization, Linear Least Squares.

Module-II	Fundamentals of Neural Networks and Deep Learning	9Hrs

Neural Networks, Training Neural Networks, Activation Functions, Loss Functions, Hyper parameters, Building blocks of Deep Neural Networks.

Module-III	Convolutional Networks	10Hrs

The Convolution Operation, Pooling, Convolution, Basic Convolution Functions, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, Basis for Convolutional Networks..

Module-IV	Recurrent and Recursive Neural Networks	9Hrs

Recurrent Neural Network: Modelling Time Dimension, 3D Volumetric Input, General Recursive Neural Network Architecture, LSTM Networks, Applications.

Recursive Neural Network: Architecture, Varieties of RNN, Applications of RNN.

Module-V	Auto Encoders	10Hrs

Undercomplete Autoencoders, Regularized Autoencoders, Representational Power, Layer Sizeand Depth, Stochastic Encoders and Decoders, Denoising Autoencoders..

Text Book:

1. Ian Goodfellow, YoshuaBengio, Aaron Courville, "Deep Learning", MIT Press,2016.
2. Josh Patterson and Adam Gibson, "Deep learning: A practitioner's approach", O'Reilly Media, First Edition, 2017

Reference Books:

1. Fundamentals of Deep Learning, Designing next-generation machine intelligence algorithms, Nikhil Buduma, O'Reilly, Shroff Publishers, 2019.
2. Deep learning Cook Book, Practical recipes to get started Quickly, DouweOsinga, O'Reilly, Shroff Publishers, 2019.

Web References:

1. https://keras.io/datasets/
2. http://deeplearning.net/tutorial/deeplearning.pdf
3. https://arxiv.org/pdf/1404.7828v4.pdf
4. https://www.cse.iitm.ac.in/~miteshk/CS7015.html
5. https://www.deeplearningbook.org
6. https://nptel.ac.in/courses/106105215

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Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

IMAGE PROCESSING

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

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0536a	3:0:0:0	3	CIE:30 SEE:70	3 Hours	PEC

Course Objectives:

Provide a theoretical and mathematical foundation of fundamental Digital Image Processing concepts.

- Image Acquisition
- Sampling And Quantization
- Preprocessing
- Enhancement
- Restoration
- Segmentation and Compression

Course Outcomes(CO):

On completion of this course, student will be able to

- Demonstrate the knowledge of the fundamental concepts of a image processing system.
- Analyze images in the frequency domain using various transforms.
- Evaluate the techniques for image enhancement and image restoration.
- Interpret image segmentation and representation techniques.
- Categorize various compression techniques.
- Interpret Image compression standards

Syllabus		Total Hours:48
Module-I	**Basics to Image Processing**	**10Hrs**

Digital Image Fundamentals: Digital Image through Scanner, Digital Camera. Concept of Gray Levels. Gray Level to Binary Image Conversion. Sampling and Quantization. Relationship between Pixels. Imaging Geometry. 2D Transformations-DFT, DCT, KLT and SVD

Module-II	**Image Enhancement**	**9Hrs**

Image Enhancement in Spatial Domain Point Processing, Histogram Processing, Spatial Filtering, Enhancement in Frequency Domain, Image Smoothing, Image Sharpening.

Module-III	**Image Restoration**	**10Hrs**

Image Restoration Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration, Interactive Restoration

Module-IV	**Image Segmentation**	**9Hrs**

Image Segmentation Detection of Discontinuities, Edge Linking and Boundary Detection, Thres holding, Region Oriented Segmentation.

Module-V	**Image Compression**	**10Hrs**

Image Compression Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Source Encoder and Decoder, Error Free Compression, Lossy Compression.

Text Book:

Digital Image Processing: R.C. Gonzalez & R. E. Woods, Addison Wesley/ Pearson Education, 2nd Ed, 2004

Reference Books:

1. Fundamentals of Digital Image Processing: A. K. Jain, PHI.
2. Digital Image Processing using MAT LAB: Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins: Pearson Education India, 2004.
3. Digital Image Processing: William K. Pratt, John Wilely, 3rd Edition, 2004.

Web References:

https://archive.nptel.ac.in/courses/117/105/117105135/

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DATABASE SECURITY
(Cyber Security)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A3709T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	PEC

Course Objectives:

- To learn the security of databases.
- To learn the design techniques of database security
- To learn the secure software design.
- Study the performance of Statistical Database Protection & Intrusion Detection Systems
- Understand the Models For The Protection Of New Generation Database Systems.

Course Outcomes(CO):

On completion of this course, student will be able to

- Understand the basic concepts of Databases Security.
- Determine the Security Models and Security Mechanisms.
- Use the Security Software Design Operating System.
- Determine the Statistical Database Protection & Intrusion Detection Systems.
- Analyze the Models For The Protection Of New Generation Database Systems -1.
- Analyze the performance of the Protection of Active Databases Conclusions.

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

Introduction

Introduction to Databases Security Problems in Databases Security Controls Conclusions.

Security Models -1

Introduction Access Matrix Model Take-Grant Model Acten Model PN Model Hartson and Hsiao's Model Fernandez's Model Bussolati and Martella's Model for Distributed databases.

Module-II	Security Models -2	9Hrs

Security Models -2

Bell and La Padula's Model Biba's Model Dion's Model Sea View Model Jajodia and Sandhu's Model The Lattice Model for the Flow Control conclusion.

Security Mechanisms

Introduction User Identification/Authentication Memory Protection Resource Protection Control Flow Mechanisms Isolation Security Functionalities in Some Operating Systems Trusted Computer System Evaluation Criteria.

Module-III	Security Software Design	10Hrs

Security Software Design

Introduction A Methodological Approach to Security Software Design Secure Operating System Design Secure DBMS Design Security Packages Database Security Design.

Module-IV	Statistical Database Protection & Intrusion Detection Systems	9Hrs

Statistical Database Protection & Intrusion Detection Systems

Introduction Statistics Concepts and Definitions Types of Attacks Inference Controls evaluation Criteria for Control Comparison .Introduction IDES System RETISS System ASES System Discovery.

Module-V	Models For The Protection Of New Generation Database Systems	10Hrs

Models For The Protection Of New Generation Database Systems -1

Introduction A Model for the Protection of Frame Based Systems A Model for the Protection of Object Oriented Systems SORION Model for the Protection of Object-Oriented Databases

Models For The Protection Of New Generation Database Systems -2

A Model for the Protection of New Generation Database Systems: the Orion Model Jajodia and Kogan's Model A Model for the Protection of Active Databases Conclusions

Text Book:

1. Database Security and Auditing, Hassan A. Afyouni, India Edition, CENGAGE Learning 2009.
2. Database Security, Castano, Second edition, Pearson Education

Reference Books:

1.Database security by alfred basta, melissa zgola, CENGAGE learning

Web References:

https://www.youtube.com/watch?v=c3YaDqvSDrQ

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FULL STACK WEB DEVELOPMENT

(Common **to CSE, AI&ML, CS, DS**)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0536c	**3:0:0:0**	**3**	**CIE:30 SEE:70**	**3 Hours**	**PEC**

Course Objectives:

This course will enable students to:

- To become knowledgeable about the most recent web development technologies.
- Idea for creating two tier and three tier architectural web applications.
- Design and analyze real time web applications.
- Constructing suitable client and server-side applications.
- To learn core concept of both front end and back end programming.

Course Outcomes(CO):

On completion of this course, student will be able to

- Summarize the knowledge on front end and back-end Tools
- Understand the REACT JS
- Develop a fully functioning website on a web server
- Use code packages based on their documentation to produce working results in a project.
- Construct web pages functioning from external data.
- Implement web application that employing efficient database access.

Syllabus		Total Hours:48
Module-I	**Web Development Basics**	**10Hrs**
Web Development Basics: Web development Basics - HTML & Web servers Shell - UNIX CLI Version control - Git &GitHub HTML, CSS		
Module-II	**Frontend Development**	**9Hrs**
Frontend Development: JavaScript basics OOPS Aspects of JavaScript Memory usage and Functions in JS AJAX for data exchange with server jQuery Framework jQuery events, UI components etc. JSON data format.		
Module-III	**REACT JS**	**10Hrs**
REACT JS: Introduction to React, React Router and Single Page Applications React Forms, Flow Architecture and Introduction to Redux More Redux and Client-Server Communication.		
Module-IV	**Architecture Requirements and Designing**	**9Hrs**
Java Web Development: JAVA PROGRAMMING BASICS, Model View Controller (MVC) Pattern, MVC Architecture using Spring REST fulAPI using Spring Frame work, Building an application usingMaven		
Module-V	**Databases & Deployment**	**10Hrs**

Databases & Deployment: Relational schemas and normalization Structured Query Language (SQL) Data persistence using Spring JDBC Agile development principles.

Text Books:

1. Web Design with HTML, CSS, JavaScript and JQuery Set Book by Jon Duckett Professional JavaScript for Web Developers Book by Nicholas C. Zakas
2. Learning PHP, MySQL, JavaScript, CSS & HTML5: A Step-by Step Guide to Creating Dynamic Websites by Robin Nixon

Reference Books:

1. Full Stack JavaScript: Learn Backbone.js, Node.js and MongoDB. Copyright © 2015 BYAZAT MARDAN
2. Full-Stack JavaScript Development by Eric Bush.
3. Mastering Full Stack React Web Development Paperback – April 28, 2017 by TomaszDyl , Kamil Przeorski , Maciej Czarnecki

Web References:

https://www.udemy.com/course/the-complete-web-development-2020

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SMART GRID
(Common **to CSE, AI&ML, CS, DS, ECE, EEE, ME**)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0241Ta	3:0:0:0	3	CIE:30 SEE:70	3 Hours	OEC

Course Objectives:

Student will be able to

- Overview of the technologies required for the smart grid
- Switching techniques and different means for data communication
- Standards for information exchange and smart metering
- Methods used for information security on smart grid
- Smart metering and protocols for smart metering
- Power quality management with upgraded technologies.

Course Outcomes(CO):

On completion of this course, student will be able to

- Understand the concepts and design of Smart grid.
- Understand the various communication technologies in smart grid.
- Understand the various measurement technologies in smart grid.
- Understand the analysis and stability of smart grid.
- Learn the renewable energy resources and storages integrated with smart grid.
- familiarize the high performance computing for Smart Grid applications

Syllabus		Total Hours: 48
Module-I	**INTRODUCTION TO SMART GRID**	**10 Hrs**
Evolution of Electric Grid, Concept, Definitions and Need for Smart Grid, Smart grid drivers, functions, opportunities, challenges and benefits, Difference between conventional & Smart Grid, Concept of Resilient &Self-Healing Grid, Present development & International policies in Smart Grid, Diverse perspectives from experts and global Smart Grid initiatives		
Module-II	**SMART GRID TECHNOLOGIES**	**8 Hrs**
Technology Drivers, Smart energy resources, Smart substations, Substation Automation, Feeder Automation ,Transmission systems: EMS, FACTS and HVDC, Wide area monitoring, Protection and control, Distribution systems: DMS, Volt/VAR control, Fault Detection, Isolation and service restoration, Outage management, High Efficiency Distribution Transformers, Phase Shifting Transformers, Plug in Hybrid Electric Vehicles (PHEV).		
Module–III	**SMART METERS**	**10 Hrs**
Introduction to Smart Meters, Advanced Metering infrastructure (AMI) drivers and benefits, AMI protocols, standards and initiatives, AMI needs in the smart grid, Phasor Measurement Unit(PMU), Intelligent Electronic Devices(IED) & their application for monitoring & protection.		
Module-IV	**POWER QUALITY MANAGEMENT IN SMART GRID**	**10 Hrs**

Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit.

Module–V	**HIGH PERFORMANCE COMPUTING**	**10 Hrs**

Local Area Network (LAN), House Area Network (HAN), Wide Area Network (WAN),Broadband over Power line (BPL), IP based Protocols, Basics of Web Service and CLOUD Computing to make Smart Grids smarter, Cyber Security for Smart Grid.

Textbooks:

1. Smart Grid, JanakaEkanayake, Liyanage, Wu, Akihiko Yokoyama, Jenkins, Wiley Publications, 2012, Reprint 2015.
2. Smart Grid: Fundamentals of Design and Analysis, James Momoh, Wiley, IEEE Press., 2012, Reprint 2016.

Reference Books:

1. The Smart Grid – Enabling Energy efficiency and demand response, Clark W. Gellings, P.E., CRC Press, Taylor & Francis group, First Indian Reprint. 2015.
2. Smart Grid – Applications, Communications, and Security Edited by Lars Torsten Berger, Krzysztof Iniewski, WILEY, 2012, Reprint 2015.
3. Practical Electrical Network Automation and Communication Systems, Cobus Strauss, ELSVIER, 2003

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3rd Mile, Bombay Highway, Gangavaram (V), Kovur(M), SPSR Nellore (Dt), Andhra Pradesh, India- 524137

Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

BASIC VLSI DESIGN

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

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0432T	3:0:0	3	CIE:30 SEE:70	3 Hours	OEC

Course Objectives:

- To give exposure to different steps involved in fabrication Process of PMOS & NMOS transistors, CMOS & BICOM Inverters.
- To provide knowledge on electrical properties of MOS & BICMOS devices to analyze the behavior of inverters designed with various loads.
- To provide knowledge on Basic Circuit Concepts of VLSI Design
- To apply the design Rules and draw layout of a given logic circuit and basic circuit concepts to MOS circuits.
- To Apply the design for testability methods for combinational & sequential CMOS circuits

Course Outcomes:

After the completion of the course students will able to:

- Acquire qualitative knowledge about the fabrication process of integrated circuit using MOS transistors.
- Understand the concept of Basic Electrical Properties of MOS/Bi-CMOS Devices
- Apply the basic circuit concepts to MOS circuits.
- Understand the concept of Scaling of MOS circuits and Limitations of Scaling
- Apply the design Rules to draw the Stick diagram &layout of a given logic circuit.
- Interpret the need for testability and testing methods in VLSI.

Syllabus		**Total Hours: 48**
Module–I:	**Introduction to Fabrication Process**	**10 Hrs**

Introduction: Brief Introduction to IC technology, Moore's Law, Different modes MOSFET operation, Fabrication Process of PMOS, NMOS, CMOS & Bi-CMOS devices, Comparison between CMOS and Bi-polar Technologies.

Fabrication Steps: Wafer Preparation, Oxidation, Photolithography, Etching, Ion Implantations, Metallization, Testing.

Module– II	**Basic Electrical Properties of MOS/BiCMOS devices**	**10 Hrs**

Basic Electrical Properties: Ids Vs Vds relationships, MOS transistor Threshold Voltage-VT, figure of merit-ω0, Transconductance - gm, Output conductance-gds, Pass transistor logic, NMOS Inverter, Pull-up to Pull-down Ratio for NMOS inverter driven by another NMOS inverter, and through one or more pass transistors Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

Module– III	**Basic Circuit Concepts**	**9 Hrs**

Basic Circuit Concepts: Sheet Resistance Rs and concepts to MOS, Area Capacitances calculations, Inverter Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and fan-out

Module– IV	**VLSI Circuit Design Processes**	**10 Hrs**

VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, Lambda(λ)-based design rules for wires, contacts and Transistors, Layout Diagrams for NMOS and CMOS Inverters Logic Gates and Various MOS Circuits. Scaling of MOS circuits, Limitations of Scaling.

Module– V	**CMOS Testing**	**9 Hrs**

CAD Tools for Design and Simulation, Aspects of Design Tools, Design for Testability, Testing Combinational Logic, Testing Sequential Logic, Practical Design for Test (OFT) Guidelines, Scan Design Techniques, Built-In-Self-Test (BIST), Future Trends.

Text Books:

1. Kamran Eshraghian, "Essentials of VLSI Circuits and Systems", Douglas and A. Pucknell and SholehEshraghian, Prentice-Hall of India Private Limited, 2005 Edition.
2. Behzad Razavi , "Design of Analog CMOS Integrated Circuits", McGraw Hill, 2003

References Books:

1. Modern VLSI Design – Wayne Wolf, 3 Ed., 1997, Pearson Education.
2. Jan M. Rabaey, "Digital Integrated Circuits", AnanthaChandrakasan and Borivoje Nikolic, Prentice-Hall of India Pvt.Ltd, 2nd edition, 2009.
3. John P. Uyemura, "Introduction to VLSI Circuits and Systems", John Wiley & Sons, reprint 2009
4. CMOS VLSI Design-A Circuits and Systems Perspective, Neil H.E Weste, David Harris, Ayan Banerjee, 3rd Edn, Pearson, 2009.

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Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

DISASTERMANAGEMENT

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

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0151T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	OEC

Course Objectives:

- Develop an understanding of why and how the modern disaster manager is involved with pre-disaster and post-disaster activities.
- Develop an awareness of the chronological phases of natural disaster response and refugee relief operations
- Describe the three planning strategies useful in mitigation
- Describe public awareness and economic incentive possibilities
- Understand the tools of post-disaster management

Course Outcomes:

On completion of this course, student will be able to

- To know about the natural hazards and its management
- To know about the fire hazards and solid waste management
- To understand about the emerging infectious diseases and aids their management
- To know about the regulations of building codes and land use planning related to risk and vulnerability.
- To impart the education related to risk reduction in schools and communities

Syllabus		Total Hours: 48
Module-I	**NATURAL HAZARDS AND DISASTER MANAGEMENT**	**9 Hrs**

Introduction of DM – Inter disciplinary -nature of the subject– Disaster Management cycle – Five priorities for action. Case study methods of the following: floods, draughts – Earthquakes – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast – landslides

Module-II	MAN MADE DISASTER	9 Hrs

Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrotirism - threat in mega cities, rail and air craft's accidents, and Emerging infectious diseases & Aids and their management.

Module–III	RISK AND VULNERABILITY	10 Hrs

Building codes and land use planning – social vulnerability – environmental vulnerability – Macroeconomic management and sustainable development, climate change risk rendition – financial management of disaster – related losses.

Module –IV	ROLE OF TECHNOLOGY IN DISASTER MANAGEMENTS	10 Hrs

Disaster management for infra structures, taxonomy of infra structure – treatment plants and process facilities-electrical substations roads and bridges- mitigation program for earth quakes –flowchart, geospatial information in agriculture drought assessment-multimedia technology in disaster risk

management and training- transformable indigenous knowledge in disaster reduction.

Module–V	EDUCATION AND COMMUNITY PREPAREDNESS	10 Hrs

Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery -Community based disaster management and social capital-Designing resilience- building community capacity for action.

Text Books:

1. Rajib shah & R R Krishnamurthy "Disaster Management" – Global Challenges and Local Solutions' Universities press. (2009),
2. Tushar Bhattacharya, "Disaster Science & Management" Tata McGraw Hill Education Pvt. Ltd., New Delhi

Reference Books:

1. Harsh. K . Gupta "Disaster Management edited", Universities press, 2003.

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Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

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

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0327Tc	3:0:0:0	3	CIE:30 SEE:70	3 Hours	OEC

Course Objectives:

- To instruct the principles of interchangeable manufacture.
- To introduce basic principles of mechanical measurements.
- To impart knowledge on mechatronics systems.

Course Outcomes:

Upon successful completion of the course, the students will be able to

- design the limit gauges for interchangeable manufacture.
- apply the basic principles of mechanical measurements for engineering practice.
- illustrate the role of mechatronics systems in manufacturing.
- explain principles of mechanical, hydraulic, pneumatic and electrical actuating systems.

Syllabus		Total Hours: 48
Module-I	**Limtis & Fits**	**10 Hrs**

Introduction, terminology pertaining to limits and fits – unilateral and bilateral tolerance system, hole and shaft basis systems – Interchangeability, deterministic & statistical tolerance, selective assembly. International Standard system of limits and fits

Limit Gauges: Taylor's principle – Classification and design of limit gauges.

Module-II	**Linear and Angular Measurements**	**10Hrs**

Line and end standards, slip gauges and length bars. bevel protractor – angle slip gauges – spirit levels and auto collimator.

Interferometry Applied to Measurement: NPL flatness interferometer and NPL gauge interferometer.

Surface Roughness Measurement: Differences between surface roughness and surface waviness- Numerical assessment of surface finish – CLA, R.M.S, Rz values, Methods of measurement of surface finish – Profilograph, Talysurf

Module-III	**Mechanical Measurements**	**10Hrs**

Introduction to measurement: Elements of generalized measurement system
Displacement Measurement- Linear Variable Differential Transformer (LVDT), encoders, potentiometers.
Temperature Measurement - Pyrometers, Resistance Temperature Detector (RTD)
Strain Measurement-Electrical strain gauge – gauge factor method of usage of resistance strain gauge

Module-IV	**Mechatronics Systems**	**10 Hrs**

Mechatronics systems- Elements of mechatronics system, mechatronics design process, system - measurement systems, control systems, programmable logic controllers, case studies of mechatronic systems

Module-V	**Actuating Systems:**	**8Hrs**

Hydraulic and pneumatic actuating systems - fluid systems, hydraulic systems, and pneumatic systems, components, control valves. mechanical actuating systems and electrical actuating systems – basic principles and elements.

Textbooks:

1. R.K. Jain, "Engineering Metrology", Khanna Publishers.
2. BeckWith, Marangoni, Linehard, " Mechanical Measurements", 6th edition,PHI / PE.

ReferenceBooks:

1. W. Bolton , "Mechatronics – Electronic Control Systems in Mechanical and Electrical Engg.", 4th Edition, Pearson, 2012.
2. IC Guptha,"Engineering Metrology ",Danpath Rai Publications.
3. Doeblin Earnest. O. Adaptation by Manik and Dhanesh,"Measurement Systems: Application and Design", Tata Mc Graw Hill Publications.

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Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

ELECTRIC VEHICLES
(Common to CSE, AI&ML, CS, DS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0232Ta	3:0:0:0	3	CIE:30 SEE:70	3 Hours	OEC

Course Objectives:

- Understand to Provide good foundation on hybrid and electrical vehicles.
- Understand To address the underlying concepts and methods behind power transmission in hybrid and electrical vehicles
- Familiarize energy storage systems for electrical and hybrid transportation
- Design and develop basic schemes of electric vehicles and hybrid electric vehicles.

Course Outcomes (CO):

On completion of this course, student will be able to

- Understand the working of hybrid and electric vehicles
- Apply a suitable drive scheme for developing an hybrid and electric vehicles depending on resources
- Develop the electric propulsion unit and its control for application of electric vehicles.
- Understand the proper energy storage systems for vehicle applications
- Design and develop basic schemes of electric vehicles and hybrid electric vehicles

Syllabus		Total Hours:50
Module–I	**Electric Vehicle Propulsion and Energy Sources**	**10 Hrs**

Introduction to electric vehicles, vehicle mechanics - kinetics and dynamics, roadway fundamentals propulsion system design - force velocity characteristics, calculation of tractive power and energy required, electric vehicle power source - battery capacity, state of charge and discharge, specific energy, specific power, Ragone plot. battery modeling - run time battery model, first principle model, battery management system- soc measurement, battery cell balancing. Traction batteries - nickel metal hydride battery, Li-Ion, Lipolymer battery.

Module–II	**Electric Vehicle Power Plant and Drives**	**10Hrs**

Introduction electric vehicle power plants. Induction machines, permanent magnet machines, switch reluctance machines. Power electronic converters-DC/DC converters - buck boost converter, isolated DC/DC converter. Two quadrant chopper and switching modes. AC drives PWM, current control method. Switch reluctance machine drives - voltage control, current control.

Module–III	**Hybrid And Electric Drive Trains**	**9 Hrs**

Introduction hybrid electric vehicles, history and social importance, impact of modern drive trains in energy supplies. Hybrid traction and electric traction. Hybrid and electric drive train topologies. Power flow control and energy efficiency analysis, configuration and control of DC motor drives and induction motor drives, permanent magnet motor drives, switch reluctance motor drives, drive system efficiency.

Module–IV	**Electric and Hybrid Vehicles - Case Studies**	**9 Hrs**

Parallel hybrid, series hybrid -charge sustaining, charge depleting. Hybrid vehicle case study – Toyota Prius, Honda Insight, Chevrolet Volt. 42 V system for traction applications.

Lightly hybridized vehicles and low voltage systems. Electric vehicle case study - GM EV1, Nissan Leaf, Mitsubishi Miev. Hybrid electric heavy-duty vehicles, fuel cell heavy duty vehicles.

Module–V	Electric And Hybrid Vehicle Design	10 Hrs

Introduction to hybrid vehicle design. Matching the electric machine and the internal combustion engine. Sizing of propulsion motor, power electronics, drive system. Selection of energy storage technology, communications, supporting subsystem. Energy management strategies in hybrid and electric vehicles - energy management strategies- classification, comparison, implementation.

Text Books:

1. Iqbal Hussein, "Electric and Hybrid Vehicles: Design Fundamentals", 2nd edition, CRC Press, 2003.
2. Amir Khajepour, M. Saber Fallah, Avesta Goodarzi, "Electric and Hybrid Vehicles: Technologies, Modeling and Control - A Mechatronic Approach", illustrated edition, John Wiley & Sons, 2014.

Reference Books:

1. Mehrdad Ehsani, YimiGao, Sebastian E. Gay, Ali Emadi, "Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design", CRC Press, 2004.
2. James Larminie, John Lowry, "Electric Vehicle Technology", Explained, Wiley, 2003.
3. John G. Hayes, G. Abas Goodarzi, "Electric Powertrain: Energy Systems, Power Electronics and Drives for Hybrid, Electric and Fuel Cell Vehicles", 1st edition, WileyBlackwell, 2018.

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3rd Mile, Bombay Highway, Gangavaram (V), Kovur(M), SPSR Nellore (Dt), Andhra Pradesh, India- 524137
Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

INDUSTRIAL ELECTRONICS
(Common to EEE,CSE, AI&ML, CS, DS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0433T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	OEC

Course Objectives:

This course will enable students to:

- Describe semi-conductor devices (such as PN junction diode & Transistor) and their switching characteristics.
- Understand the characteristics of AC to DC converters.
- Understand about the practical applications Electronics in industries.
- Describe the ultrasonic and its application.

Course Outcomes (CO):

On completion of this course, student will be able to

- Understand the semi-conductor devices and their switching characteristics.
- Apply the Ultrasonic waves with different applications.
- Understand the working of Transistor and its different configurations.
- Analyze the thermal effects of ultrasonic, soldering and welding by ultrasonic, ultrasonic Drying in the industry; interpret the characteristics of AC to DC converters.
- Develop the practical applications Electronics in industries.
- Apply the process of Resistance welding, Induction heating and Dielectric heating in the industry.

Syllabus		Total Hours:48
Module-I	**Scope of industrial Electronics**	**10 Hrs**

Scope of industrial Electronics, Semiconductors, Merits of semiconductors, crystalline structure, Intrinsic semiconductors, Extrinsic semiconductors, current flow in semiconductor, Open circuited p-n junction, Diode resistance, Zener diode, Photo conductors and junction photo diodes, Photo voltaic effect, Light emitting diodes(LED).

Module-II	**Junction Transistor**	**9 Hrs**

Introduction, The junction transistor, Conventions for polarities of voltages and currents, Open circuited transistor, Transistor biased in the active region, Current components in transistors, Currents in a transistor, Emitter efficiency, Transport factor and transistor-α, Dynamic emitter resistance, Transistor as an amplifier, Transistor construction, Letter symbols for semiconductor Devices, Characteristic curves of junction transistor in common configuration, static characteristic curves of PNP junction transistor in common emitter configuration, The transistor in common collector Configuration.

Module-III	**AC to DC converters**	**10 Hrs**

AC to DC converters- Introduction, Classification of Rectifiers, Half wave Rectifiers, Full wave Rectifiers, Comparison of Half wave and full wave rectifiers, Bridge Rectifiers, Bridge Rectifier meter, Voltage multiplying Rectifier circuits, Capacitor filter, LC Filter, Metal Rectifiers, Regulated Power Supplies, Classification of Voltage Regulators, Short period Accuracy of Regulators, Long period .Accuracy of Voltage Regulator, Principle of automatic voltage Regulator,

Simple D.C. Voltage stabilizer using Zener diode, D.C. Voltage Regulators, Series Voltage Regulators, Complete series voltage regulator circuit, Simple series voltage regulator.

Module-IV	Resistance welding controls	10 Hrs

Resistance welding controls: Introduction, Resistance welding process, Basic Circuit for A.C. resistance welding, Types of Resistance welding, electronic welding control used in Resistance welding, Energy storage welding. Induction heating: Principle of induction heating, Theory of Induction heating merits of induction heating, Application of induction heating, High frequency power source of induction heating. Dielectric heating: Principle of dielectric heating, theory of dielectric heating, dielectric properties of typical materials, electrodes used in dielectric heating, method of coupling of electrodes to the R.F. generator, Thermal losses in Dielectric heating, Applications.

Module-V	Ultrasonics	9 Hrs

Ultrasonics: Introduction, Generation of Ultrasonic waves, Application of Ultrasonic waves, Ultrasonic stroboscope, ultrasonic as means of communication, ultrasonic flaw detection, Optical image on non-homogeneities, ultrasonic study of structure of matter, Dispersive study of structure of matter, Dispersive and colloidal effect of Ultrasonic, Coagulating action of Ultrasonic, separation of mixtures by ultrasonic waves, cutting and machining of hard materials by ultrasonic vibrations, Degassing of liquids by ultrasonic waves, Physio-chemical effects of ultrasonics, chemical effects of ultrasonics, Thermal effects of ultrasonics, soldering and welding by ultrasonics, Ultrasonic Drying

Text Books:

1. Fundamentals of Industrial Electronics, Bogdan M Wilamowski, J David irwin, 2nd Edition, 2011.
2. Industrial and Power Electronics – G. K. Mithal and Maneesha Gupta, Khanna Publishers, 19th Ed., 2003.

References:

1. Integrated Electronics – J. Millman and C.C Halkias, McGraw Hill, 1972.
2. Electronic Devices and circuits – Theodore. H. Bogart, Pearson Education, 6thEdn., 2003.
3. Integrated Circuits and Semiconductor Devices – Deboo and Burroughs, ISE

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Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

CONSTRUCTION MANAGEMENT
(Common to ME, CSE, AI&ML, CS, DS, ECE, EEE)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0152T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	OEC

Course Objectives:

This course will enable students to:

- To make the student familiar with various construction activities, preparing construction schedule and maintaining documents and records of those activities
- To teach the students about various terms and technologies involved in earthwork of construction activities
- To make the students familiar with concepts involved in project management like bar charts and milestone charts
- To teach the students the concepts of time estimates involved in CPM and PERT , float and slack, critical path calculations

Course Outcomes (CO):

On completion of this course, student will be able to

- Identify the various construction activities like preparing construction schedule and maintaining documents and records of those activities
- Understand the concepts and techniques involved in earthwork activities
- To understand about the emerging infectious diseases and aids their management
- Understand the steps involved in developing a project scheduling and management and the application of bar charts and milestone charts.
- Understand the various elements of a network diagram like event, activity and dummy.
- Understand the concepts of calculation of time estimates of CPM and PERT

Syllabus		Total Hours:48
Module-I	**FUNDAMENTALS OF CONSTRUCTION TECHNOLOGY**	**9 Hrs**

Definitions and Discussion – Construction Activities –Construction Processes -Construction Works – Construction Estimating – Construction Schedule – Productivity and Mechanized Construction – Construction Documents – Construction Records – Quality – Safety – Codes and Regulations.

Module-II	**EARTHWORK**	**9 Hrs**

Classification of Soils – Project Site – Development – Setting Out - Mechanized Excavation – Groundwater Control – Trenchless (No-dig) Technology – Grading – Dredging.Rock Excavation – Basic Mechanics of Breakage – Blasting Theory – Drillability of Rocks – Kinds of Drilling – Selection of the Drilling Method and Equipment – Explosives – Blasting Patterns and Firing Sequence – Smooth Blasting – Environmental Effect of Blasting

Module-III	**PROJECT MANAGEMENT AND BAR CHARTS AND MILESTONE CHARTS**	**10 Hrs**

Project planning – Scheduling – Controlling – Role of decision in project management – Techniques for analyzing alternatives Operation research – Methods of planning and programming problems – Development of bar chart – Illustrative examples – Shortcomings of bar charts and remedial

measures – Milestone charts

Module-IV	ELEMENTS OF NETWORK AND DEVELOPMENT OF NETWORK	10 Hrs

Introduction – Event – Activity – Dummy – Network rules – Graphical guidelines for network – Common partial situations in network – Numbering the events – Cycles Problems.

Module-V	PERT AND CPM	10Hrs

Time estimates – Frequency distribution – Mean, variance and standard deviation-Expected time Problems -Earliest expected time – Formulation for TE - Latest allowable occurrence time – Formulation for TL - Combined tabular computations for TE and TL problems.Introduction - Slack – Critical path-Illustrative examples Problems.

Text Books:

1. Construction project management by Jha ,Pearsonpublications, New Delhi 2nd Edition 2015
2. Construction Technology by SubirK.Sarkar and SubhajitSaraswati – Oxford Higher EducationUniv.Press, Delhi 2008 edition

Reference Books:

1. Project Planning and Control with PERT and CPM by Dr.B.C.Punmia, K.K.Khandelwal, Lakshmi Publications New Delhi 2022 editionDelhi
2. Optimal design of water distribution networks P.R.Bhave, Narosa Publishing house 2003.
3. Total Project management, the Indian context- by : P.K.JOY- Mac Millan Publishers India Limited.

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Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

INTRODUCTION TO ROBOTICS
(Common to EEE,CSE, AI&ML, CS, DS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0331Tc	3:0:0:0	3	CIE:30 SEE:70	3 Hours	OEC

Course Objectives:

The objectives of this course are Identify robots and its peripherals for satisfactory operation and control of robots for industrial and non-industrial applications.

Course Outcomes (CO):

After the completion of the course students will able to

- List and explain the basic elements of industrial robots
- Analyze robot kinematics and its control methods.
- Classify the various sensors used in robots for better performance.
- Summarize various industrial and non-industrial applications of robots

Syllabus		Total Hours:48
Module-I	**ROBOT BASICS**	**10 Hrs**

Automation and Robotics: Robot-Basic concepts, Need, Law, History, Anatomy, specifications. Robot configurations-cartesian, cylinder, polar and articulate. Robot wrist mechanism, Precision, accuracy, repeatability, work and volume of robot.

Module-II	**ROBOT ELEMENTS**	**10 Hrs**

End effectors-Classification- Types of Mechanical actuation, Gripper design, Robot drive system Types, Position and velocity feedback devices-Robot joints and links-Types, Motion interpolation

Module-III	**ROBOT KINEMATICS AND CONTROL**	**9 Hrs**

Robot kinematics – Basics of direct and inverse kinematics, Robot trajectories, 2D and 3D Transformation-Scaling, Rotation, Translation Homogeneous transformation. Control of robot manipulators – Point to point, Continuous Path Control, Robot programming

Module-IV	**ROBOT SENSORS**	**9 Hrs**

Sensors in robot – Touch sensors -Tactile sensor – Proximity and range sensors. Force sensor-Light sensors, Pressure sensors, Introduction to Machine Vision and Artificial Intelligence.

Module-V	**ROBOT APPLICATIONS**	**10 Hrs**

Industrial applications of robots-Medical, Household, Entertainment, Space, Underwater, Defense, Disaster management. Applications, Micro and Nanorobots, Future Applications.

Text Books:

1. Mikell P. Groover, Mitchell Weiss, Roger N Nagel, Nicholas G Odrey, “Industrial Robotics Technology,
2. Programming and Applications”, Tata –McGraw Hill Pub. Co., 2008.

Reference Books:

1. Deb.S.R and Sankha Deb, "Robotics Technology and Flexible Automation", Tata McGraw Hill Publishing Company Limited, 2010.
2. Klafter.R.D, Chmielewski.T.A, and Noggin’s., “Robot Engineering: An Integrated Approach”’, Prentice Hall of India Pvt. Ltd., 1994.
3. Fu.K.S, Gonzalez.R.C&Lee.C.S.G, “Robotics control, sensing, vision and intelligence”, Tata-McGraw Hill Pub. Co., 2008
4. Yu. “Industrial Robotics”, MIR Publishers Moscow, 1985

Web References:

https://onlinecourses.nptel.ac.in/noc20_de11/preview

https://onlinecourses.nptel.ac.in/noc22_de11/preview

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3rd Mile, Bombay Highway, Gangavaram (V), Kovur(M), SPSR Nellore (Dt), Andhra Pradesh, India- 524137
Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

R PROGRAMMING (SKILL)
(Common to CSE, AIML, DS,CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0525	1:0:2:0	2	CIE:30 SEE:70	3 Hours	SC

Course Objectives:

This course will enable students to:

- HowtomanipulatedatawithinRandtocreatesimplegraphsandchartsusedinintroductorystatistics.
- The given data using different distribution functionsin R.
- The hypothesis testing and calculate confidence intervals; perform linear regression models for data analysis.
- The relevance and import ance ofthe theory in solving practical problems in the real world.

Course Outcomes (CO):

On completion of this course, student will be able to

- Install anduse Rforsimpleprogrammingtasks.
- Extend the functionality of Rbyusing add-on packages
- Extractdatafromfilesandothersourcesandperformvariousdatamanipulationtasksonthem.
- Explore statistical functionsin R.
- UseRGraphicsandTablestovisualizeresultsofvariousstatisticaloperationsondata.
- Apply the knowledge of Rgained to data Analytics forreal-life applications

Syllabus | **Total Hours:48**

LIST of EXPERIMENTS:

List of Experiments

Module -1:Installation of R – studio procedure.

Experiment-1 Installation of R-Programming Environment.

Module-2:R basic syntax ,Data types, variables and Reserve words.

Experiment-2 Implementation of Data types, variables and Reserved words.

Module-3: Operators ,R statements ,loops and R functions

Experiment-3 Implementation of operators, statements, Loops and functions.

Module-4: R – objects :Vector,List,Array.

Experiment-4 Implementation of objects**:** Vector, List, Array.

Module-5: Array and implementation of array Concept.

Experiment-5: Write a R program to combine three arrays so that the first row of the first array is followed by the first row of the second array and then first row of the third array.

Module-6: R objects and manipulation on R objects : Data frame, Matrix, Factors.

Experiment-6: Implementation of objects**:** Data frame, Matrix, Factors.

Module - 7: Data frame concept and implementation of data frame using simple programs.
Experiment-7 Write a R program to create a data frame using two given vectors and display the duplicated elements and unique rows.

Module - 8:Data sets - introduction and data sets for performing manipulations.
Experiment-8 Collect the Data sets for Performing Mathematical operations.

Module-9:Learn about the Data Visualization using R:visualization packages in R.
Experiment-9 Implementation of Data Visualization using R: visualization packages in R, Pie Charts, Bar Charts, Box Plots, Histograms, Line Graphs, Scatter Plots.

Module-10: Dataset and Statistical Analysis.
Experiment-10 Collect Dataset and Perform Statistical Analysis.

Module-11: Data visualization.
Experiment-11 Collect Dataset and Perform data visualization.

Text Books:

1. Beginning R, the statistical programming language by Dr Mark Gardener.

Reference Books:

1. "R Programming for Beginners: Fast and Easy Learning" by Steven Keller, Kindle Edition.
2. "A Handbook of Statistical Analyses Using R" by Brian Everitt and TorstenHothorn.
3. "R Graphics Cookbook" by Winston Chang.

Web References:

1. https://www.rstudio.com/
2. https://www.w3schools.com/
3. https://www.r-project.org/

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SECURE SOFTWARE ENGINEERING
(Common to CSE, AIML, CS, DS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A05H01a	3:1:0:0	4	CIE: 30 SEE:70	3 Hours	Honours

Course Objectives:

This course will enable students to:

- Design and implementation of secure software.
- Demonstrate about the characteristics and best security programming practices.
- Specify Desired Security Properties for web and mobile applications.

Course Outcomes (CO):

On completion of this course, student will be able to

- Explain the Properties of Secure Software and Specify Desired Security Properties.
- Incorporate requirements into secured software development process
- Apply secure design principles for developing attack resistant software
- Analyze the Security and complexity of system drivers.
- Examine features of Governance and Security and Maturity of Practice

Syllabus		Total Hours:48
Module-I	**Security a software Issue**	**10 Hrs**
Introduction, the problem, Software Assurance and Software Security, Threats to software security, Sources of software insecurity, Benefits of Detecting Software Security What Makes Software Secure: Properties of Secure Software, Influencing the security properties of software, Asserting and specifying the desired security properties.		
Module-II	**Requirements Engineering for secure software**	**10 Hrs**
Introduction, the SQUARE process Model, Requirements elicitation and prioritization.		
Module-III	**Secure Software Architecture and Design**	**10 Hrs**
Introduction, software security practices for architecture and design: architectural risk analysis, software security knowledge for architecture and design: security principles, security guidelines and attack patterns Secure coding and Testing: Code analysis, Software Security testing, Security testing considerations throughput the SDLC.		
Module-IV	**Security and Complexity**	**9 Hrs**
System Assembly Challenges: introduction, security failures, functional and attacker perspectives for security analysis, system complexity drivers and security.		
Module-V	**Governance and Managing for More Secure Software**	**9 Hrs**
Governance and security, adopting an enterprise software security framework, How much security is enough, Security and project management, Maturity of Practice.		

Text Books:

1. Software Security Engineering: A Guide for Project Managers, Julia H. Allen, Sean Barnum, Robert J. Ellison, Gary McGraw, Nancy R. Mead, Addison- Wesley Professional

Reference Books:

1. Howard , M and Lipner,S : The Security Development Lifecycle , Microsoft Press, 2006
2. Swiderski, F and Snyder W. :, Threat Modeling, Microsoft Press, 2004.
3. Viega, J and MCGraw G., : Building Secure Software: How to avoid Security Problems in the Right Way, Addison-Wesley,2001

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AGILE SOFTWARE DEVELOPMENT APROACHES
(Common to CSE, AI&ML, DS, CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A05H01b	3: 1:0:0	4	CIE: 30 SEE:70	3 Hours	Honours

Course Objectives:

- Organize Agile Software Development, Extreme Programming and Software Development Rhythms.
- Describe their unique features relative to traditional software practices.
- Examine their applications in the real world and addresses their impacts on developing software.
- An awareness of current research in software development, the analytical skills and research techniques for their critical and independent evaluation and their application to new problems.

Course Outcomes (CO):

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

- Summarize the agile methodologies: extreme programming, scrum, and feature driven programming.
- Apply The Twelve XP Practices and Illustrate pair programming and its characteristics.
- Apply XP to a small project.
- Examine Feature-Driven Development and Regaining Control
- Outline Agile Modeling and RUP.
- Apply the various tools available to Agile Development to facilitate the project.

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

Introduction: Agile Methods, Agile Manifesto, and Agile Modeling Introduction, What Is Agile, The Agile Manifesto, Agile Methods, XP: Extreme Programming, DSDM, SCRUM, Feature-Driven Development, Modeling Misconceptions, Agile Modeling, Tools of Misconceptions, Updating Agile Models

Module-II	**Extreme Programming**	**9 Hrs**

Extreme Programming: Introduction, Core XP Values, The Twelve XP Practices, About Extreme Programming, Planning XP Projects, Test First Coding, Making Pair Programming Work.

Module-III	**Agile Modeling and XP**	**9Hrs**

Agile Modeling and XP: Introduction, The Fit, Common Practices, Modeling Specific Practices, XP Objections to Agile Modeling, Agile Modeling and Planning XP Projects, XP Implementation Phase.

Module-IV	**Feature-Driven Development**	**9 Hrs**

Feature-Driven Development: Introduction, Incremental Software Development, Regaining Control: The Motivation behind FDD, Planning Iterative Project, Architecture Centric, FDD and XP.

Module-V	**Agile Methods with RUP and PRINCE2 and Tools and Obstacles**	**10Hrs**

Agile Methods with RUP and PRINCE2 and Tools and Obstacles: Agile Modeling and RUP, FDD and RUP, Agile Methods and Prince2, Tools to Help with Agile Development, Eclipse: An Agile IDE, Obstacles to Agile Software Development, Management Intransigence, The Failed Project Syndrome, Contractual Difficulties, Familiarity with Agility.

Text Books:

1. Agile software construction,1/e,John hunt, springer, 2005
2. Agile and Iterative Development: a manager's guide, Addison-Wesley Craig Larman, [Pearson Education] - 2004.

Reference Books:

1. The Art of Agile Development, Pearson, Robert C. Martin, Juli, James Shore, Chromatic, 2013, O'Reilly Media.
2. Agile Testing, Elisabeth Hendrickson, Quality Tree Software Inc 2008.

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Introduction to IOT
(Common to CSE, AI&ML, DS, CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A05H02a	3: 1:0:0	4	CIE: 30 SEE:70	3 Hours	Honours

Course Objectives:

Introduce the fundamental concepts of IoT and physical computing, Expose the student to a variety of embedded boards and IoT Platform, Create a basic understanding of the communication protocols in IoT communications. Familiarize the student with application program interfaces for IoT and Enable students to create simple IoT applications.

Course Outcomes (COS):

After completion of the course, students will be able to:

- Understand the Basic sensors and actuators for an IoT application.
- Select protocols for a specific IoT application.
- Utilize the cloud platform and APIs for IoT applications.
- Experiment with embedded boards for creating IoT prototypes.
- Design a solution for a given IoT application.
- Able to understand the application areas of IOT.

Syllabus		Total Hours:48
Module- I	**Overview of IoT**	**12 Hrs**

The Internet of Things: An Overview, The Flavor of the Internet of Things, the "Internet" of "Things", The Technology of the Internet of Things, Enchanted Objects, who is Making the Internet of Things?

Design Principles for Connected Devices: Calm and Ambient Technology, Privacy, Web Thinking for Connected Devices, Affordances.

Prototyping: Sketching, Familiarity, Costs Vs Ease of Prototyping, Prototypes and Production, Open-source Vs Close source, Tapping into the community

Module-II	Embedded Devices	9 Hrs

Electronics, Embedded Computing Basics, Arduino, Raspberry Pi, Mobile phones and tablets, Plug Computing: Always-on Internet of Things

Module-III	Communication in the IoT	9 Hrs

Internet Communications: An Overview, IP Addresses, MAC Addresses, TCP and UDP Ports, Application Layer Protocols

Prototyping Online Components:
Getting Started with an API, Writing a New API, Real-Time Reactions, Other Protocols Protocol

Module-IV	Business Models	9 Hrs

Business Models: A short history of business models, the business model canvas, Who is the business model for, Models, Funding an Internet of Things startup, Lean Startups.

Manufacturing: What are you producing, designing kits, Designing printed circuit boards**.**

Module-V	Manufacturing Process	9 Hrs

Manufacturing continued: Manufacturing printed circuit boards, Mass-producing the case and other fixtures, Certification, Costs, Scaling up software.

Ethics: Characterizing the Internet of Things, Privacy, Control, Environment, Solutions

Textbooks:

1. Adrian McEwen, Hakim Cassimally - Designing the Internet of Things, Wiley Publications, 2012

Reference Books:

1. Arshdeep Bahga, Vijay Madisetti - Internet of Things: A Hands-On Approach, Universities Press, 2014.
2. The Internet of Things, Enabling technologies and use cases – Pethuru Raj, Anupama C. Raman, CRC Press.

Online Learning Resources:

1. https://www.arduino.cc/
2. https://www.raspberrypi.org/

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

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A05H02b	3: 1:0:0	4	CIE: 30 SEE:70	3 Hours	Honors

Course Objectives:

- To understand the Fundamental Concepts of vision
- To understand the filtering and image filtering operations
- To understand basic principles of Thresholding.
- To teach the importance of edge detection in computer vision
- To understand the broad concepts of texture

Course Outcomes (COS):

After completion of the course, students will be able to:

- Understand vision and its concepts(L1)
- Understand the concepts of image filtering (L2).
- Use the Thresholding techniques in image conversion (L3)
- Use image edge detection for smoothing (L2)
- Understand the use of texture in image processing (L2).

Syllabus		Total Hours:48
Module-I	**Vision, the Challenge**	**9Hrs**

Vision, the Challenge: Introduction, The Nature of Vision- The Process of Recognition, Tackling the Recognition Problem, Object Location, Scene Analysis, Vision as Inverse Graphics

Module-II	Imaging and Image Filtering Operations	10 Hrs

Images and Imaging Operations: Introduction, Image Processing Operations, Convolutions and Point Spread Functions. Sequential Versus Parallel Operations.

Basic Image Filtering Operations: Introduction, Noise Suppression by Gaussian Smoothing, Median Filters, Mode Filters, Rank Order Filters, Shifts Introduced by Median Filters, Discrete Model of Median Shifts

Module-III	Thresholding Techniques	9Hrs

Thresholding Techniques: Introduction, Region-Growing Methods, Thresholding, Adaptive Thresholding, More Thoroughgoing Approaches to Threshold Selection, The Global Valley Approach to Thresholding, Practical Results Obtained Using the Global Valley Method.

Module-IV	Edge Detection	10 Hrs

Edge detection: Introduction, Basic Theory of Edge Detection, The Template Matching Approach, Theory of 3 3 3 Template Operators, The Design of Differential Gradient Operators, The Concept of a Circular Operator, Detailed Implementation of Circular Operators, 0 Hysteresis Thresholding, The Canny Operator, The Laplacian Operator, Practical Results Obtained Using Active Contour

Module-V	Texture and Binary Shape Analysis	10 Hrs

Texture: Some Basic Approaches to Texture Analysis, Gray level Co-occurrence Matrices, Laws' Texture Energy Approach, Ade's Eigen filter Approach, Appraisal of the Laws and Ade Approaches

Binary Shape Analysis: Connectedness in Binary Images, Size Filtering, Distance Functions and Their Uses.

Text Books:

1. E. R. DAVIES, Machine Vision: Theory, Algorithms, Practicalities Fourth Edition

Reference Books:

1. David A. Forsyth and Jean Ponce: Computer Vision – A Modern Approach, PHI Learning (Indian Edition), 2009.
2. R. C. Gonzalez and R. E. Woods "Digital Image Processing" Addison Wesley 2008.
3. Richard Szeliski "Computer Vision: Algorithms and Applications" Springer-Verlag London Limited 2011.

E-resources:

1. https://onlinecourses.nptel.ac.in/noc19_cs58/preview

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VISUAL BASIC PROGRAMMING
(Common to CSE, AI&ML, DS, CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A05H03a	3: 1:0:0	4	CIE: 30 SEE:70	3 Hours	Honors

Course Objectives:

- To introduce the fundamental concepts of object-oriented programming to design & implement object-oriented programming concepts in Visual Programming.
- To learn Graphical User Interface Language.
- To develop an application using GUI Language.
- Implement VB programs to solve simple problems.
- Learn the usage of Control structures, Creating Menus and MDI Forms in Visual programming.

Course Outcomes (COS):

After completion of the course, students will be able to:

- Understand the basic concepts of OOP
- Compare & Contrast basic constructs of OOP & POP
- Design & Develop a Forms in Visual programming
- Apply Control statements to solve real time problems
- Analyze the concepts of forms and its controls, Properties of Tool Box
- Implementing Menus & MDI Forms in Visual programming

Syllabus		Total Hours:48
Module-I	**Fundamentals of Visual Programming**	**9Hrs**

Object Oriented Programming: Introduction to OOPS – Basic Concepts – Objects and Classes – Concepts of Inheritance, Encapsulation and Polymorphism.

Fundamentals Of Visual Programming: Introduction to Visual programming– Examples of Visual Programming - Applications of Visual Programming language- Advantages of visual programming language- Disadvantages of visual programming language

Module-II	Fundamentals of Visual Basic	10 Hrs

Fundamentals Of Visual Basic: Features of VB – VB Editions – Controls – Properties – Events – Methods.

Application Window: The Project Explorer window – the Properties Window -Tool Box: Text box control- Command Button – Check Box-Menu Bar -Tool Bars – Tool Box – Project Explorer Window – Properties Window – Object Browser – Form Designer – Code Editor Window – Form Layout Window

Module-III	Forms and Controls	9Hrs

Forms and Controls:
Setting Form Properties – Working with Properties Window – Name – Caption – Picture – The Control Box – Min Button and Max Button – Movable – Border Style - Font Properties

Form Methods – Move, Graphic Methods – Show Method

Form Events – Working with a Control – Opening the Code Window

Module-IV	Variables in VB, Arrays	10 Hrs
Variables In Vb: Declaring Variables – Data Types – Constants – Conversion – Operators **Arrays:** Definition, One Dimensional & Two-Dimensional Arrays, Declaring Array, Storing Values in An Array, Control Arrays. **Writing Code in VB:** The Code Window – Subroutine – control structures in VB – Performing Loops in VB.		
Module-V	**Menus, Multi Document Interface**	**10 Hrs**
Menus: Menu Conventions – Creating Menus in VB. Menu Editor **Multiple Document Interface:** Features of MDI form–Property– Creating MDI Forms.		

Text Books:

1. Programming with Visual Basic Mohammed Azam-Vikas publishing house Pvt.Ltd.New Delhi. Mastering Visual Basic 6 by Evangelos Perroutosos (BPB Publications)
2. Gary Cornell - Visual Basic 6 from the Ground up - Tata McGraw Hill

E-resources:

1. https://www.tutlane.com/tutorial/visual-basic
2. https://www.vbtutor.net/lesson1.html
3. https://www.geeksforgeeks.org/introduction-to-visual-programming-language/

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NETWORK MANAGEMENT SYSTEMS
(Common to CSE, AI&ML, DS, CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A05H03b	3: 1:0:0	4	CIE: 30 SEE:70	3 Hours	Honors

Course Objectives:

- Describe the introduction concepts of Network Management System platform, Current Status and Future of Network Management.
- Implement network management standards to manage practical networks
- Identify different approaches for managing OSI network model.
- Illustrate SNMP and RMON for monitoring the behavior of the network
- Describe different types of Broad band access networks
- Identify Network Management Applications

Course Outcomes (COS):

After completion of the course, students will be able to:

- Analyze the issues and challenges pertaining to management of emerging network technologies such as wired/wireless networks and high-speed internets.
- Apply network management standards to manage practical networks
- Formulate possible approaches for managing OSI network model.
- Infer SNMP for managing the network
- Infer RMON for monitoring the behavior of the network
- Identify the various components of network and formulate the scheme for the managing them.

Syllabus		Total Hours:48
Module-I	**Introduction**	**9 Hrs**

Introduction: Analogy of Telephone Network Management, Data and Telecommunication Network Distributed computing Environments, TCP/IP Based Networks: The Internet and Intranets, Communications Protocols and Standards- Communication Architectures, Protocol Layers and Services; The Importance of topology , Filtering Does Not Reduce Load on Node, Some Common Network Problems; Challenges of Information Technology Managers, Network Management: Goals, Organization, and Functions- Goal of Network Management, Network Provisioning, Network Operations and the NOC, Network Installation and Maintenance; Network and System Management, Network Management System platform, Current Status and Future of Network Management.

Module-II	Basic Foundations	9 Hrs

Basic Foundations: Standards, Models, and Language: Network Management Standards, Network Management Model, Organization Model, Information Model – Management Information Trees, Communication Model; ASN.1- Terminology, Symbols, and Conventions, Objects and Data Types, Object Names, An Example of ASN.1 from ISO 8824; Encoding Structure; Macros, Functional Model.

Module-III	SNMPv1 Network Management	10 Hrs

SNMPv1 Network Management: Managed Network: The SNMP Model, The Organization Model, The Information Model – Introduction, The Structure of Management Information, Managed Objects, Management Information Base. The SNMP Communication Model – The SNMP Architecture, Administrative Model, SNMP Specifications, SNMP Operations, Functional Model SNMP Management – RMON: Remote Monitoring, RMON SMI and MIB, RMONI1- RMON1 Textual Conventions, RMON1 Groups and Functions, Relationship Between Control and Data Tables, RMON1 Common and Ethernet Groups, RMON Token Ring Extension Groups, RMON2 – The RMON2 Management Information Base, RMON2 Conformance Specifications.

Module-IV	Broadband Access Networks	10 Hrs

Broadband Access Networks: Broadband Access Technology; HFCT Technology: The Broadband LAN, The Cable Modem, The Cable Modem Termination System, The HFC Plant, The RF Spectrum for Cable Modem; Data Over Cable, Reference Architecture; HFC Management – Cable Modem and CMTS Management, HFC Link Management, RF Spectrum Management, DSL Technology; Asymmetric Digital Subscriber Line Technology – Role of the ADSL Access Network in an Overall Network, ADSL Architecture, ADSL Channeling Schemes, ADSL Encoding Schemes; ADSL Management – ADSL Network Management Elements, ADSL Configuration Management, ADSL Fault Management, ADSL Performance Management,.

Module-V	Network Management Applications	10Hrs

Network Management Applications: Configuration Management- Network Provisioning, Inventory Management, Network Topology, Fault Management- Fault Detection, Performance Management – Performance Metrics, Data Monitoring, Performance Statistics; Event Correlation Techniques – Rule-Based Reasoning, State Transition Graph Model, Finite State Machine Model, Security Management – Policies and Procedures, Security Breaches and the Resources Needed to Prevent Them, Firewalls, Cryptography, Authentication and Authorization, Client/Server Authentication Systems, Report Management,

Text Books:

1. Simon Haykin, “Neural Networks: A comprehensive foundation”, Second Edition, Pearson Education Asia.
2. Satish Kumar, “Neural Networks: A classroom approach”, Tata McGraw Hill, 2004.

Reference Books:

1. Robert J. Schalkoff, “Artificial Neural Networks”, McGraw-Hill International Editions, 1997.

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ARTIFICIAL NEURAL NETWORKS

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

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A05H04a	3: 1:0:0	4	CIE: 30 SEE:70	3 Hours	Honors

Course Objectives:

The course introduces perceptrons, discusses its capabilities and limitations as a pattern classifier and later develops concepts of multilayer perceptrons with back propagation learning

Course Outcomes (COS):

After completion of the course, students will be able to:

- Understand the role of neural networks in engineering, artificial intelligence, and cognitive modeling.
- Analyze the Mathematical foundations &Learning Mechanisms in neural networks
- Classify single layer perceptrons by using neural networks
- Design Multi-layer feed forward networks in neural networks.
- Apply various Radial basis function networks in neural networks.
- Provide hands-on experience in selected applications

Syllabus		Total Hours:48
Module-I	**Introduction and ANN Structure**	**9 Hrs**

Introduction and ANN Structure: Biological neurons and artificial neurons. Model of an ANN. Activation functions used in ANNs. Typical classes of network architectures.

Module-II	Mathematical Foundations and Learning mechanisms	9 Hrs

Mathematical Foundations and Learning mechanisms: Re-visiting vector and matrix algebra. State-space concepts. Concepts of optimization. Error-correction learning. Memory-based learning. Hebbian learning. Competitive learning.

Module-III	Single layer perceptrons	10 Hrs

Single layer perceptrons: Structure and learning of perceptrons. Pattern classifier – introduction and Bayes' classifiers. Perceptron as a pattern classifier. Perceptron convergence. Limitations of a perceptrons.

Module-IV	Feed forward ANN	10 Hrs

Feed forward ANN: Structures of Multi-layer feed forward networks. Back propagation algorithm. Back propagation – training and convergence. Functional approximation with back propagation. Practical and design issues of back propagation learning.

Module-V	Radial Basis Function Networks:	10 Hrs

Radial Basis Function Networks: Pattern separability and interpolation. Regularization Theory. Regularization and RBF networks. RBF network design and training. Approximation properties of RBF.

Text Books:

1. E. R. DAVIES, Machine Vision: Theory, Algorithms, Practicalities Fourth Edition

Reference Books:

1. David A. Forsyth and Jean Ponce: Computer Vision – A Modern Approach, PHI Learning (Indian Edition), 2009.
2. R. C. Gonzalez and R. E. Woods "Digital Image Processing" Addison Wesley 2008.
3. Richard Szeliski "Computer Vision: Algorithms and Applications" Springer-Verlag London Limited 2011.

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3rd Mile, Bombay Highway, Gangavaram (V), Kovur(M), SPSR Nellore (Dt), Andhra Pradesh, India- 524137
Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

DISTRIBUTED SYSTEMS
(Common to CSE, AI&ML, DS, CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A05H04b	3: 1:0:0	4	CIE: 30 SEE:70	3 Hours	Honors

Course Objectives:

- To learn the principles, architectures, algorithms and programming models used in distributed systems.
- To examine state-of-the-art distributed systems, such as Google File System.
- To design and implement sample distributed systems.

Course Outcomes (COS):

After completion of the course, students will be able to:

CO1: Understand the basic concepts of Distributed Systems, Architectural and Fundamental Models.
CO2: Analyze the distributed debugging concepts and multicast communication and its related problems.
CO3: Choose proper APIs for Internet protocols and client server communication and its marshalling.
CO4: Construct the basic architecture of a distributed file system and its name services.
CO5: Analyze the transaction modes and concurrency control in distributed transactions.
CO6: Identify the common deadlocks in transaction recovery while processing.

Syllabus		Total Hours:48
Module-I	**Characterization of Distributed Systems, System Models**	**9 Hrs**

Characterization of Distributed Systems: Introduction, Examples of Distributed systems, Resource sharing and web, challenges.

System Models: Introduction, Architectural and Fundamental models.

Module-II	**Time and Global States, Agreemen**	**9 Hrs**

Time and Global States: Introduction, Clocks, Events and Process states, Synchronizing physical clocks, Logical time and Logical clocks, Global states, Distributed Debugging.

Coordination and Agreement: Introduction, Distributed mutual exclusion, Elections, Multicast Communication, Consensus and Related problems.

Module-III	**Inter Process Communication, Distributed Objects and Remote Invocation**	**10 Hrs**

Inter Process Communication: Introduction, The API for the internet protocols, External Data Representation and Marshalling, Client-Server Communication, Group Communication, Case Study: IPC in UNIX.

Distributed Objects and Remote Invocation: Introduction, Communication between Distributed Objects, Remote Procedure Call, Events and Notifications, Case study-Java RMI.

Module-IV	Distributed File Systems, Name Services, Distributed Shared Memory	10 Hrs

Distributed File Systems: Introduction, File service Architecture, Case Study1: Sun Network File System, Case Study 2: The Andrew File System.

Name Services: Introduction, Name Services and the Domain Name System, Directory Services, Case study of the Global Name Service.

Distributed Shared Memory: Introduction Design and Implementation issues, Sequential consistency and Ivy case study, Release consistency and Munin case study, other consistency models.

Module-V	Transactions and Concurrency Control, Distributed Transactions	10Hrs

Transactions and Concurrency Control: Introduction, Transactions, Nested Transactions, Locks, Optimistic concurrency control, Timestamp ordering, Comparison of methods for concurrency control.

Distributed Transactions: Introduction, Flat and Nested Distributed Transactions, Atomic commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery

Text Books:

1. Distributed Systems, Concepts and Design, George Coulouris, J Dollimore and Tim Kindberg, Pearson Education, 4th Edition,2009.

Reference Books:

1. Distributed Systems, Principles and paradigms, Andrew S.Tanenbaum, Maarten Van Steen, Second Edition, PHI.
2. Distributed Systems, An Algorithm Approach, Sikumar Ghosh, Chapman & Hall/CRC, Taylor & Fransis Group, 2007.

E-resources:

1. https://nptel.ac.in/courses
2. https://freevideolectures.com/university/iitm

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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
22A05M01a	3: 1:0:0	4	CIE:30 SEE:70	3 Hours	Minors

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:

3. Carl Hamacher, Zvonko Vranesic, SafwatZaky, "Computer Organization", 5th Edition, McGraw Hill Education, 2013.
4. M.Morris Mano, RajibMall, "Computer System Architecture", Revised Third Edition, Pearson Education India.

Reference Books:

3. Themes and Variations, Alan Clements, "Computer Organization and Architecture", CENGAGE Learning.
4. 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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OPERATING SYSTEMS
(Common to CSE, AI&ML, DS, CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A05M01b	3: 1:0:0	4	CIE:30 SEE:70	3 Hours	Minors

Course Objectives:

This course will enable students to:

- Choose different Scheduling Algorithms.
- Solve Classic problems of synchronization.
- Apply various memory management techniques.
- Analyzing disk management functions and techniques.
- Implement files and directories.
- Analyze the Protection and Security mechanisms.

Course Outcomes (CO):

On completion of this course, student will be able to

- Illustrate the overall view of operating system structure. (L3)
- Analyze process scheduling algorithms and Synchronization methods. (L4)
- Solve Deadlock problems using various synchronization techniques. (L3)
- Apply memory management techniques in the design of operating systems (L3).
- Identify efficient file allocation methods for optimal disk utilization. (L3).
- Analyze Security and Protection Mechanism in Operating System (L4).

Syllabus		Total Hours:48
Module-I	**Operating Systems Overview and Structures**	**10 Hrs**
Introduction, Operating System Operations, Types of Operating Systems, functions of Operating Systems, Operating System Services, System Calls, System Programs, Operating System Structure.		
Module-II	**Process Management and Synchronization**	**10 Hrs**
Process Management: Process Concepts, Process Scheduling, Operations on Processes, Inter-process Communication, Thread Models, Implementing Threads in User Space and the Kernel **Process Synchronization:** Critical - Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization.		
Module-III	**Deadlocks and Memory Management**	**10 Hrs**
Deadlocks: System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Deadlock Detection, Recovery from Deadlock. **Memory Management**: Introduction, Swapping, Contiguous memory allocation, Paging, Segmentation, Virtual Memory Management, Page-Replacement Algorithms, Thrashing, Kernel memory allocation.		
Module-IV	**Mass – Storage Structure and File Systems**	**9Hrs**

Mass – Storage Structure: Disk Structure, Disk Scheduling, RAID Structure.

File Systems: Files, Directory, File System Structure, File- System Implementation, Directory Implementation.

Module-V	System Protection, System Security	9 Hrs

System Protection: Goals of protection, Principles and domain of protection, Access matrix, Access control, Revocation of access rights.

System Security: Introduction, Program threats, System and network threats.

Text Books:

3. Silberschatz A, Galvin P B, and Gagne G, Operating System Concepts, 9th edition, Wiley, 2016.
4. Tanenbaum A S, Modern Operating Systems, 3rd edition, Pearson Education, 2008. (Topics: Distributed Systems)

Reference Books:

5. Tanenbaum A S, Woodhull A S, Operating Systems Design and Implementation, 3rd edition, PHI, 2006.
6. Dhamdhere D M, Operating Systems A Concept Based Approach, 3rd edition, Tata McGraw Hill, 2012.
7. Stallings W, Operating Systems -Internals and Design Principles, 6th edition, Pearson Education, 2009.
8. Nutt G, Operating Systems, 3rd edition, Pearson Education, 2004.

Web References:

3. https://nptel.ac.in/courses/106/106/106106144/
4. http://peterindia.net/OperatingSystems.html

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ADVANCED JAVA PROGRAMMING
(Common to CSE, AI&ML, DS, CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A05M01c	3: 1:0:0	4	CIE:30 SEE:70	3 Hours	Minors

Course Objectives:

This course will enable students to:

- To provide knowledge on console, GUI and Web based applications.
- To understand the java technologies for multi-tier enterprise application development.
- To practice applications development on Integrated Development Environment.
- To perform operations on database using Hibernate Query lnaguage.
- To examine the working principles of real time enterprise applications.
- To develop the enterprise applications with cross platform capabilities.

Course Outcomes (CO):

On completion of this course, student will be able to

- Implement simple Web Applications and networking API.
- Develop database applications using JDBC.
- Understand the dynamic request and response model using Servlets
- Design enterprise application using Java Server Pages (JSP)
- Implement Web applications using java server faces and struts
- Develop applications using Hibernate and Spring Frameworks

Syllabus		Total Hours:48
Module-I	**Introduction to J2EE and Networking**	**10 Hrs**

Java Enterprise Edition: Java Platform, J2EE Architecture Types, Explore Java EE Containers, Types of Servers in J2EE Application, HTTP Protocols and API, Request Processing in Web Application, Web Application Structure, Web Containers and Web Architecture Models.

Java Networking: Network Basics and Socket overview, TCP/IP client sockets, URL,TCP/IP server sockets, Data grams, java.net package Socket, ServerSocket, InetAddress, URL, URL Connection

Module-II	JDBC Programming	9 Hrs

The JDBC Connectivity Model, Database Programming: Connecting to the Database, Creating a SQL Query, Getting the Results, Updating Database Data, Error Checking and the SQLException Class, The SQLWarning Class, The Statement Interface, PreparedStatement, CallableStatement The ResultSet Interface, Updatable Result Sets, JDBC Types, Executing SQL Queries, ResultSetMetaData, Executing SQL Updates, Transaction Management.

Module-III	Servlet API and Overview	9 Hrs

Servlet Model: Overview of Servlet, Servlet Life Cycle, HTTP Methods Structure and Deployment descriptor Servlet Context and Servlet Config interface, Attributes in Servelt Request Dispacher interface The Filter API: Filter, Filter Chain. Using the Generic Servlet Class

Filter Config Cookies and Session Management: Understanding state and session, Understanding Session Timeout and Session Tracking, URL Rewriting.

Module-IV	Java Server Pages	10 Hrs

JSP Overview: The Problem with Servlets, Life Cycle of JSP Page, JSP Processing, JSP Application Design with MVC, Setting Up the JSP Environment JSP Directives, JSP Action, JSP Implicit Objects JSP Form Processing, JSP Session and Cookies Handling.

JSP with DATABASES: JSP Session Tracking JSP Database Access, JSP Standard Tag Libraries, JSP Custom Tag, JSP Expression Language, JSP Exception Handling, JSP XML Processing.

Module-V	Java Server Faces and struts	10 Hrs

Java Server Faces :Introduction to JSF, JSF request processing Life cycle, JSF Expression Language, JSF Standard Component, JSF Facelets Tag, JSF Convertor Tag, JSF Validation Tag, JSF Event Handling and Database Access.

Struts Framework: Basics & Architecture – Request Handling Life Cycle - Building a simple struts– Configuration, Actions, Interceptors, Results, Struts2 Tag Libraries,Struts2 XML based Validations - Database Access

Text Books:

1. Black Book " Java server programming" J2EE, 1st ed., Dream Tech Publishers, 2008. 3. Kathy walrath
2. Complete Reference J2EE by James Keogh mcgraw publication
3. Professional Java Server Programming by SubrahmanyamAllamaraju, Cedric Buest Wiley Publication

Reference Books:

1. SCWCD, Matthew Scarpino, HanumantDeshmukh, JigneshMalavie, Manning publication
2. Core Java, Volume II: Advanced Features by Cay Horstmann and Gary Cornell Pearson Publication
3. Java Persistence with Hibernate by Christian Bauer, Gavin King
4. Spring in Action 3rdedition , Craig walls, Manning Publication
5. Hibernate 2nd edition, Jeff Linwood and Dave Minter, Beginning Après publication
6. Java Server Faces in Action, Kito D. Mann, Manning Publication
7. JDBC™ API Tutorial and Reference, Third Edition, Maydene Fisher, Jon Ellis, Jonathan Bruce, Addison Wesley.
8. Beginning JSP, JSF andTomcat, Giulio Zambon, Apress.
9. JSF2.0 CookBook, Anghel Leonard, PACKT publication

E-resources:

1. https://www.computerscienceonline.org/learn-java/
2. https://docs.oracle.com/javase/tutorial/
3. https://www.tutorialspoint.com/servlets/
4. https://www.tutorialspoint.com/hibernate/index.htm
5. https://www.geeksforgeeks.org/java/

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DESIGN AND ANALYSIS OFALGORITHMS
(Common to CSE, AI&ML, DS, CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A05M02a	3: 1:0:0	4	CIE:30 SEE:70	3 Hours	Minors

Course Objectives:

This course will enable students :

- To demonstrate the importance of algorithms in computing.
- To explain the analysis of algorithms
- To illustrate the method of finding the complexity of algorithms
- To explain the advanced algorithm design and analysis techniques.
- To introduce special classes of algorithms NP – completeness and the classes P and NP

Course Outcomes(CO):

On completion of this course, student will be able to

- To interpret the basic concepts of algorithms, Time complexity, Space complexity, Divide and conquer method, Greedy method, dynamic programming, Back tracking, Branch and Bound, NP-Hard and NP-Complete problems (Remember/Understand)
- To apply Divide and Conquer method and Greedy Method to different problems and compute their time complexity (Apply)
- To apply Dynamic Programming method to different problems (Apply)
- To apply Backtracking method to different real-world problems (Apply)
- To apply branch and bound to different problems (Apply)
- To apply NP-hard and Np-Complete concepts for different problems (Apply)

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

Introduction:
What is an Algorithm? , Algorithm Specification , Performance Analysis: Space complexity, Time complexity, **Asymptotic Notations:** Big-Oh notation (O), Omega notation (Ω), Theta notation (Θ), Mathematical analysis of Non-Recursive and recursive Algorithms with Examples.

Module-II	Divide and conquer & Greedy Method	9Hrs

Divide and conquer: General method, Applications-Finding Maximum and minimum, Selection, binary search, quick sort, Strassen's matrix multiplication.

Greedy Method: General method, Applications-job sequencing with deadlines, Fractional knapsack problem, minimum cost spanning trees, Single source shortest path problem.

Module-III	Dynamic Programming	10Hrs
Dynamic Programming: General method, The Principle of Optimality, Applications- 0/1 knapsack problem, All pairs shortest path problem, Travelling salesperson problem, Optimal Binary Search Tree, Reliability design, Matrix chain multiplication.		
Module-IV	**Backtracking**	**9Hrs**
Backtracking: General method, N-Queens problem, Sum of subsets problem , Graph coloring , Hamiltonian cycles. **Branch and Bound**: General method, applications - travelling sales person problem, 0/1 knapsack problem- LC branch and bound solution, FIFO branch and bound solution.		
Module-V	**NP-Complete and NP-Hard problems**	**10Hrs**
NP-Complete and NP-Hard problems: Basic concepts: deterministic and non deterministic algorithms, Tractable and Intractable Problems , Complexity Classes: P, NP, NP-Hard and NP-Complete		

Text Books:

2. Fundamentals of Computer Algorithms, Ellis Horowitz, Sartaj Sahni and Rajasekharam, Galgotia publications Pvt. Ltd.

Reference Books:

1. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein, 3rd Edition, PHI.
2. Design and Analysis of Algorithms , S. Sridhar, Oxford (Higher Education).
3. Introduction to the Design and Analysis of Algorithms, Anany Levitin:, 2rd Edition, 2009. Pearson.
4. Design and Analysis of Computer Algorithms by Aho, Hopcraft, Ullman 1998, PEA.
5. Introduction to the Design and Analysis of Algorithms by Goodman, Hedetniemi, TMG.

Web References:

1. https://onlinecourses.nptel.ac.in/noc19_cs47/preview
2. https://nptel.ac.in/courses/106106131

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

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A05M02b	3: 1:0:0	4	CIE:30 SEE:70	3 Hours	Minors

Course Objectives:

This course will enable students :

- Determine the basic concepts of Computer Networks.
- Determine the layered approach for design of computer networks
- Distinguish OSI and TCP/IP reference models
- Predict the network path used in Internet environment
- Use the format of headers of IP, TCP and UDP
- Illustrate the concepts of application layer, network security fundamentals.

Course Outcomes(CO):

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

- Use the software and hardware components of a computer network (L3)
- Apply the reference model of a computer network(L3)
- Solve the error correction and detection in existing protocols(L3)
- Predict path for routing, and congestion control algorithms(L3)
- Determine the functionality of TCP and UDP(L3)
- Use the appropriate application layer applications(L3)

Syllabus		Total Hours:48
Module-I	**The Internet and the Reference Models**	**10Hrs**

Introduction: Computer Network, Network Topologies, types of networks, Reference models- The OSI Reference Model the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models.

Physical Layer –Introduction to physical layer, Guided Media- Twisted-pair cable, Coaxial cable, Fiber optic cable, Unguided media: Wireless-Radio waves, microwaves, infrared..

Module-II	The Data Link Layer	9Hrs

The Data Link Layer :Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols

Module-III	The Network Layer	10Hrs

The Network Layer: Network Layer design issues, Routing algorithms, Congestion control and Internetworking, Network layer in internet.

Module-IV	Transport Layer	9Hrs

Transport Layer: Transport layer services, service primitives, Elements of transport protocols**,** The Internet Transport Protocols: TCP/IP, UDP.

Module-V	**The Application Layer and Network security**	**10Hrs**

The Application Layer : DNS, SMTP, FTP, Email and security, network security.

Text Books:

2. Andrew S.Tanenbaum, David j.wetherall, Computer Networks, 5th Edition, PEARSON.
5. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach", 6th edition, Pearson, 2019.

Reference Books:

3. Forouzan, Datacommunications and Networking, 5th Edition, McGraw Hill Publication.
4. Youlu Zheng, Shakil Akthar, "Networks for Computer Scientists and Engineers", Oxford Publishers, 2016.

Web Resources:

- https://nptel.ac.in/courses/106105183/25
- http://www.nptelvideos.in/2012/11/computer-networks.html
- https://nptel.ac.in/courses/106105183/3

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FULL STACK WEB DEVELOPMENT
(Common **to CSE, AI&ML, CS, DS**)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0536c	3:1:0:0	3	CIE: 30 SEE:70	3 Hours	PEC

Course Objectives:

This course will enable students to:

- To become knowledgeable about the most recent web development technologies.
- Idea for creating two tier and three tier architectural web applications.
- Design and analyze real time web applications.
- Constructing suitable client and server-side applications.
- To learn core concept of both front end and back end programming.

Course Outcomes(CO):

On completion of this course, student will be able to

- Summarize the knowledge on front end and back-end Tools
- Develop a fully functioning website on a web server.
- Use code packages based on their documentation to produce working results in a project.
- Construct web pages functioning from external data.
- Implement web application that employing efficient database access.

Syllabus		Total Hours:48
Module-I	**Web Development Basics**	**10Hrs**
Web Development Basics: Web development Basics - HTML & Web servers Shell - UNIX CLI Version control - Git &GitHub HTML, CSS		
Module-II	**Frontend Development**	**9Hrs**
Frontend Development: JavaScript basics OOPS Aspects of JavaScript Memory usage and Functions in JS AJAX for data exchange with server jQuery Framework jQuery events, UI components etc. JSON data format.		
Module-III	**REACT JS**	**10Hrs**
REACT JS: Introduction to React, React Router and Single Page Applications React Forms, Flow Architecture and Introduction to Redux More Redux and Client-Server Communication.		
Module-IV	**Architecture Requirements and Designing**	**9Hrs**
Java Web Development: JAVA PROGRAMMING BASICS, Model View Controller (MVC) Pattern, MVC Architecture using Spring RESTful API using Spring Framework, Building an application using Maven		

Module-V	Databases & Deployment	10Hrs
Databases & Deployment: Relational schemas and normalization Structured Query Language (SQL) Data persistence using Spring JDBC Agile development principles.		

Text Books:

3. Web Design with HTML, CSS, JavaScript and JQuery Set Book by Jon Duckett Professional JavaScript for Web Developers Book by Nicholas C. Zakas
4. Learning PHP, MySQL, JavaScript, CSS & HTML5: A Step-byStep Guide to Creating Dynamic Websites by Robin Nixon

Reference Books:

1. Full Stack JavaScript: Learn Backbone.js, Node.js and MongoDB. Copyright © 2015 BYAZAT MARDAN
2. Full-Stack JavaScript Development by Eric Bush.
3. Mastering Full Stack React Web Development Paperback – April 28, 2017 by TomaszDyl , Kamil Przeorski , Maciej Czarnecki

Web References:

1. https://www.udemy.com/course/the-complete-web-development-2020

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OBJECT ORIENTED ANALYSIS AND DESIGN
(Common to CSE, AI&ML, DS, CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A05M03a	3:1:0:0	4	CIE: 30 SEE:70	3 Hours	Minors

Course Objectives:

This course will enable students to:

- Understand the concepts of object oriented system
- Unified approach,& Understand object oriented system development methodologies. & Demonstrate UML diagrams
- Model user interface and map object oriented system to relational system

Course Outcomes(CO):

On completion of this course, student will be able to

- Understand the concepts of object model.
- Identify the classes and vocabulary of the problem domain.
- Illustrate the importance of modeling and software development life cycle.
- Draw the class and object diagrams for various applications.
- Apply the basics of behavioral modeling to behavioral diagrams.
- Model the various components and deployment diagram for the applications.

Syllabus		Total Hours:48
Module-I	**Introduction & Asymptotic Notations**	**9Hrs**

Introduction to Object Model: Introduction to object oriented analysis and Design, Iterative development and the Unified Process (UP), UP phases: Inception, Elaboration, Construction and Transition, Object-oriented metrics, the Evaluation of Object Model, Foundation of Object Model, Elements of object Model, Applying object Model.

Module-II	Classes and Objects	10Hrs

Classes and Objects: The Nature of an Object, Relationships among Objects, The Nature of a Class, Relationships among Classes, The Interplay of Classes and Objects, The Importance of Proper Classification, Identifying Classes and Objects, Key Abstractions and Mechanisms.

Module-III	Introduction to UML	9Hrs

Introduction to UML: The importance of modeling, Principles of modeling, Object oriented modeling, why model, Conceptual model of UML, Architecture, Software Development Life Cycle.

Module-IV	Structural Modeling	10Hrs

Basic Structural Modelling: Classes, Relationships, Common Mechanisms, and diagrams, class diagrams.

Advanced Structural Modelling: Advanced classes, advanced relationships, Interfaces, Types

and Roles, Packages, Object Diagrams

Module-V	Behavioral Modeling	10Hrs

Basic Behavioral Modeling: Interactions, Interaction diagrams, use cases, Use case diagrams, Activity Diagrams, Sequence Diagrams, Collaboration and Deployment diagrams.

Advanced Behavioral Modeling: Events and signals, state machines, time and space, state chart diagrams

Text Books:

1. "Object- Oriented Analysis And Design with Applications", Grady BOOCH, Robert A. Maksimchuk, Michael W. ENGLE, Bobbi J. Young, Jim Conallen, Kellia Houston, PEARSON, 3rd edition, 2013.
2. The Unified Modeling Language User Guide", Grady Booch, James Rumbaugh, Ivar Jacobson, PEARSON 12th Impression, 2012

Reference Books:

1. "Object-oriented analysis and design using UML", Mahesh P. Matha, PHI
2. "Head first object-oriented analysis and design", Brett D. McLaughlin, Gary Pollice, Dave West, O'Reilly
3. "Object-oriented analysis and design with the Unified process", John W. Satzinger, Robert B. Jackson, Stephen D. Burd, Cengage Learning

Web Resources:

1. https://www.youtube.com/watch?v=VnVHgj6OPrQ&list=PLAXUYU7PbJhhH0iWvtyD_J2L8mv15pchq

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Unit of USHODAYA EDUCATIONAL SOCIETY
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3rd Mile, Bombay Highway, Gangavaram (V), Kovur(M), SPSR Nellore (Dt), Andhra Pradesh, India- 524137
Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

No SQL
(Common to CSE, AI&ML, DS, CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A05M03b	3:1:0:0	4	CIE: 30 SEE:70	3 Hours	Minors

Course Objectives:

- Discuss the history unstructured data
- To know non-relational databases and their importance in Data science.
- Understand the differences between Relational and No SQL databases
- To explore the several types of No SQL databases and understand the role in Big Data

Course Outcomes(CO):

On completion of this course, student will be able to

- Explain and compare different types of No SQL Databases
- Compare and contrast RDBMS with different No SQL databases.
- Demonstrate the detailed architecture and performance tune of Document-oriented No SQL databases.
- Explain performance tune of Key-Value Pair No SQL databases.
- Explain performance tune of Column-oriented and Graph No SQL databases
- Apply No sql development tools on different types of No SQL Databases.

Syllabus		Total Hours:48
Module-I	**Overview and history of No SQL Databases**	**8Hrs**

Definition of the four types of No SQL databases. The value of Relational Databases, Getting at Persistent Data, Concurrency, Integration, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The emergence of No SQL, Key Points.

Module-II	**RDBMS Vs No SQL**	**8Hrs**

Comparison of relational databases to new No SQL stores, MongoDB, Cassandra, HBASE, Neo4j use and deployment, Application, RDBMS approach, Challenges No SQL approach, Key-Value and Document Data Models, Column-Family Stores, Aggregated-Oriented Databases, Replication and Sharding, MapReduce on databases, Distribution Models, Single Server, Sharding, Master-Slave Replication, Peer-to-Peer Replication, Combining Sharding and Replication

Module-III	**Document Databases**	**8Hrs**

No-SQL Key-Value Databases using MongoDB, Document Databases, Document oriented Database Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Web Analysis or Real Time Analytics.

Module-IV	**Column Oriented Databases**	**12Hrs**

Column-oriented No SQL databases using Apache HBASE, Column-oriented No SQL databases using Apache Cassandra, Architecture of HBASE, Column-Family Data Store Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Counters, Expiring Usage.

Module-V	**Key Value Databases**	**12Hrs**

No SQL Key-Value databases using Riak, Key-Value Databases, Key-Value Store, Key-Value Store Features, Consistency, Transactions, Query Features, Consistency, Transactions, Query Features, Structure of Data, Scaling, Suitable Use Cases, Storing Session Information, User Profiles, Preferences, Shopping Cart Data, Relationships among Data, Multi operation Transactions, Query by Data, Operations by Sets, Firebase- Cloud hosted No SQL Database, Graph No SQL databases using Neo4j, No SQL database development tools and programming languages, Graph Databases features, consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases.

Text Books:

1. Sadalage, P. & Fowler, NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Wiley Publications, 1st Edition 2019.

Reference Books:

1. NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence Paperback – Illustrated, 8 August 2012 by Martin Fowler (Author), Pramod Sadalage (Author)

Web References:

1. https://www.ibm.com/cloud/learn/nosql-databases
2. https://www.coursera.org/lecture/nosql-databases/introduction-to-nosql-VdRNp
3. https://www.geeksforgeeks.org/introduction-to-nosql/
4. https://www.javatpoint.com/nosql-databa

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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	3:1:0:0	3	CIE:30 SEE:70	3 Hours	Minors

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:

3. Pressman R, "Software Engineering- Practioner Approach", McGraw Hill.
4. Somerville, "Software Engineering", Pearson 2.

Reference Books:

4. Rajib Mall, "Fundamentals of Software Engineering", 5th Edition, PHI, 2018.
5. Richard Fairley, "Software Engineering Concepts", Tata McGraw Hill.
6. Jalote Pankaj, "An integrated approach to Software Engineering", Narosa.

Web References:

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