GEETHANJALI INSTITUTE OF SCIENCE & TECHNOLOGY

Unit of USHODAYA EDUCATIONAL SOCIETY

An ISO 9001:2015 certified Institution: Recognized under Sec. 2(f)& 12(B) of UGC Act, 1956

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

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

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	22A0534Ta 22A3311Tb 22A0534Tc 22A3312Td	**Professional Elective-III:** 1. Software Project Management 2. Social Network Analysis 3. Internet of Things 4. Fog Computing	3	0	0	3
3	PEC	22A3313Ta 22A3314Tb 22A0535Tc 22A3315Td	**Professional Elective-IV:** 1. Speech Recognition and Synthesis 2. Data Science 3. Adhoc and Wireless Sensor Networks 4. Cloud Security	3	0	0	3
4	PEC	22A3316Ta 22A0534Tb 22A0536Tc 22A3317Td	**Professional Elective-V:** 1. Large language model 2. Big Data Technologies 3. Block chain Technology 4. High Performance Computing	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	22A3318P	**Skill Advanced Course:** Generative AI	1	0	2	2

Industrial / Research Internship 2 Months (Mandatory) after Third year (to be evaluated during VII semester)	0	0	0	3

	Total credits			**23**
Honors / Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)	**4**	**0**	**0**	**4**

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

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:

- Gain fundamental knowledge on Management, Administration, Organization & its concepts.
- Understand the role of management in Production
- Understand the concept of HRM in order to have an idea on Recruitment, Selection, Training & Development, job evaluation and Merit rating concepts.
- Be aware of identify Strategic Management areas & the PERT/CPM for better Project Management.
- Be 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(L2)
- Apply the knowledge of Work-study principles & Quality Control techniques in industry(L3)
- Analyze the concepts of HRM in Recruitment, Selection and Training & Development(L4)
- Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time & cost of project & to analyze the business through SWOT(L4)
- Create Modern technology in management science(L3)

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 & Staff Organization-Functional Organization-Matrix Organization-Project Organization-Committee form of Organization-Social responsibilities of Management.

Module – II	**Operations Management**	**10 Hrs**

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 Project Management	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. R. Aryasri, “Management Science”, TMH,2 013
2. Stoner, Freeman and 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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ENTREPRENEURSHIP AND INNOVATION

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

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:

- Make the student understand about Entrepreneurship
- Know various sources of generating new ideas in setting up of new enterprise
- Know various sources of finance in starting up of a business
- Impart knowledge about various government sources which provide financial assistance to entrepreneurs / women entrepreneurs
- 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	**Entrepreneurship**	**10 Hrs**
Entrepreneurship-Concept, knowledge and skills requirement-Characteristics of successful entrepreneurs-Entrepreneurship Process-Factors impacting emergence of entrepreneurship-Differences between Entrepreneur and Intrapreneur-Understanding individual entrepreneurial mind set and personality-Recent trends in Entrepreneurship.		
Module – II	**Starting Up New Venture**	**10 Hrs**
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 Finance**	**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 - theirway of financingin 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.

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BUSINESS ENVIRONMENT

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

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:

- Understand about the business environment.
- Know the importance of fiscal and monitory policy.
- Understand the export policy of the country.
- Impart knowledge about the functioning and role of WTO.
- know the structure of stock market.

Course Outcomes (CO):

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

- Understand various types of business environment(L2)
- Understand fiscal and monitory policy(L2)
- Analyze India's Trade Policy(L4)
- Understand the role of WTO(L2)
- Apply the knowledge of Money markets in future investment(L3)

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	10 Hrs

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

Course Code	L: T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0534Ta	3:0:0:0	3	CIE: 30 SEE:70	3 Hours	PEC

Course Objectives:

This course will enable students to:

- Understand 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, the students will be able to

- Describe the purpose of project management from the perspectives of planning, tracking and completion of project(L2)
- Determine the conventional software Management and Software Economics(L2)
- Use the improving software processes and modern software management(L3)
- Use the software Life Cycle Phases and artifact sets(L3)
- Determine the Iterative Process Planning and Process Automation(L3)
- Apply the quality indicators and Core Metrics(L3)

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

Reference Books:

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

E-resources:

1. https://archive.nptel.ac.in/courses/106/105/106105218/
2.

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SOCIAL NETWORK ANALYSIS

Course Code	L: T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A3311Tb	3:0:0:0	3	CIE: 30 SEE:70	3Hours	PEC

Course Objectives:

This course will enable students to:

- Understand the basic concepts of social network analysis
- Identify communities in social networks
- Perform predictive analytics in social networks

Course Outcomes (CO):

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

- Understand the basic concepts of Social Networks(L2)
- Compute different centrality measures of social network(L3)
- Detect communities in social networks(L3)
- Predict links in social networks(L3)
- Perform Social Influence Analysis(L3)

Syllabus		Total Hours:48
Module-I	**Fundamentals of Networks**	**10 Hrs**

Networks in the real world: Social networks, Information networks, Technological networks, biological networks

Mathematics of networks: Networks and their representation, Types of networks: Weighted, directed and hyper graphs, the adjacency, Laplacian, and incidence matrices, Degree, paths, components, independent paths, connectivity, and cut sets.

Module-II	Centrality measures	9 Hrs

Degree centrality, Closeness centrality, Homophily, Transitivity and Preferential attachment, Clustering coefficient and Assortative mixing, Eigenvector centrality, Katz centrality, Betweenness centrality, Page rank, Hubs and Authorities

Module-III	Community Detection in Social Networks	10 Hrs

Detecting communities in social networks, Definition of community, Applications of community detection. Algorithms for community detection: The Kernighan-Lin Algorithm, Agglomerative/Divisive Algorithms, Markov Clustering, Multi-level Graph Partitioning, Spectral Algorithms, Modularity Maximization, Other Approaches, Evaluating communities

Module-IV	Predictive Analytics in Social Networks	10 Hrs
Link prediction problem, Link prediction measures, Feature based Link Prediction, Evaluation Node classification problem Node classification: Problem definition and applications; Iterative classification methods; Label propagation method; Graph regularization method; Evaluation		
Module-V	**Current Research in Social Networks**	**9 Hrs**
Social Influence Analysis, privacy in social networks, integrating sensors and social networks, multimedia information networks in social media and social tagging and applications.		

Text Book:

1. Newman, M. E. J. (2010), "Networks: An introduction. "Oxford University Press.
2. Alexander Kouznetsov, "Social Network Analysis for Start-ups: Finding connections on the social web**",** Shroff publishers and distributors Pvt. Ltd

Reference Books:

1. Tanmay Chakraborty "Social Network analysis" Wiley
2. Newman, M. E. J. (2010). Networks: an introduction. Oxford; New York: Oxford University Press.
3. Aggarwal, C. C. (2011). An introduction to social network data analytics. In Social network data analytics (pp. 1-15). Springer, Boston, MA.
4. Barabási, A. L. (2013). Network science. Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences, 371(1987), 20120375.

Web References:

https://social-network-analysis.in/

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INTERNET OF THINGS

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

Course Code	L: T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0534Tc	3:0:0:0	3	CIE:30 SEE:70	3 Hours	PEC

Course Objectives:

This course will enable students to:

- Understand the terminology of IOT, technology and its applications
- Understand the concept of M2M (machine to machine) with necessary protocols
- Understand the Python Scripting Language which is used in many IoT devices
- Understand the Raspberry PI platform, that is widely used in IoT applications
- Understand the implementation of web based services on IoT devices

Course Outcomes (CO):

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

- Interpret the impact and challenges posed by IoT networks leading to new architectural models(L2)
- Compare and contrast the deployment of smart objects and the technologies to connect themto network(L4)
- Appraise the role of IoT protocols for efficient network communication(L2)
- Elaborate the need for Data Analytics and Security in IoT(L2)
- Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry(L2)

Syllabus		Total Hours:48 Hrs
Module-I	**Introduction to IoT**	**10 Hrs**
Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates Domain Specific IoTs – Home, City, Environment, Energy, Retail,Logistics, Agriculture, Industry, health and Lifestyle		
Module-II	**IoT and M2M**	**8 Hrs**
IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER		
Module-III	**Introduction to Python**	**10Hrs**

Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib

Module-IV	**IoT Physical Devices and Endpoints**	**10 Hrs**

IoT Physical Devices and Endpoints - Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, and reading input from pins

Module-V	**IoT Physical Servers and Cloud Offerings**	**10 Hrs**

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs Web server – Web server for IoT, Cloud for IoT, Python web application framework designing a Restful web API

Text Books:

1. Arshdeep Bahga and Vijay Madisetti, “Internet of Things - A Hands-on Approach”, UniversitiesPress, 2015.
2. Matt Richardson & Shawn Wallace, “Getting Started with Raspberry” PiO'Reilly (SPD), 2014

Reference Books:

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos,David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a NewAge of Intelligence”, 1st Edition, Academic Press, 2014.
2. Pethuru Raj,Anupama C. Raman, “The Internet of Things, Enabling technologies and use cases” CRC Press.

Web References

1. https://www.arduino.cc/
2. https://www.raspberrypi.org/

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FOG COMPUTING

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

Course Code	L: T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A3312Td	3:0:0:0	3	CIE: 30 SEE:70	3 Hours	PEC

Course Objectives:

This course will enable students to:

- Extend the students' knowledge of fog computing & edge computing
- Enhance their expertise in area of wearable computing enjoinment
- Carry out real life application of fog computing.

Course Outcomes (CO):

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

- Understand the basic concepts of Fog Computing(L2)
- Understand the architecture and Components of Fog Computing System(L2)
- Understand different Fog Protocols(L2)
- Understand the Security Methods of Fog computing system(L2)
- Understand the applications of Fog Computing(L2)

Syllabus		Total Hours:50
Module-I	**Introduction to Fog Computing**	**10 Hrs**

Introduction to Fog Computing: Fog Computing-Definition-Characteristics-Application Scenarios - Issues –Fog. Computing and Internet of Things-Pros and Cons-Myths of Fog Computing -Need and Reasons for Fog Computing Fog Computing and Edge Computing-IoT,FOG, Cloud Benefits.

Module-II	Architecture	8 Hrs

Architecture: Working Procedure -Performance Evaluation Components- Software Systems – Architecture-Modeling and Simulation –Challenges.

Module-III	Fog Protocols	10Hrs

Fog Protocols: Fog Protocol-Fog Kit- Proximity Detection Protocols- DDS/RTPS computing protocols.

Module-IV	Management of Data and Security Analysis:	10 Hrs

Management of Data and Security Analysis: Smart Management of Big Data-Smart Data-Structure of Smart Data- Smart Data Life. Cycle-System Architecture-Multi-dimensional Payment Plan Security and Privacy. Issues-Multimedia Fog Computing-Architecture-
Deduplication-Hybrid Secure. Deduplication- Security Challenges-Security Requirements

Module-V	Applications of Fog Computing	12 Hrs

CASE STUDY: Case Study: Wind Farm - Smart Traffic Light System, Wearable Sensing. Devices, Wearable Event Device, Wearable System, Demonstrations

Text Books:

Assad Abbas, Samee U. Khan "Fog Computing: Theory and Practice " wiley India May2020.

Reference Books:

1. Jennifer Greene & Andrew Stellman, Stojan Kitanov , "Introduction to Fog Computing" IGI Global Publication.Head First PMP, O"Reilly,2007
2. Ivan Stojmenovic, Sheng Wen ," The Fog Computing Paradigm: Scenarios and Security Issues" Proceedings of the 2014 Federated Conference on Computer Science and Information Systems pp. 1–8
3. Amir Vahid Dastjerdi and Rajkumar Buyya "Fog Computing: Helping the Internet of Things Realize its Potential

Web References:

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

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Speech Recognition and Synthesis (Common to CSE, AI&ML, DS, CS)					
Course Code	**L: T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A3313T	**3:0:0:0**	**3**	**CIE: 30 SEE:70**	**3 Hours**	**PEC**

Course Objectives:

This course will enable students to:

- Understand the concepts of Speech Recognition and synthesis
- Understand different methods of feature extraction from speech
- Implement different speech recognition algorithms

Course Outcomes (CO):

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

- Understand the concepts of speech and signal Processing(L2)
- Implement edge detection algorithms and feature extraction methods such as MFCCs for speech recognition tasks(L3)
- Utilize the Baum-Welch algorithm to estimate HMM parameters from observed data(L3)
- Evaluate the effectiveness of LVCSR systems in real-world applications(L3)
- Implement a basic TTS system using sub word units(L3)
- Execute procedures for TTS waveform generation(L3)

Syllabus		**Total Hours:48**
Module-I	**Speech Fundamentals**	**9 Hrs**
Basic Concepts: Articulatory Phonetics – Production and Classification of Speech Sounds; Acoustic Phonetics – acoustics of speech production; Review of Digital Signal Processing concepts; Short-Time Fourier Transform, Filter-Bank and LPC Methods.		
Module-II	**Speech Analysis**	**10 Hrs**
Features, Feature Extraction and Pattern Comparison Techniques: Speech distortion measures – mathematical and perceptual – Log Spectral Distance, Cepstral Distances, Weighted Cepstral Distances and Filtering, Likelihood Distortions, Spectral Distortion using a Warped Frequency Scale, LPC, PLP and MFCC Coefficients, Time Alignment and Normalization – Dynamic Time Warping, Multiple Time – Alignment Paths		
Module-III	**Speech Modeling**	**10 Hrs**

Hidden Markov Models: Markov Processes, HMMs – Evaluation, Optimal State Sequence – Viterbi Search, Baum-Welch Parameter Re-estimation, Implementation issues

Module-IV	Speech Recognition	10Hrs

Large Vocabulary Continuous Speech Recognition: Architecture of A Large Vocabulary Continuous Speech Recognition System – Acoustics and Language Models – N grams, Context Dependent Sub-Word Units; Applications and Present Status.

Module-V	Speech Synthesis	9 Hrs

Text-to-Speech Synthesis: Concatenative and Waveform Synthesis MethodsSub word Units for TTS, Intelligibility and Naturalness – Role of Prosody, Applications and Present Status.

Text Books:

1. Lawrence Rabiner and Biing-Hwang Juang, "Fundamentals of Speech Recognition", Pearson Education, 2003.

Reference Books:

1. Daniel Jurafsky and James H Martin, "Speech and Language Processing – An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition", Pearson Education.
2. .Steven W. Smith, "The Scientist and Engineer's Guide to Digital Signal Processing", California Technical Publishing.
3. Thomas F Quatieri, "Discrete-Time Speech Signal Processing – Principles and Practice", Pearson Education.

Web References:

https://nptel.ac.in/courses/112105293

https://archive.nptel.ac.in/courses/112/105/112105293/

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

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

Course Code	L: T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A3314Tb	3:0:0:0	3	CIE: 30 SEE:70	3 Hours	PCC

Course Objectives:

This course will enable students to:

- Explore the fundamental concepts required for Data science
- Explain the basic concepts of data science.
- Be familiarize with Python libraries for Data Visualization.
- Elucidate various Machine Learning algorithms

Course Outcomes (CO):

On completion of this course, student will be able to

- Understand the basic concepts of Data Science. (L2)
- Learn about types of data and data preprocessing(L2)
- Visualize the data using NumPy, Pandas and Matplotlib(L3)
- Solve decision making problems using k-NN, Naïve Bayes, SVM and Decision(L3)
- Demonstrate the way to use machine Learning algorithms using python(L3)

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

Introduction: What Is Data Science? How Does Data Science Relate to Other Fields? Data Science and Statistics, Computer Science, Engineering and Business Analytics.

Data Science, Social Science, and Computational Social Science, The Relationship between Data Science and Information Science, Information vs. Data, Skills for Data Science, Tools for Data Science.

Module-II	**Types of Data**	**9 Hrs**

Data: Introduction, Data Types, Structured Data, Unstructured Data, Challenges with Unstructured Data, Data Collections, Open Data, Social Media Data, Multimodal Data, Data Storage and Presentation.

Module-III	**Techniques and Introduction to Libraries**	**10 Hrs**

Data: Data Pre-processing, Data Cleaning, Data Integration, Data Transformation, Data Reduction, Data Discretization.

Introduction to NumPy, Pandas, Matplotlib, Exploratory Data Analysis (EDA), Descriptive Statistics, Basic tools (plots, graphs and summary statistics) of EDA.

Module-IV	**Machine Learning for Data Science-1**	**10 Hrs**

Machine Learning for Data Science-1: Supervised machine learning algorithms: what is regression, simple linear regression, multiple regression and Logistic regression, classification algorithms: k-Nearest Neighbors, Naive Bayes, SVM

Module-V	Machine Learning for Data Science-2	9 Hrs

Machine Learning for data Science-2: Unsupervised learning algorisms overview: what is clustering, types of clustering algorithms, hierarchical clustering, k means clustering, what is Association, Differences between supervised and un supervised learning algorithms

Text Books:

1. Chirag Shah, "A Hands-On Introduction to Data Science", Cambridge University Press.
2. Allen B. Downey, "Think Python", 2nd edition, SPD/O'Reilly, 2016.
3. Joel Grus, "Data Science from Scratch, First Principles with Python" O'Reilly, First Edition.

Reference Books:

1. Field Cady ,"The Data Science Handbook" , WILEY.
2. Jeffrey M. Stanton, Jeffrey Stanton, "An Introduction to Data Science", 2012
3. Cathy O'Neil, Rachel Schutt, "Doing Data Science", Straight Talk from the Frontline. O'Reilly,2013.
4. Christopher Bishop, "Pattern Recognition and Machine Learning", Springer, 2007
5. Dr. Gypsy Nandi, Dr. Rupa Kumar Sharma. "Data Science Fundamentals and Practical Approaches".

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

ADHOC AND WIRELESS SENSOR NETWORKS
(Common to AI&ML, DS, CS)

Course Code	L: T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0535Tc	3:0:0:0	3	CIE:30 SEE:70	3 Hours	PEC

Course Objectives:

This course will enable students to:

- Understand the state-of-the-art research in the emerging subject of Adhoc and Wireless Sensor Networks
- Solve the issues in real-time application development based on ASN.
- Conduct further research in the domain of ASN

Course Outcomes (CO):

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

- Understand the concepts of Wireless Sensor Networks(L2)
- Understand the data transmission in Wireless Adhoc Networks(L2)
- Understand the protocols of Wireless Sensor Networks(L2)
- Understand the layered architecture of Adhoc networks(L2)

Syllabus		Total Hours:48
Module-I	**Introduction to Adhoc Networks**	**9 Hrs**

Introduction to Ad Hoc Networks - Characteristics of MANETs, Applications of MANETs and Challenges of MANETs.

Routing in MANETs - Criteria for classification, Taxonomy of MANET routing algorithms, Topology- based routing algorithms-**Proactive**: DSDV; **Reactive**: DSR, AODV; Hybrid: ZRP; Position-based routing algorithms-**Location Services**-DREAM, Quorum-based; **Forwarding Strategies:** Greedy Packet, Restricted Directional Flooding-DREAM, LAR.

Module-II	**Data Transmission**	**10 Hrs**

Data Transmission - Broadcast Storm Problem, **Rebroadcasting Schemes**-Simple-flooding, Probability-based Methods, Area-based Methods, Neighbor Knowledge-based: SBA, Multipoint Relaying, AHBP. **Multicasting: Tree-based:** AMRIS, MAODV; **Mesh-based:** ODMRP, CAMP; **Hybrid:** AMRoute**,** MCEDAR.

Module-III	**Geo Casting**	**9 Hrs**

Geocasting: Data-transmission Oriented-LBM; Route Creation Oriented-GeoTORA, MGR**.** TCP over Ad Hoc TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc

Module-IV	**Lower Layers of Sensor Networks**	**10Hrs**

Basics of Wireless, Sensors and Lower Layer Issues: Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer, Routing Layer.

Module-V	Upper Layers of Sensor Networks	10Hrs

Upper Layer Issues of WSN: Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, Sensor Networks and mobile robots.

Text Books:

1. Carlos Corderio Dharma P. Aggarwal,"Ad Hoc and Sensor Networks – Theory and Applications", World Scientific Publications, March 2006.
2. Feng Zhao, LeonidasGuibas, "Wireless Sensor Networks: Information Processing Approach", Elsevier Science

Reference Books:

1. A.Grama, A. Gupta, G. Karypis and V. Kumar,"An Introduction to Parallel Computing: Design and Analysis of Algorithm"s, Second Edition - Pearson. Feng Zhao and Leonides Guibas, "Wireless Sensor Networks", Elsevier Publication - 2002.
2. Holger Karl and Andreas Willig "Protocols and Architectures for Wireless Sensor Networks", Wiley, 2005

Web References:

1. NPTEL: Computer Science and Engineering - NOC: Wireless Adhoc and Sensor Networks

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

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

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A3315Td	3:0:0:0	3	CIE: 30 SEE:70	3 Hours	PEC

Course Objectives:

This course will enable students to:

- Impart fundamental concepts in the area of virtualization.
- Impart knowledge in infrastructure as a service.
- Explain monitoring, management and applications.
- Understand the concept of design patterns.
- Learn to design the trusted cloud computing system.

Course Outcomes (CO):

On completion of this course, student will be able to

- Use the fundamentals of virtualization(L3)
- Analyze the cloud service models(L4)
- Apply the cloud monitoring, management and applications(L3)
- Build a cloud security application(L3)
- Create a scenario for threat protection(L3).

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

Fundamentals: System Modeling, Clustering and Virtualization: distributed system models and enabling technologies, computer clusters for scalable parallel computing, virtual machines and virtualization of clusters and data centers. introduction to cloud computing, migrating into cloud, enriching the integration of service paradigm for cloud era, the enterprise cloud computing paradigm

Module-II	Infra Structure as Service	9 Hrs

Infra Structure as Service: Virtual machine provisioning and migration services, on the management of virtual machines for cloud infrastructure, enhancing cloud computing environments using a cluster as service, secure distributed data storage in cloud computing Aneka, comet cloud, T-systems, work flow engine for clouds, understanding scientific applications for cloud environments.

Module-III	Cloud Data Security	10 Hrs

Data Protection (rest, at transit, in use), Data Information lifecycle, Cloud Data Audit (Intro, Audit, Best Practice): Aws — EBS, S3, Azure — SAS, Demo-Aws cli & powershell & Amazon, Azure portal, Key management, Cloud Key management Audit (Intro, Audit, Best Practice): Aws —KMS, Azure — Azure Key Vault

Module-IV	Identity and Access Management	10 Hrs
Introduction to Identity and Access Management, Introduction to Federated Identity Management, Case Study, Cloud IAM Audit (Intro, Audit, Best Practice): Aws —IAM, Demo -Aws Cli & Amazon portal		
Module-V	**Cloud Application Security**	**9 Hrs**
Cloud Application Challenges, OWSAP Top 10, Secure SDLC, Dev Sec Ops, Cloud Trail, Cloud watch, Lambda		

Text Books:

1. Ronald L. Krutz, Russell Dean Vines, "Cloud Security: A Comprehensive Guide to Secure Cloud Computing", 30 July 2010

Reference Books:

1. Charlie Kaufman, "Network Security: Private Communication in a Public World", 2nd edition, Prentice Hall. A
tul Kahate 2008.
2. Robert Bragg, Mark Rhodes "Cryptography and Network Security", 2nd edition, Tata Mc Grawhill, India., 2004.

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LARGE LANGUAGE MODELS
(Common to CSE, AI&ML, DS, CS)

Course Code	L: T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A3316Ta	3:0:0:0	3	CIE: 30 SEE:70	3 Hours	PEC

Course Objectives:

This course will enable students to:
- Explore the fundamental Natural Language Processing
- Understand the basic concepts of Linguistic fundamentals for NLP.
- Be familiarize with Data Collection and Pre-processing for Language Modeling.
- Understand the Neural Networks in Language Modeling, Transformer-based Models for Language Modeling

Course Outcomes (CO):

On completion of this course, student will be able to
- Understand the basic concepts of Natural Language Processing(L2)
- Learn about Linguistic fundamentals for NLP(L2).
- Analyze Data Collection and Pre-processing for Language Modeling(L4)
- Apply Neural Networks in Language Modeling(L3)
- Apply Transformer-based Models for Language Modeling(L3)

Syllabus		Total Hours:48
Module-I	**Fundamentals of Natural Language Processing**	**10Hrs**
Introduction, Structure, Objectives, The definition and applications of NLP, The history and evolution of NLP, The components of NLP		
Module-II	**Linguistic fundamentals for NLP**	**9 Hrs**
The challenges of NLP, Introduction to Language Models, A brief history of language models and their evolution, Types of language models, Autoregressive and auto encoding language models, Examples of large language models, Training basic language models		
Module-III	**Data Collection and Pre-processing for Language Modeling**	**10 Hrs**
Introduction, Data acquisition strategies, Data cleaning techniques, Text pre-processing: preparing text for analysis, Data annotation, Managing noisy and unstructured data, Data privacy and security		
Module-IV	**Neural Networks in Language Modeling**	**10 Hrs**
Introduction, Introduction to neural networks, Backpropagation, Gradient descent, Neural Network Architectures for Language Modeling, Understanding shallow and deep neural networks, Fundamentals of RNN, Types of RNNs:		

Module-V	Transformer-based Models for Language Modeling	9 Hrs
Introduction, Key concepts, Transformer architecture, Advantages and limitations of transformers, Training Large Language Models, Building a tiny language model, Building a character-level text generation model Building effective LLMs		

Text Books:

1.Sanket Subhash Khandare, "Mastering Large Language Models", BPB Publications

Reference Books:

1. Lior Gazit,Meysam Ghaffari ,"Mastering NLP from Foundations to LLMs", Packt Publishing
2. Gilbert Mizrahi ,"Unlocking the Secrets of Prompt Engineering", Packt Publishing

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

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0534Tb	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(L2)
- Analyzing the Data with Hadoop(L4)
- Develop MapReduce application(L3)
- Illustrate the Anatomy of MapReduce and Hadoop environment Determine why existing technologies are inadequate to analyze the large data(L2)
- Apply large-scale analytic tools to solve some of the open big data problems(L3)

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 MapReduce 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. Michael Minnelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging business intelligence and analytic trends for today's businesses", 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:

1. https://onlinecourses.swayam2.ac.in/arp19_ap60/preview
2. https://www.shiksha.com/online-courses/big-data-analytics-courses-certification-training-by-nptel-st601-tg91

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BLOCK CHAIN TECHNOLOGY
(Common to CSE, AI&ML, DS, CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0536Tc	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(L2)
- Describe the primitives of the distributed computing and cryptography related to block chain(L2)
- Illustrate the concepts of Bit coin and their usage(L2)
- Implement Ethereum block chain contract(L3)
- Apply security features in block chain technologies(L3)
- Use smart contract in real world applications(L3)

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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HIGH PERFORMANCE COMPUTING
(Common to CSE, AIML, CS& DS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A3317Td	3:0:0:0	3	CIE: 30 SEE:70	3 Hours	PEC

Course Objectives:

This course will enable students to:

- Learn concepts of parallel processing as it pertains to high-performance computing.
- Solve problems a raised in Parallel Processing.
- Design and analyze parallel programs on high performance computing resources using parallel programming paradigms

Course Outcomes (CO):

On completion of this course, student will be able to

- Understand the basic concepts of Parallel Processing(L2)
- Understand the concept of Message Passing Programming(L2)
- Understand the concept of Pipelined computations(L2)
- Understand the concept of Load Balancing(L2)
- Understand the concept of Shared Memory Multiprocessors(L2)

Syllabus		**Total Hours:48**
Module-I	**Parallel Computers**	**9Hrs**
The Demand for Computational Speed, Potential for Increased Computational Speed, Types of Parallel Computers, Cluster Computing		
Module-II	**Message Passing Computing**	**9Hrs**
Basics of Message - Passing Programming, Using a Cluster of Computers, Evaluating Parallel Programs, Debugging and Evaluating Parallel Programs Empirically		
Module-III	**Pipelined Computations and Synchronous Computations**	**10Hrs**
Pipeline Technique, Computing Platform for Pipelined Applications, Pipeline Program Examples, Synchronization, Synchronization Computations, Synchronous Iteration Program Examples		
Module-IV	**Load Balancing and Termination Detection**	**10Hrs**
Load Balancing, Dynamic Load Balancing, Distributed Termination Detection Algorithms, Program Example		
Module-V	**Programming with Shared Memory**	**10Hrs**
Shared Memory Multiprocessors, Constructs for Specify Parallelism, Sharing Data, Parallel Programming Languages and Constructs, Performance Issues		

Text Books:

1. Parallel Programming: Techniques and Applications using Networked Work-stations and Parallel Computers" (2nd ed.) by B. Wilkinson and M. Allen, Prentice Hall..

Reference Books:

1. An Introduction to Parallel Computing: Design and Analysis of Algorithms, Second Edition - A.Grama, A. Gupta, G. Karypis and V. Kumar, Pearson.

Web References:

1. https://nptel.ac.in/courses/112105293
2. https://archive.nptel.ac.in/courses/112/105/112105293/

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SMART GRID
(Open Elective-III)
(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:

This course will enable students to gain knowledge on:

- 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, the students will be able to

- Understand the concepts and design of Smart grid(L2)
- Understand the various communication technologies in smart grid(L2)
- Understand the various measurement technologies in smart grid(L2)
- Understand the analysis and stability of smart grid(L2)
- Learn the renewable energy resources and storages integrated with smart grid(L2)
- Familiarize the high-performance computing for Smart Grid applications(L2)

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. Janaka Ekanayake, Liyanage, Wu, Akihiko Yokoyama, Jenkins, "Smart Grid", Wiley Publications, 2012, Reprint 2015.
2. James Momoh, "Smart Grid: Fundamentals of Design and Analysis", Wiley, IEEE Press., 2012, Reprint 2016.

Reference Books:

1. Clark W. Gellings," The Smart Grid – Enabling Energy efficiency and demand response", P.E., CRC Press, Taylor & Francis group, First Indian Reprint. 2015.
2. Lars Torsten Berger, Krzysztof Wisniewski," Smart Grid – Applications, Communications, and Security", WILEY, 2012, Reprint 2015.
3. Cobus Strauss, "Practical Electrical Network Automation and Communication Systems", ELSVIER, 2003

Web References:

https://onlinecourses.nptel.ac.in/noc22_ee82/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

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	3:0:0:0	3	CIE:30 SEE:70	3 Hours	OEC

Course Objectives:

This course will enable students to

- Gain exposure to different steps involved in fabrication Process of PMOS & NMOS transistors, CMOS & BICOM Inverters.
- Gain knowledge on electrical properties of MOS & BICMOS devices to analyze the behavior of inverters designed with various loads.
- Gain knowledge on Basic Circuit Concepts of VLSI Design
- Apply the design Rules and draw layout of a given logic circuit and basic circuit concepts to MOS circuits.
- 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(L2)
- Understand the concept of Basic Electrical Properties of MOS/Bi-CMOS Devices(L2)
- Apply the basic circuit concepts to MOS circuits(L3)
- Understand the concept of Scaling of MOS circuits and Limitations of Scaling(L2)
- Apply the design Rules to draw the Stick diagram &layout of a given logic circuit(L3)
- Interpret the need for testability and testing methods in VLSI(L2)

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.

Web References:

https://nptel.ac.in/courses/117106092

https://www.digimat.in/nptel/courses/video/108107129/L01.html

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

DISASTER MANAGEMENT

(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:

This course will enable students to

- 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

- Know about the natural hazards and its management(L2)
- Know about the fire hazards and solid waste management(L2)
- Understand about the emerging infectious diseases and aids their management(L2)
- Know about the regulations of building codes and land use planning related to risk and vulnerability(L2)
- Impart the education related to risk reduction in schools and communities(L2)

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 Management	10 Hrs

Disaster management for infra structures, taxonomy of infra structure – treatment plants and process facilities-electrical substations roads and bridges- mitigation programme 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.

Web References:

1. https://www.youtube.com/watch?v=DExlZTfKZAM&list=PLC4PaTsQiLcbejXqJR7S59Ohk2OK1rgEG

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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

MEASUREMENTS AND MECHATRONICS

(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:

This course will enable students to

- Understand the principles of interchangeable manufacture.
- Understand basic principles of mechanical measurements.
- 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(L3).
- Apply the basic principles of mechanical measurements for engineering practice(L3)
- Illustrate the role of mechatronics systems in manufacturing(L2)
- Explain principles of mechanical, hydraulic, pneumatic and electrical actuating systems(L2)

Syllabus		Total Hours: 48
Module-I	**Limits & 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.

Reference Books:

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.

Web References:

https://archive.nptel.ac.in/courses/112/107/112107242/

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

ELECTRIC VEHICLES
(Open Elective-IV)
(Common to all Except EEE)

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:

This course will enable students to

- 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(L2)
- Apply a suitable drive scheme for developing an hybrid and electric vehicles depending on resources(L3)
- Develop the electric propulsion unit and its control for application of electric vehicles(L3)
- Understand the proper energy storage systems for vehicle applications(L2)
- Design and develop basic schemes of electric vehicles and hybrid electric vehicles(L3)

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	9Hrs
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**	**10Hrs**
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, AvestaGoodarzi, "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.

Web References:

https://onlinecourses.nptel.ac.in/noc23_ee01/preview

https://onlinecourses.nptel.ac.in/noc21_ee112/preview

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

INDUSTRIAL ELECTRONICS
Common to **(EEE, CSE, AI&ML, IT, 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(L2)
- Apply the Ultrasonic waves with different applications(L3)
- Understand the working of Transistor and its different configurations(L2)
- Analyze the thermal effects of ultrasonic, soldering and welding by ultrasonic, ultrasonic Drying in the industry; interpret the characteristics of AC to DC converters(L4)
- Develop the practical applications Electronics in industries(L3)
- Apply the process of Resistance welding, Induction heating and Dielectric heating in the industry(L3)

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. Bogdan M Wilamowski, J David irwin," Fundamentals of Industrial Electronics", 2nd Edition, 2011.
2. G. K. Mithal and Maneesha Gupta," Industrial and Power Electronics", Khanna Publishers, 19th Ed., 2003.

References:

1. J. Millman and C.C Halkias, "Integrated Electronics ", McGraw Hill, 1972.
2. Theodore. H. Bogart," Electronic Devices and circuits" Pearson Education, 6thEdn., 2003.
3. Deboo and Burroughs, "Integrated Circuits and Semiconductor Devices", ISE

Web References:

https://onlinecourses.nptel.ac.in/noc21_ee01/preview

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

CONSTRUCTION MANAGEMENT
(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:

- Be familiar with various construction activities, preparing construction schedule and maintaining documents and records of those activities
- Understand various terms and technologies involved in earthwork of construction activities
- Understand the concepts involved in project management like bar charts and milestone charts
- Understand 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(L2)
- Understand the concepts and techniques involved in earthwork activities(L2)
- Understand about the emerging infectious diseases and aids their management(L2)
- Understand the steps involved in developing a project scheduling and management and the application of bar charts and milestone charts(L2)
- Understand the various elements of a network diagram like event, activity and dummy(L2)
- Understand the concepts of calculation of time estimates of CPM and PERT(L2)

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. Jha," Construction project management", Pearson publications, New Delhi 2nd Edition 2015
2. Subir K. Sarkar and Subhajit Saraswat "Construction Technology", Oxford Higher Education Univ. Press, Delhi 2008 edition

Reference Books:

1. Dr.B.C.Punmia, K.K.Khandelwal ,"Project Planning and Control with PERT and CPM", Lakshmi Publications ,New Delhi 2022 editionDelhi
2. P.R.Bhave,"Optimal Design of Water Distribution Networks" Narosa Publishing house 2003.
3. P.K.JOY,"Total Project Management -The Indian context",Mac Millan Publishers India Limited.

Web References:

https://nptel.ac.in/courses/105104161

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

INTRODUCTION TO ROBOTICS					
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 to 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, the students will be able to

1. List and explain the basic elements of industrial robots(L2)
2. Analyze robot kinematics and its control methods(L4)
3. Classify the various sensors used in robots for better performance(L2)
4. Summarize various industrial and non-industrial applications of robots(L2)

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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Unit of USHODAYA EDUCATIONAL SOCIETY
An ISO 9001:2015 certified Institution: Recognized under Sec. 2(f)& 12(B) of UGC Act, 1956
3rd Mile, Bombay Highway, Gangavaram (V), Kovur(M), SPSR Nellore (Dt), Andhra Pradesh, India- 524137
Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

Generative AI (AI&ML)					
Course Code	**L: T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A3318P	**1:0:2:0**	**2**	**CIE:30 SEE:70**	**3 Hours**	**SC**

Course Objectives:

This course will enable students to:

- Describe generative AI and how it aligns to machine learning.
- Define the importance of generative AI and explain its potential risks andbenefits.
- Identify business value from generative AI use cases.
- Learn real-world application of Generative AI.
- Apply generative AI models and popular tools

Course Outcomes (CO):

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

- Understand evolution of Generative AI(L2)
- Identify Business Value(L2)
- Learn Capabilities of Generative AI in different Domains(L2)
- Understand Chat GPT(L2)
- Create/Deploying of a Generative AI application(L2)

Syllabus		**Total Hours:48**
Module-I	**Prompt Engineering Fundamentals**	**10Hrs**

Prompt Engineering Fundamentals: Prompt, Elements of a Prompt. Tips for Designing Prompt, Example prompts for various use cases

Module-II	**Generative Texts and Images**	**10 Hrs**

Generative Texts: Introduction to AI Chatbots, Working of AI Chatbots, Popular AI Chatbots, ChatGPT and its working, How to use ChatGPT, Use cases of ChatGPT for varioususers.

Generative Images: Role of AI in Image Generation, Image Sourcing Vs, Image Generation,and Popular AI tools for Image Generation. Mid journey for Image Generation, Working of mid journey, Advantages and disadvantages of Mid journey, How to use Mid journey, Use cases of Mid journey

Module-III	**Generative Videos**	**9 Hrs**

Generative Videos: A: Tools in Video Making, Working of AI Video Makers, Benefits of AIVideo Makers, Popular AI Video Makers, Introduction to Synthesia, Features of Synthesia, Who should use Synthesia? Compatibility of Synthesia, Pros and Cons of Synthesia, How to use Synthesia, How to make AI Videos in 10 minutes, Practical Case studies of Synthesia.

Module-IV		**10 Hrs**

Generative Codes: Role of AI Tools in Programming, Copilot by Github, Working of Copilot, Copilot Compatibility, Advantages and Drawbacks of Copilot, How to use Copilot, How to Install the GitHub Copilot Extension, Converting Comments to Code using Copilot, Auto filling Repetitive Code using Copilot, Running Tests using Copilot, Navigating, Unfamiliar Territory with Copilot, Creating an Application Entirely With Copilot, Some useful keyboard shortcuts for GitHub's Copilot

Module-V	**ChatGPT Alternatives**	**9 Hrs**

ChatGPT Alternatives: Alternative Chatbots, Comparison of ChatGPT, Bard, LLAMA,Claude..

List of experiments

1. Text Generation using Generative AI
2. Image Generation using Generative AI
3. Audio Generation using Generative AI
4. Video Generation using Generative AI
5. Code Generation using Generative AI
6. Image to Text Generation using Generative AI
7. Speech to Text generation using Generative AI
8. Develop a Transactional Chatbot using Generative AI
9. Develop a Social Chatbot using Generative AI
10. Develop a Scripted Chatbot using Generative AI

Text Books:

1. Deep Learning" by Ian Good fellow, Yoshua Bengio, and Aaron Courville,1st edition,2016

Reference Books:

3. Generative Deep Learning: Teaching Machines to Paint, Write, Compose, and Play"by David Foster, 1st edition, 2019
4. "Generative Deep Learning: Deep Learning for Generative Models" by RowelAtienza, 1st edition, 2019 "
5. "Deep Generative Models" by Aaron Courville, Ian Good fellow, and Yoshua Bengio,1st edition, 2020"Generative Adversarial Networks: An Overview" by Anton Bogushevsky and Vladimir

Semester-8 (Project-1)							
Sl. No.	**Category**	**Course Code**	**Course Title**	**Hours per week**			**Credits**
				L	**T**	**P**	**C**
1	Major Project	22A3311	Project work, Seminar and Internship inindustry	0	0	24	12
INTERNSHIP (6 MONTHS)							
						Total credits	12