Jawaharlal Nehru Technological University Anantapur

(Established by Govt. of A.P., Act. No. 30 of 2008)

Ananthapuramu–515 002 (A.P) India

III & IV year B.Tech

Course Structures and Syllabi

under R19 Regulations

III & IV Year Course Structure & Syllabus

Semester - 5 (Theory - 6, Lab - 3)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	19A05504T	Computer Networks	PC	3-0-0	3
2.	19A05502T	Artificial Intelligence	PC	3-0-0	3
3.	19A05503T	Object Oriented Analysis Design & Testing	PC	2-0-0	2
4.	19A52601T	English Communications	OE	3-0-0	3
5.		Professional Elective-I	PE	3-0-0	3
	19A05602T	Big Data Analytics			
	19A05702T	Software Testing			
	19A12501	No SQL Databases			
6.		Open Elective-I	OE	3-0-0	3
	19A01506a	Experimental stress analysis.			
	19A01506b	Building Technology			
	19A02506a	Electrical Engineering Materials			
	19A03506a	Introduction to Hybrid and Electric Vehicles			
	19A03506b	Rapid Prototyping			
	19A04506a	Analog Electronics			
	19A04506b	Digital Electronics			
	19A05506a	Computer Graphics and Multimedia Animation			
	19A05506b	Free and Open Sources Systems			
	19A27506a	Brewing Technology			
	19A27506b	Computer Applications in Food Technology			
	19A54506a	Optimization Techniques			
	19A52506a	Technical Communication and Presentation Skills			
7.	19A05504P	Computer Networks Lab	PC	0-0-3	1.5
8.	19A05503P	Object Oriented Analysis Design & Testing Lab	PC	0-0-2	1.0
9.	19A52601P	English Communications	PC	0-0-3	1.5
10.	19A12502	Socially Relevant Project	PR	------	0.5
11.	19A99501	Mandatory course: Constitution of India	MC	3-0-0	0
				Total	**21.5**

		Semester - 6 (Theory - 6, Lab - 2)			
S.No	Course No	Course Name	Category	L-T-P	Credits
1.	19A12601T	Web Technologies	PC	2-1-0	3
2.	19A05603a	Systems Software and Compiler Design	PC	3-0-0	3
3.	19A12602T	Data warehousing and Data mining	PC	3-0-0	3
4.	19A12603 19A05603b 19A05603c	Professional Elective-II Cryptography & Network Security Machine Learning Design Patterns	PE	3-0-0	3
5.	19A01604a 19A01604b 19A02604a 19A02604b 19A03604a 19A03604b 19A04604a 19A04604b 19A05604a 19A05604b 19A27604a 19A27604b 19A54604a 19A52604a	Open Elective-II Industrial waste and waste water management. Building Services & Maintenance Industrial Automation System Reliability Concepts Introduction to Mechatronics Optimization techniques through MATLAB Basics of VLSI Principles of Communication Systems Fundamentals of VR/AR/MR Data Science Food Toxicology Food Plant Equipment Design Wavelet Transforms & its applications Soft Skills	OE	3-0-0	3
6.	19A52602a 19A52602b 19A52602c 19A52602d 19A52602e	Humanities Elective-I Entrepreneurship & Incubation Managerial Economics And Financial Analysis Business Ethics And Corporate Governance Enterprise Resource Planning Supply Chain Management	HE	3-0-0	3
7.	19A12601P	Web Technologies Lab	PC	0-0-3	1.5
8.	19A12602P	Data warehousing and Data mining Lab	PC	0-0-3	1.5
9.	19A12604	Socially Relevant Project	PR	------	0.5
10.	19A99601	Mandatory Course: Research Methodology	MC	3-0-0	0
				Total	21.5

S.No	Course No	Course Name	Category	L-T-P	Credits
		Semester – 7 (Theory - 5, Labs -2 & Project – 1)			
1.	19A05701T	Internet of Things	PC	2-1-0	3
2.	19A05505c	Mobile Application Development	PC	2-1-0	3
3.		Professional Elective-III	PE	3-0-0	3
	19A05703a	Cloud Computing			
	19A05703b	Natural Language Processing			
	19A05703c	Agile Methodologies			
4.		Open Elective-III	OE	3-0-0	3
	19A01704a	Air pollution and control.			
	19A01704b	Basics of civil Engineering			
	19A02704a	Renewable Energy Systems			
	19A02704b	Electric Vehicle Engineering			
	19A03704a	Finite element methods			
	19A03704b	Product Marketing			
	19A04704a	Introduction to Microcontrollers & Applications			
	19A04704b	Principles of Digital Signal Processing			
	19A05704a	Fundamentals of Game Development			
	19A05704b	Cyber Security			
	19A27704a	Corporate Governance in Food Industries			
	19A27704b	Process Technology for Convenience & RTE Foods			
	19A54704a	Numerical Methods for Engineers (ECE , CSE, IT &CE)			
5.		Humanities Elective-II	HS	3-0-0	3
	19A52701a	Organizational Behavior			
	19A52701b	Management Science			
	19A52701c	Business Environment			
	19A52701d	Strategic Management			
	19A52701e	E-Business			
6.	19A12701	Mobile Application Development Lab	PC	0-0-3	1.5
7.	19A05701P	Internet of Things Lab	PC	0-0-3	1.5
8.	19A05705	Project*	PR	------	2
9.	19A05706	Industrial Training/Skill Development/Research Project*	PR	------	1.5
				Total	**21.5**

		Semester – 8 (Theory - 2, Project – 1)			
S.No	Course No	Course Name	Category	L-T-P	Credits
1.	19A05801a 19A05801b 19A05801c	Professional Elective-IV Dev Ops Deep Learning Adhoc & Sensor Networks	PE	3-0-0	3
2.	19A01802a 19A01802b 19A02802a 19A02802b 19A03802a 19A03802b 19A04802a 19A04802b 19A04802c 19A04802d 19A05802a 19A05802b 19A27802a 19A27802b 19A54802a	Open Elective-IV Disaster Management. Global Warming and climate changes IoT Applications in Electrical Engineering Smart Electric Grid Energy conservation and management Non destructive testing Introduction to Image Processing Principles of Cellular and Mobile Communications Industrial Electronics Electronic Instrumentation Block Chain Technology and Applications MEAN Stack Technology Food Plants Utilities & Services Nutraceuticals & Functional Foods Mathematical Modeling & Simulation	OE	3-0-0	
3.	19A05803	Project	PR	------	7
				Total	13

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B.Tech (IT)– IV-I Sem   **L   T   P   C**
                                                         2   1   0   3

(19A05701T) INTERNET OF THINGS

(Common to CSE & IT)

Course Objectives:

This course is designed to:

- Introduce the fundamental concepts of IoT and physical computing
- Expose the student to a variety of embedded boards and IoT Platforms
- Create a basic understanding of the communication protocols in IoT communications.
- Familiarize the student with application program interfaces for IoT.
- Enable students to create simple IoT applications.

UNIT I

Overview of IoT:

The Internet of Things: An Overview, The Flavour 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.

Learning Outcomes:

After completing this Unit, students will be able to

- Explain IoT architecture. [L2]
- Interpret the design principles that govern connected devices [L2]
- Summarize the roles of various organizations for IoT [L2]
- Interpret the significance of Prototyping [L2]

UNIT II

Embedded Devices:

Electronics, Embedded Computing Basics, Arduino, Raspberry Pi, Mobile phones and tablets, Plug Computing: Always-on Internet of Things

Learning Outcomes:

After completing this Unit, students will be able to

- Explain the basics of microcontrollers [L2]
- Outline the architecture of Arduino [L2]
- Develop simple applications using Arduino [L3]
- Outline the architecture of Raspberry Pi [L2]
- Develop simple applications using Raspberry Pi [L3]
- Select a platform for a particular embedded computing application [L3]

UNIT III

Communication in the IoT:

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

Learning Outcomes:

After completing this Unit, students will be able to

- Interpret different protocols and compare them [L2]
- Select which protocol can be used for a specific application [L3]
- Utilize the Internet communication protocols for IoT applications [L3]
- Select IoT APIs for an application [L3]
- Design and develop a solution for a given application using APIs [L6]
- Test for errors in the application [L4]

UNIT IV

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.

Learning Outcomes:

After completing this Unit, students will be able to

- Plan the business model [L6]
- Predict the market value [L6]
- Build the product [L6]

UNIT V

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.

Learning Outcomes:

After completing this Unit, students will be able to

- Outline the manufacturing techniques [L2]
- Adapt the Ethics of the IoT[L6]

Course outcomes:

Upon completion of the course, the students should be able to:
- Choose the sensors and actuators for an IoT application (L1)
- Select protocols for a specific IoT application (L2)
- Utilize the cloud platform and APIs for IoT applications (L3)
- Experiment with embedded boards for creating IoT prototypes (L3)
- Design a solution for a given IoT application (L6)

Text Book:

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.

Reference sites:

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

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B.Tech (IT)– IV-I Sem   **L   T   P   C**
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(19A05505C) MOBILE APPLICATION DEVELOPMENT
(Common to CSE & IT)

COURSE OBJECTIVES:

This course is designed to:

- Facilitate students to understand android SDK
- Help students to gain a basic understanding of Android application development
- Inculcate working knowledge of Android Studio development tool

UNIT-I: Introduction to Android: The Android Platform, Android SDK, Eclipse Installation, Android Installation,Building you First Android application, Understanding Anatomy of Android Application, AndroidManifest file.

Learning Outcomes:

At the end of the unit, students will be able to:
- Make use of the Android platform (L3)
- Create and Run Android project using SDK (L6)
- Define the Anatomy of Android Application. (L1)

UNIT-II: Android Application Design Essentials: Anatomy of an Android applications, Android terminologies,Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions

Learning Outcomes:

At the end of the unit, students will be able to:
1. Explain the terminology used in Android applications (L2)
2. Develop first level Android applications that can accept information from the users (L3)
3. Illustrate the Android Manifest File and its common settings (L2)

UNIT-III: Android User Interface Design Essentials: User Interface Screen elements, Designing User Interfaceswith Layouts, Drawing and Working with Animation.

Learning Outcomes:

At the end of the unit, students will be able to:
- Design Android application screen with various elements for improving users experience(L6)
- Develop Android application with animations (L6)

UNIT-IV: Testing Android applications, Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources.

Learning Outcomes:

At the end of the unit, students will be able to:
- Demonstrate Testing and publishing of their developed Android applications in the internet. (L2)
- Explain how to manage Application resources in a hierarchy (L2)

UNIT V: Using Common Android APIs: Using Android Data and Storage APIs, Managing data using Sqlite,Sharing Data between Applications with Content Providers, Using Android Networking APIs, UsingAndroid Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.

Learning Outcomes:

At the end of the unit, students will be able to:
- Develop top end applications that work with data storing and sharing facility.(L6)
- Interpret and Develop applications based on customer perspective(L5)
- Utilize various Android API's for improving users experience(L3)

Course Outcomes

Upon completion of the course, the students should be able to:

- Identify various concepts of mobile programming that make it unique from programming forother platforms (L3)
- Evaluate mobile applications on their design pros and cons. (L5)
- Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces. (L3)
- Develop mobile applications for the Android operating system that use basic and advanced phone features. (L6)
- Demonstrate the deployment of applications to the Android marketplace for distribution. (L2)

TEXT BOOKS:

1. Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education, 2nd ed. (2011)

REFERENCE BOOKS:
    1. Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd
    2. Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd
    3. Android Application Development All in one for Dummies by Barry Burd, Edition: I

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B.Tech (IT)– IV-I Sem   **L T P C**
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(19A05703a) CLOUD COMPUTING
(Professional Elective-III)

Course Objectives:

This course is designed to:
- Define cloud services and models
- Demonstrate design the architecture for new cloud application.
- Explain how to re-architect the existing application for the cloud.

Unit-I: Introduction to Cloud Computing, Characteristics of Cloud Computing, Cloud Models, Cloud Services Examples, Cloud based services and Applications, Cloud Concepts and Technologies, Virtualization, Load Balancing, Scalability and Elasticity, Deployment, Replication, Monitoring, Software defined networking, Network function virtualization, Map Reduce, Identity and Access Management, Service Level Agreements, Billing.

Learning Outcomes

At the end of the unit, students will be able to:
- Outline the Cloud characteristics and models.(L2)
- Classify different models, different technologies in cloud.(L2)

Unit-II: Cloud Services and Platforms: Compute Services, Storage Services, Database Services, Application Services, Content Delivery Services, Analytics Services, Deployment and Management Services, Identity and Access Management Services, Open Source Private Cloud Software, Apache Hadoop, Hadoop MapReduce Job Execution, Hadoop Schedulers, Hadoop Cluster Setup.

Learning Outcomes:

At the end of the unit, students will be able to:
- Summarize the Services and Platform of cloud.(L2)
- Demonstrate Hadoop Cluster Setup. (L2)

Unit-III: Cloud Application Design: Design Considerations, Reference Architectures, Cloud Application Design Methodologies, Data Storage Approaches,

Multimedia Cloud: Introduction, Case Study: Live Video Streaming App, Streaming Protocols, Case Study: Video Transcoding APP.

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Learning Outcomes:

At the end of the unit, students will be able to:
- Design and build cloud applications.(L6)
- Describe the multimedia cloud. (L2)

Unit-IV: Python for Amazon Web Services, Python for Google Cloud Platform, Python for Windows Azure, Python for MapReduce, Python Packages of Interest, Python Web Application Framework – Django, Designing a RESTful Web API.

Learning Outcomes:

At the end of the unit, students will be able to:
- Select different cloud services from different vendors (L2)
- Utilize Python language to access cloud services (L3)

Unit-V: Cloud Application Development in Python, Design Approaches, Image Processing APP, Document Storage App, MapReduce App, Social Media Analytics App, Cloud Application Benchmarking and Tuning, Cloud Security, Cloud Computing for Education.

Learning Outcomes:

At the end of the unit, students will be able to:
- Investigate different Cloud applications. (L4)
- Design cloud applications using Python. (L6)

Course Outcomes:

Upon completion of the course, the students should be able to:

- Outline the procedure for Cloud deployment (L2)
- Distinguish different cloud service models and deployment models (L4)
- Compare different cloud services. (L5)
- Design applications for an organization which use cloud environment. (L6)

Textbooks:

1. Arshadeep Bhaga, Vijay Madisetti, "Cloud Computing A Handson Approach", Universities Press, 2018.

References:

1. Chris Hay, Brian Prince, "Azure in Action" Manning Publications [ISBN: 9781935182481],2010.
2. Henry Li, "Introducing Windows Azure" Apress; 1 edition [ISBN: 978-14302-2469-3],2009.
3. Eugenio Pace, Dominic Betts, Scott Densmore, Ryan Dunn, Masashi Narumoto, MatiasWoloski, "Developing Applications for the Cloud on the Microsoft Windows Azure Platform" Microsoft Press; 1 edition [ISBN: 9780735656062],2010.
4. Eugene Ciurana, "Developing with Google App Engine" Apress; 1 edition [ISBN: 978-1430218319],2009.
5. Charles Severance, "Using Google App Engine" O'Reilly Media; 1 edition, [ISBN: 978-0596800697], 2009.

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B.Tech (IT)– IV-I Sem   **L   T   P   C**
                              3   0   0   3

(19A05703b) NATURAL LANGUAGE PROCESSING
Professional Elective - III

Course Objectives:

This course is designed to:

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

UNIT I:
Introduction to Natural language
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.

Learning Outcomes:

At the end of the module, students will be able to:
- Classify various NLP Applications (L2)
- Apply the logic by using Python Programming(L3)
- List the AI Languages (L1)
- Outline the Linguistic Background (L2)

Unit II: Grammars and Parsing
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, Bayees Rule, Shannon game, Entropy and Cross Entropy.

Learning Outcomes:

At the end of the module, students will be able to:
- Demonstrate the Top- Down and Bottom-Up Parsing techniques (L2)
- Apply Bayes Rule, Shannon game, Entropy and Cross Entropy. (L3).
- Develop game playing strategies using Shannon game. (L3)

UNIT III: Grammars for Natural Language

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.

Learning Outcomes:

At the end of the module, students will be able to:
- Classify Grammars for Natural Language (L2)
- Explain Hold Mechanisms in ATNs. (L2)
- Explain Human Preferences in Parsing. (L2)

UNIT IV:
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 Modeling

Introduction, n-Gram Models, Language model Evaluation, Parameter Estimation, Language Model Adaption, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Crosslingual Language Modeling.

Learning Outcomes:

At the end of the module, students will be able to:
- Distinguish Language model Evaluation (L4)
- List the types of Language Models (L1)

UNIT V:
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 Anusarsaka Output, Language Bridges.

Multilingual Information Retrieval

Introduction, Document Preprocessing, 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.

Learning Outcomes:

At the end of the module, students will be able to:
- Apply Machine Translation techniques. (L3)
- Elaborate Multilingual Information Retrieval and Multilingual Automatic Summarization. (L6)

Course Outcomes:
Upon completion of the course, the students should be able to:

- Build NLP applications using Python. (L6)
- Apply various Parsing techniques, Bayes Rule, Shannon game, Entropy and Cross Entropy. (L3)
- Explain the fundamentals of CFG and parsers and mechanisms in ATN's. (L2)
- Apply Semantic Interpretation and Language Modeling..(L3)
- Interpret Machine Translation and multilingual Information Retrieval systems and Automatic Summarization.(L2)

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 Imed Zitouni, Pearson Publications.
3. Natural Language Processing, A paninian perspective, Akshar Bharathi,Vineet chaitanya,Prentice –Hall of India.

REFERENCES 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.

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B.Tech (IT)– IV-I Sem	L	T	P	C
	3	0	0	3

(19A05703c) AGILE METHODOLOGIES
Professional Elective - III

Course Objectives:

This course is designed to:

- Master the art of agile development.
- Understand how an iterative, incremental development process leads to faster delivery of more useful software.
- Elucidate the essence of agile development methods
- Explain the principles and practices of extreme programming

UNIT I:

Why Agile? , How to be Agile, Understanding XP, Values and Principles, Improve the Process, Eliminate Waste, Deliver Value.

Learning Outcomes:

After completing this Unit, students will be able to

- Appraise the importance of Agile and the philosophy behind being Agile (L5)
- Interpret the questions that helps to eliminate waste from the process and increase one's agility (L2)

UNIT II:

Practicing XP-Thinking, Pair Programming, Energized Work, Informative Workspace, RootCause Analysis, Retrospectives, Collaborating, Sit Together, Real Customer Involvement, Ubiquitous Language, Stand-Up Meetings, Coding Standards, Iteration Demo, Reporting.

Learning Outcomes:

After completing this Unit, students will be able to

- Apply practices to excel as mindful developers (L3)
- Illustrate the eight practices to help a team and its stakeholders collaborate efficiently and effectively (L2)

UNIT III:

Releasing-Done Done, No Bugs, Version Control, Ten-Minute Build, Continuous Integration, Collective Code Ownership, Documentation.

Learning Outcomes:

After completing this Unit, students will be able to

- Examine pushing software into production (L4)
- Explain the importance of documentation in ensuring the long-term maintainability of the product at appropriate times. (L2)

UNIT IV:

Planning-Vision, Release Planning, Risk Management, Iteration Planning, Stories, Estimating.

Learning Outcomes:

After completing this Unit, students will be able to

- List the eight practices that allows to control the chaos of endless possibility (L1)

UNIT V:

Developing-Incremental Requirements, Customer Tests, Test- Driven Development, Refactoring, Incremental Design and Architecture, Spike Solutions, Performance Optimization.

Learning Outcomes:

After completing this Unit, students will be able to

- Outline the practices that keep the code clean and allow the entire team to contribute to development. (L2)

Course outcomes:

Upon completion of the course, the students should be able to:

- Adopt Extreme Programming (L1)
- Create own agile method by customizing XP to a particular situation(L6)

Text Books:

1. James Shore and Shane Warden, " The Art of Agile Development", O'REILLY, 2007.

References:

1. Robert C. Martin, "Agile Software Development, Principles, Patterns, and Practices" , PHI, 2002.
2. Angel Medinilla, "Agile Management: Leadership in an Agile Environment", Springer, 2012.
3. Bhuvan Unhelkar, "The Art of Agile Practice: A Composite Approach for Projects and Organizations", CRC Press.
4. Jim Highsmith, "Agile Project Management", Pearson education, 2004.

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B.Tech (IT)– IV-I   L   T   P   C
                                                      3   0   0   3

(19A01704a)   AIR POLLUTION AND CONTROL
OPEN ELECTIVE-III

Course Objectives:

- To identify the sources of air pollution
- To know the composition and structure of atmosphere
- To know the pollutants dispersion models
- To understand the working of air pollution control equipments
- To identify the sources of noise pollution and their controlling methods

UNIT I

Introduction: sources, effects on – ecosystems, characterization of atmospheric pollutants, air pollution episodes of environmental importance. Indoor Air Pollution– sources, effects.

Learning Outcomes:
After completing this Unit, students will be able to

- To understand the character of atmospheric pollutants and their effects

UNIT II

Meteorology - composition and structure of the atmosphere, wind circulation, solar radiation, lapse rates, atmospheric stability conditions, wind velocity profile, Maximum Mixing Depth (MMD), Temperature Inversions, Wind rose diagram.

Learning Outcomes:
After completing this Unit, students will be able to

- Understand the composition and structure and structure of atmosphere
- To understand the maximum mixing depth and windrose diagram

UNIT III

General characteristics of stack emissions, plume behaviour, heat island effect. Pollutants dispersion models – description and application of point, line and areal sources. Monitoring of particulate matter and gaseous pollutants –respirable, non-respirable and nano - particulate matter. CO, CO2, Hydrocarbons (HC), SOX and NOX, photochemical oxidants.

Learning Outcomes:
After completing this Unit, students will be able to

- To know about the general characteristics of stack emissions and their behavior
- To understand the monitoring of particulate matter and gaseous pollutants

UNIT IV

Air Pollution Control equipment for particulate matter & gaseous pollutants– gravity settling chambers, centrifugal collectors, wet collectors, fabric filters, electrostatic precipitator (ESP). – Adsorption, Absorption, Scrubbers, Condensation and Combustion.

Learning Outcomes:
After completing this Unit, students will be able to

- To know about the various air pollution control equipments

UNIT V

Noise - sources, measurements, effects and occupational hazards. Standards, Noise mapping, Noise attenuation equations and methods, prediction equations, control measures, Legal aspects of noise.

Learning Outcomes:
After completing this Unit, students will be able to

- To know about the noise sources, mapping, prediction equations etc.,

Course Outcomes:
Upon the successful completion of this course, the students will be able to:
- Identify the sources of air pollution
- Understand the composition and structure and structure of atmosphere.
- Know about the general characteristics of stack emissions and their behavior
- Know about the general characteristics of stake emission and their behavior
- Know about the noise sources, mapping, prediction equations etc.,

REFERENCES:

1. WarkK ., Warner C.F., and Davis W.T., "Air Pollution - Its Origin and Control", Harper & Row Publishers, New York.
2. Lee C.C., and Lin S.D., "Handbook of Environmental Engineering Calculations", McGraw Hill, New York.
3. Perkins H.C., "Air Pollution", McGraw Hill.
4. Crawford M., "Air Pollution Control Theory", TATA McGraw Hill.
5. Stern A.C., "Air Pollution", Vol I, II, III.
6. Seinfeld N.J.,, "Air Pollution", McGraw Hill.
7. Stern A.C. Vol. V, "Air Quality Management".
8. M N Rao and HVN Rao, Air Pollution" Tata McGraw Hill publication

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B.Tech (IT)– IV-I   **L   T   P   C**

                                                 3   0   0   3

(19A01704b)   BASICS OF CIVIL ENGINEERING
OPEN ELECTIVE-III

Course Objectives:

- To identify the traditional materials that are used for building constructions
- To know the principles of building planning
- To know the causes of dampness in structures and its preventive measures
- To know about the low cost housing techniques
- To know the basic principles of surveying

UNIT I

Traditional materials: Stones- Types of stone masonry -Brick-types of brick masonry- lime Cement – Timber – Seasoning of timber - their uses in building works

Learning Outcomes:

After completing this Unit, students will be able to

- To understand the characteristics of different building materials.

UNIT II

Elements of building planning- basic requirements-orientation-planning for energy efficiency-planning based on utility-other requirements.

Learning Outcomes:

After completing this Unit, students will be able to

- To understand the principles of planning in buildings

UNIT III

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.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the causes of dampness in buildings and its ill effects
- To know about the general characteristics of ideal material for damp proofing

UNIT IV

Cost effective construction techniques in mass housing schemes: Minimum standards –Approach to cost effective mass housing schemes- cost effective construction techniques.

Learning Outcomes:
After completing this Unit, students will be able to

- To know about the various cost effective techniques in mass housing schemes.

UNIT V

Introduction to Surveying: Object and uses of surveying- Primary divisions in surveying-Fundamental principles of surveying- Classification of surveying-plans and maps-scales-types of graphical scales- units and measurements

Learning Outcomes:
After completing this Unit, students will be able to

- To know about the objects of surveying and its classification.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:
- Identify the traditional building materials that are used in building construction.
- Plan the buildings based on principles of planning.
- Identify the sources of dampness and its ill effects on buildings and its prevention.
- Know the cost effective construction in mass housing schemes.
- Know the importance of surveying in planning of the buildings.

Text books:

1. S.S.Bhavikatti, "Basic civil engineering", New age international publishers.
2. S.S.Bhavikatti, "Building Construction:, Vikas Publishing house, New Delhi.
3. G.C.Sahu and Joygopal jena, "Building materials and Construction", McGraw Hill Education.

Reference books:

1. N.Subramanian, "Building Materials testing and sustainability", Oxford university press.

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B.Tech (IT)– IV-I Sem   **L   T   P   C**
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(19A02704a) RENEWABLE ENERGY SYSTEMS

OPEN ELECTIVE-III

Course Objectives:

At the end of the course the student will be able to
- Identify various sources of Energy and the need of Renewable Energy Systems.
- Understand the concepts of Solar Radiation, Wind energy and its applications.
- Distinguish between solar thermal and solar PV systems
- Interpret the concept of geo thermal energy and its applications.
- Understand the use of biomass energy and the concept of Ocean energy and fuel cells.

UNIT -I

Solar Energy

Solar radiation - beam and diffuse radiation, solar constant, earth sun angles, attenuation and measurement of solar radiation, local solar time, derived solar angles, sunrise, sunset and day length. flat plate collectors, concentrating collectors, storage of solar energy-thermal storage.

Learning Outcomes:
At the end of the course the student will be able to
- To understand about solar thermal parameters
- To distinguish between flat plate and concentrated solar collectors
- To know about thermal storage requirements
- To know about measurement of solar radiation

UNIT – II

PV Energy Systems

Introduction, The PV effect in crystalline silicon basic principles, the film PV, Other PV technologies, Electrical characteristics of silicon PV cells and modules, PV systems for remote power, Grid connected PV systems.

Learning Outcomes:
After completing this Unit, students will be able to

- Understand the concept of PV effect in crystalline silicon and their characteristics
- Understand other PV technologies
- To know about electrical characteristics of PV cells & modules
- To know about grid connected PV systems

UNIT - III

Wind Energy

Principle of wind energy conversion; Basic components of wind energy conversion systems; wind mill components, various types and their constructional features; design considerations of horizontal and vertical axis wind machines: analysis of aerodynamic forces acting on wind mill blades and estimation of power output; wind data and site selection considerations.

Learning Outcomes:
After completing this Unit, students will be able to

- To understand basics of wind energy conversion and system
- To distinguish between VAWT and HAWT systems
- To understand about design considerations
- To know about site selection considerations of WECS

UNIT - IV

Geothermal Energy

Estimation and nature of geothermal energy, geothermal sources and resources like hydrothermal, geo-pressured hot dry rock, magma. Advantages, disadvantages and application of geothermal energy, prospects of geothermal energy in India.

Learning Outcomes:
After completing this Unit, students will be able to

- Understand the Geothermal energy and its mechanism of production and its applications
- Analyze the concept of producing Geothermal energies
- To learn about disadvantages and advantages of Geo Thermal Energy Systems
- To know about various applications of GTES

UNIT -V

Miscellaneous Energy Technologies

Ocean Energy: Tidal Energy-Principle of working, performance and limitations. Wave Energy-Principle of working, performance and limitations.

Bio mass Energy: Biomass conversion technologies, Biogas generation plants, Classification, advantages and disadvantages, constructional details, site selection, digester design consideration

Fuel cell: Principle of working of various types of fuel cells and their working, performance and limitations.

Learning Outcomes:

After completing this Unit, students will be able to

- Analyze the operation of tidal energy
- Analyze the operation of wave energy
- Analyze the operation of bio mass energy
- Understand the principle, working and performance of fuel cell technology
- Apply these technologies to generate power for usage at remote centres

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- To distinguish between various alternate sources of energy for different suitable application requirements
- To differentiate between solar thermal and PV system energy generation strategies
- To understand about wind energy system
- To get exposed to the basics of Geo Thermal Energy Systems
- To know about various diversified energy scenarios of ocean, biomass and fuel cells

Text Books:

1. Stephen Peake, "Renewable Energy Power for a Sustainable Future", Oxford International Edition, 2018.
2. G. D. Rai, "Non-Conventional Energy Sources", 4th Edition, Khanna Publishers, 2000.

References:

1. S. P. Sukhatme, "Solar Energy",3rd Edition, Tata Mc Graw Hill Education Pvt. Ltd, 2008.
2. B H Khan , " Non-Conventional Energy Resources", 2nd Edition, Tata Mc Graw Hill Education Pvt Ltd, 2011.
3. S. Hasan Saeed and D.K.Sharma,"Non-Conventional Energy Resources",3rd Edition, S.K.Kataria & Sons, 2012.
4. G. N. Tiwari and M.K.Ghosal, "Renewable Energy Resource: Basic Principles and Applications", Narosa Publishing House, 2004.

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(19A02704b) ELECTRIC VEHICLE ENGINEERING
OPEN ELECTIVE-III

Course Objectives:
After completing this Unit, students will be able to

- To get exposed to new technologies of battery electric vehicles, fuel cell electric vehicles
- To get exposed to EV system configuration and parameters
- To know about electro mobility and environmental issues of EVs
- To understand about basic EV propulsion and dynamics
- To understand about fuel cell technologies for EV and HVEs
- To know about basic battery charging and control strategies used in electric vehicles

UNIT-I
Introduction to EV Systems and Parameters

Past, Present and Future EV, EV Concept, EV Technology, State-of-the Art EVs, EV configuration, EV system, Fixed and Variable gearing, single and multiple motor drive, in-wheel drives, EV parameters: Weight, size, force and energy, performance parameters.

Learning Outcomes:
After completing this Unit, students will be able to

- To know about past, present and latest technologies of EV
- To understand about configurations of EV systems
- To distinguish between EV parameters and performance parameters of EV systems
- To distinguish between single and multiple motor drive EVs
- To understand about in-wheel EV

UNIT-II
EV and Energy Sources

Electro mobility and the environment, history of Electric power trains, carbon emissions from fuels, green houses and pollutants, comparison of conventional, battery, hybrid and fuel cell electric systems

Learning Outcomes:
After completing this Unit, students will be able to

- To know about various types of EV sources
- To understand about e-mobility
- To know about environmental aspects of EV
- To distinguish between conventional and recent technology developments in EV systems

UNIT-III
EV Propulsion and Dynamics

Choice of electric propulsion system, block diagram, concept of EV Motors, single and multi motor configurations, fixed and variable geared transmission, In-wheel motor configuration, classification, Electric motors used in current vehicle applications, Recent EV Motors, Vehicle load factors, vehicle acceleration.

Learning Outcomes:
After completing this Unit, students will be able to

- To know about what is meant by propulsion system
- To understand about single and multi motor EV configurations
- To get exposed to current and recent applications of EV
- To understand about load factors in vehicle dynamics
- To know what is meant acceleration in EV

UNIT-IV
Fuel Cells

Introduction of fuel cells, basic operation, model, voltage, power and efficiency, power plant system – characteristics, sizing, Example of fuel cell electric vehicle.
Introduction to HEV, brake specific fuel consumption, comparison of series, series-parallel hybrid systems, examples

Learning Outcomes:
After completing this Unit, students will be able to

- To know about fuel cell technology of EV
- To know about basic operation of FCEV
- To know about characteristics and sizing of EV with suitable example
- To get exposed to concept of Hybrid Electric Vehicle using fuel cells
- To know about the comparison of various hybrid EV systems

UNIT-V
Battery Charging and Control

Battery charging: Basic requirements, charger architecture, charger functions, wireless charging, power factor correction.

Control: Introduction, modelling of electro mechanical system, feedback controller design approach, PI controllers designing, torque-loop, speed control loop compensation, acceleration of battery electric vehicle

Learning Outcomes:

After completing this Unit, students will be able to

- To understand about basic requirements of battery charging and its architecture
- To know about charger functions
- To get exposed to wireless charging principle
- To understand about block diagram, modelling of electro mechanical systems of EV
- To be able to design various compensation requirements

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- To understand and differentiate between conventional and latest trends in Electric Vehicles
- To know about various configurations in parameters of EV system
- To know about propulsion and dynamic aspects of EV
- To understand about fuel cell technologies in EV and HEV systems
- To understand about battery charging and controls required of EVs

TEXT BOOKS:

1. C.C Chan, K.T Chau: "Modern Electric Vehicle Technology", Oxford University Press Inc., New York 2001.
2. James Larminie, John Lowry, "Electric Vehicle Technology Explained", Wiley, 2003.

REFERENCE BOOKS:

1. Iqbal Husain,, "Electric and Hybrid Vehicles Design Fundamentals", CRC Press 2005.
2. Ali Emadi, "Advanced Electric Drive Vehicles", CRC Press, 2015.

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(19A03704a)   FINITE ELEMENT METHODS
OPEN ELECTIVE-III

Course Objectives:

- Familiarize basic principles of finite element analysis procedure.
- Explain   theory and characteristics of finite elements that represent engineering structures.
- Apply finite element solutions to structural, thermal, dynamic problem.
- Learn to model complex geometry problems and solution techniques.

UNIT – I

Introduction to finite element methods for solving field problems, Stress and equilibrium, Boundary conditions, Strain-Displacement relations, Stress- strain relations for 2D and 3D Elastic problems.Potential energy and equilibrium, The Rayleigh-Ritz method, Formulation of Finite Element Equations.

One dimensional problems: Finite element modeling coordinates and shape functions. Assembly of global stiffness matrix and load vector. Finite element equations, Treatment of boundary conditions, Quadratic shape functions.

Learning Outcomes:

At the end of the unit, the student will be able to
- Understand the concept of nodes and elements.(l2)
- Understand the general steps of finite element methods.(l2)
- Understand the role and significance of shape functions in finite element formulations (l2)
- Formulate and solve axially loaded bar problems. (l6)

UNIT - II

Analysis of trusses: Stiffness Matrix for plane truss element. Stress Calculations and Problems.
Analysis of beams: Element Stiffness Matrix for two noded, two degrees of freedom per node beam element and simple problems.

Learning Outcomes:

At the end of the unit, the student will be able to
- Explain the use of the basic finite elements for structural applications using truss and beam. (l2)
- Formulate and analyze truss and beam problems. (l6)

UNIT - III

Finite element modeling of two dimensional stress analysis - constant strain triangles-quadrilateral element-treatment of boundary conditions. Estimation of load Vector, Stresses.Finite element modeling of Axi-symmetric solids subjected to axi-symmetric loading with triangular elements.Two dimensional four nodedIsoparametric elements and problems.

Learning Outcomes:

At the end of the unit, the student will be able to
- Explain the formulation of two – dimensional elements (Triangular and Quadrilateral Elements). (L2)
- Apply the formulation techniques to solve two – dimensional problems using triangle and quadrilateral elements. (L3)
- Formulate and solve axisymmetric problems.(L6)

UNIT - IV

Steady state heat transfer analysis: One dimensional analysis of slab and fin, two dimensional analysis of thin plate.
Analysis of a uniform shaft subjected to torsion loading.

Learning Outcomes:

At the end of the unit, the student will be able to
- Explain the application and use of the Finite Element Methods for heat transfer problems. (L2)
- Formulate and solve heat transfer problems. (L6)
- Analyse the

UNIT V

Dynamic analysis: Formulation of finite element model,element –mass matrices,evaluation of Eigen values and Eigen vectors for a stepped bar truss.
3D Problems: Finite Element formulation- Tetrahedron element-Stiffness matrix.

Learning Outcomes:

At the end of the unit, the student will be able to
- Understand problems involving dynamics using Finite Element Methods.
- Evaluate the Eigen values and Eigen Vectors for steeped bar.
- Develop the stiffness matrix for tetrahedron element.

Course Outcomes:

Upon successful completion of this course you should be able to
- Understand the concepts behind variational methods and weighted residual methods in FEM.
- Identify the application and characteristics of FEA elements such as bars, beams, and isoparametric elements, and 3-D element.
- Develop element characteristic equation procedure and generation of global stiffness equation will be applied.
- Able to apply Suitable boundary conditions to a global structural equation, and reduce it to a solvable form.
- Able to identify how the finite element method expands beyond the structural domain, for problems involving dynamics, heat transfer and fluid flow.

TEXT BOOKS

1. Chandraputla, Ashok &Belegundu, "Introduction to Finite Element in Engineering", Prentice Hall.
2. S.S.Rao, "The Finite Element Methods in Engineering", 2nd Edition, Elsevier Butterworth - Heinemann 2011.

REFERENCE BOOKS

1. J N Reddy, "An introduction to the Finite Element Method", McGraw – Hill, New York, 1993.
2. R D Cook, D S Malkus and M E Plesha, "Concepts and Applications of Finite Element Analysis", 3rd Edition, John Wiley, New York, 1989.
3. K J Bathe, "Finite Element Procedures in Engineering Analysis", Prentice-Hall, Englewood Cliffs,1982.
4. T J R Hughes, "the Finite Element Method, Prentice", Hall, Englewood Cliffs, NJ, 1986.
5. C Zienkiewicz and R L Taylor, "the Finite Element Method", 3rd Edition. McGraw-Hill, 1989.

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(19A03704b)   PRODUCT MARKETING
OPEN ELECTIVE-III

Course Objectives:

- Introduce the basic concepts of Product marketing.
- Familiarize with market information systems and research
- Understand the nature and importance of industrial market
- Discuss the major stages in new product development
- Identify the factors affecting pricing decisions

UNIT I:
Introduction (7 Hours)

Historical development of marketing management, Definition of Marketing, Core marketing concepts, Marketing Management philosophies, Micro and Macro Environment, Characteristics affecting Consumer behaviour, Types of buying decisions, buying decision process, Classification of consumer products, Market Segmentation Concept of Marketing Myopia. Importance of marketing in the Indian Socio economic system.

Learning Outcomes:

At the end of this student, the student will be able to
- Define Marketing. (L1)
- Discuss marketing philosophies. (L2)
- Sketch the buying decision process. (L3)
- Understand the importance of marketing in the Indian socio economic system. (L2)

UNIT II:

Marketing of Industrial Products (6 Hours)

Components of marketing information system–benefits & uses marketing research system, marketing research procedure, Demand Estimation research, Test marketing, Segmentation Research - Cluster analysis, Discriminate analysis. Sales forecasting: objective and subjective methods. Nature and importance of the Industrial market, classification of industrial products, participants in the industrial buying process, major factors influencing industrial buying behavior, characteristics of industrial market demand. Determinants of industrial market demand Buying power of Industrial users, buying motives of Industrials users, the industrial buying process, buying patterns of industrial users.

Learning Outcomes:

At the end of this student, the student will be able to
- Identify the components of marketing information system. (L2)
- List the advantages and uses of marketing research system. (L1)
- Demonstrate sales forecasting. (L3)
- Explain the major factors influencing industrial buying behaviour. (L2)

UNIT III:

Product Management And Branding (7 Hours)

The concept of a product, features of a product, classification of products, product policies – product planning and development, product line, product mix – factors influencing change in product mix, product mix strategies, meaning of "New – product; major stages in new – product development product life cycle. Branding: Reasons for branding, functions of branding features of types of brands, kinds of brand name.

Learning Outcomes:

At the end of this student, the student will be able to
- Indentify the factors influencing change in product mix. (L2)
- Sketch various stages in product life cycle. (L2)
- Recall the features of a product and product policies. (L1)
- Demonstrate on features, functions and reasons of branding. (L3)

UNIT IV:

Pricing And Pacakaging (7Hours)

Importance of Price, pricing objectives, factors affecting pricing decisions, procedure for price determination, kinds of pricing, pricing strategies and decisions Labeling: Types, functions advantages and disadvantages, Packaging**:** Meaning, growth of packaging, function of packaging, kinds of packaging.

Learningt Outcomes:

At the end of this student, the student will be able to
- List the factors affecting pricing decisions. (L1)
- Explain the procedure for price determination. (L2)

- Employ Pricing strategies and decisions. (L3)
- Understand the functions of labelling and packaging. (L2)

UNIT V:

Product Promotion (6Hours)

Importance of Price, pricing objectives, factors affecting pricing decisions, procedure for price determination, kinds of pricing, pricing strategies and decisions. Advertising and sales promotion**:** Objectives of advertisement function of advertising, classification of advertisement copy, advertisement media – kinds of media, advantages of advertising. Objectives of sales promotion, advantages sales promotion. Personal Selling **:** Objectives of personal selling, qualities of good salesman, types of salesman, major steps in effective selling

Learning Outcomes:

At the end of this student, the student will be able to
- Discuss the procedures for price determination. (L2)
- Explain the objectives of advertisement function of advertising. (L2)
- List the advantages and disadvantages of advertising. (L1)
- Describe the major steps in effecting selling. (L2)

Course Outcomes:

At the end of the course, the student will be able to
- Understand basic marketing management concepts and their relevance to business development. (L2)
- Prepare a questionnaire for market research. (L5)
- Design marketing research plan for business organizations. (L5)
- Optimize marketing mix to get competitive advantage. (L4)

Text Books:

1. Philip Kotler, "Principles of Marketing", Prentice – Hall.
2. Philip Kotler, "Marketing Management", Prentice – Hall.

Reference Books:
1. Wiliam J Stanton, "Fundamentals of Marketing", McGraw Hill
2. R.S.N. Pillai and Mrs.Bagavathi, "Marketing", S. Chand & Co. Ltd
3. Rajagopal, "Marketing Management Text & Cases", Vikas Publishing House

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(19A04704a)   INTRODUCTION TO MICROCONTROLLERS & APPLICATIONS
OPEN ELECTIVE-III

Course Objectives:

This course will enable students to:
- Describe theArchitecture 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.

UNIT – I

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.

Learning Outcomes:

At the end of this student, the student will be able to
- Understand the importance of Microcontroller and acquire the knowledge of Architecture of 8051 Microcontroller. (L1)
- Analyze interface required memory of RAM & ROM. (L3)

UNIT – II

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

Learning Outcomes:

At the end of this student, the student will be able to
- Explain different types instruction set of 8051. (L1)
- Develop the 8051 Assembly level programs using 8051 instruction set. (L3)

UNIT – III

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.

Learning Outcomes:

At the end of this student, the student will be able to
- Describe Stack and Subroutine of 8051. (L1)
- Design Timer /counters using of 8051. (L4)

UNIT –IV

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.

Learning Outcomes:

At the end of this student, the student will be able to
- Acquire knowledge of Serial Communication and develop serial port programming. (L1)
- Develop an ALP to generate an external interrupt using a switch. (L3)

UNIT – V

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.

Learning Outcomes:

At the end of this student, the student will be able to
- Apply and Interface simple switches, simple LEDs, ADC 0804 and LCD to using 8051 I/O ports. (L2)
- Design Stepper Motor and f motor interfacing of 8051. (L4)

Course outcomes:

- Understand the importance of Microcontroller and 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, operation of Timers/Counters and Serial port of 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.

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(19A04704b)   PRINCIPLES OF DIGITAL SIGNAL PROCESSING
OPEN ELECTIVE-III

Course Objectives:

- To explain about signals and perform various operations on it.
- To understand discrete time signals and systems.
- To solve Laplace transforms and z-transforms for various signals.
- To find Discrete Fourier Transform of a sequence by using Fast Fourier Transform.
- To design and realize IIR and FIR filters.

UNIT- I:

INTRODUCTION TO SIGNALS

Classification of Signals: Analog, Discrete, Digital, Deterministic & Random, Periodic & Aperiodic, Even & Odd, Energy & Power signals. Basic operations on signals: Time shifting, Time scaling, Time reversal, Amplitude scaling and Signal addition. Elementary Signals: Unit step, Unit ramp, Unit parabolic, Impulse, Sinusoidal function, Exponential function, Gate function, Triangular function, Sinc function and Signum function.

Learning Outcomes:

At the end of this student, the student will be able to
- Define basic signals and its operations, Classify discrete time signals and systems. (L1)
- Understand various basic operations on signals (L1)

UNIT – II:

DISCRETE TIME SIGNALS AND SYSTEMS

Discrete Time Signals: Elementary discrete time signals, Classification of discrete time signals: power and energy signals, even and odd signals. Simple manipulations of discrete time signals: Shifting and scaling of discrete-time signals.
Discrete Time Systems: Input-Output description of systems, Block diagram representation of discrete time systems, Linear Constant Coefficient Difference Equations, Classification of discrete time systems: linear and nonlinear, time-invariant and variant systems, causal and non causal, stable and unstable systems.

Learning Outcomes:

At the end of this student, the student will be able to
- Define basic signals and its operations, Classify discrete time signals and systems. (L1)
- Understand various basic operations on signals (L1)

UNIT- III:
LAPLACE TRANSFORMS AND Z- TRANSFORMS

Laplace Transforms: Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of Region of Convergence (ROC), Constraints on ROC for various classes of signals, Properties of Laplace transforms.
Z-Transforms: Concept of Z-transform of a discrete sequence, Region of convergence in Z-Transform, constraints on ROC for various classes of signals, inverse Z-transform, properties of Z-Transforms.

Learning Outcomes:

At the end of this student, the student will be able to
- Understand the basic concepts of Laplace and Z transforms (L1)
- Apply the transform techniques to solve the problems (L2)

UNIT – IV:

FAST FOURIER TRANSFORMS

Discrete Time Fourier Transform (DTFT), Discrete Fourier Transform (DFT), Radix-2 Fast Fourier Transforms (FFT), Decimation in Time and Decimation in Frequency FFT Algorithms: radix-2 DIT-FFT, DIF-FFT, and Inverse FFT: IDFT-FFT.

Learning Outcomes:

At the end of this student, the student will be able to
- Understand the importance of DTFT, DFT, FFT and their inverse transforms with respect to signals and systems (L1)
- Analyze the Decimation in time and frequency algorithms (L3)

UNIT – V:

IIR AND FIR DIGITAL FILTERS

IIR DIGITAL FILTERS: Analog filters approximations: Butterworth and Chebyshev, Design of IIR digital filters from analog filters. Realization of IIR filters: Direct form-I, Direct form-II, cascade form and parallel form.

FIR DIGITAL FILTERS: Characteristics of FIR digital filters, frequency response. Design of FIR digital filters using window techniques: Rectangular window, Triangular or Bartlett window, Hamming window, Hanning window, Blackman window. Realization of FIR filters: Linear phase and Lattice structures.

Learning Outcomes:

At the end of this student, the student will be able to
- Understand the importance of IIR and FIR digital Filters (L1)
- Realize IIR filters and analyze various windowing techniques in FIR filters (L2)
- Design IIR and FIR filters (L4)

Course outcomes:

- Define basic signals and its operations, Classify discrete time signals and systems.
- Solve Laplace Transform and z-Transform for various signals, Calculate DFT of a given sequence by using Fast Fourier Transform.
- Analyze the continuous and discrete signals and systems
- Design and realize IIR and FIR filters from the given specifications.

TEXT BOOKS:

1. B. P. Lathi, "Signals, Systems and Communications", BS Publications, 2008.
2. John G. Proakis, Dimitris G. Manolakis, "Digital signal processing, principles, Algorithms and applications" , 4th edition , Pearson Education/PHI, 2007.
3. A.V. Oppenheim and R.W. Schaffer, "Discrete Time Signal Processing", 2nd edition., PHI.

REFERENCES:

1. A.V. Oppenheim, A.S. Will sky and S.H. Nawab, "Signals and Systems", PHI, 2nd Edition, 2013.
2. A. Anand Kumar, "Signals and Systems", PHI Publications, Third Edition, 2013
3. P. Ramesh Babu. "Digital Signal Processing".
4. Andreas Antoniou, "Digital signal processing", Tata McGraw Hill, 2006.
5. R S Kaler, M Kulkarni,, Umesh Gupta, "A Text book on Digital Signal processing" –I K International Publishing House Pvt. Ltd.
6. M H Hayes, Schaum's Outlines, "Digital Signal Processing", Tata Mc-Graw Hill, 2007.

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(19A05704a) FUNDAMENTALS OF GAME DEVELOPMENT

(Common to CSE & IT)

Course Objectives:

This course is designed to:

- Get familiarized with the various components in a game and game engine.
- Explore the leading open source game engine components.
- Elaborate on game physics.
- Introduce to the game animation.
- Expose to network-based gaming issues.

Unit – 1: Introduction to Game
What is a Game? The Birth of Games, The Rise of Arcade Games, The Crash and Recovery, The Console Wars, Online Games and Beyond.

The Game Industry: Game Industry Overview, Game Concept Basics, Pitch Documentation, pitching a Game to a Publisher, Managing the developer-Publisher Relationship, Legal Agreements, Licenses, Console Manufacturers Approval.

Roles on the Team: Production, Art, Engineering, Design, Quality Assurance Testing, Team Organization, Corporate.

Learning Outcomes:

After completing this Unit, students will be able to

- Demonstrate online games and beyond. [L2]
- Outline the process carried out in the Game Industry [L2]
- Inspect the roles on the Team[L4]

Unit – 2: Teams
Project Leadership, Picking Leads, Team Building, Team Buy-in and Motivation.

Effective Communication: Written Communication, Oral Communication, Nonverbal Communication, Establishing Communication Norms, Communication Challenges.

Game Production Overview: Production Cycle, Preproduction, Production, Testing, Postproduction.

Learning Outcomes:

After completing this Unit, students will be able to

- Build a team and pick a leader. [L6]
- Develop Effective communication. [L3]
- Outline the Game Production cycle [L2]

Unit – 3: Game Concept
Introduction, Beginning the Process, Defining the Concept, Game Programming Basics, Prototyping, Risk Analysis, Pitch Idea, Project Kickoff.

Characters, setting, and Story: Story Development, Gameplay, Characters, Setting, Dialogue, Cinematics, Story Documentation.

Game Requirements: Define Game Features, Define Milestones and Deliverables, Evaluate Technology, Define Tools and Pipeline, Documentation, Approval, Game Requirements Outline

Learning Outcomes:

After completing this Unit, students will be able to

- Design a game. [L6]
- Demonstrate the game play. [L2]
- Identify the Game requirements [L3]

Unit – 4 : Game Plan
Dependencies, Schedules, Budgets, Staffing, Outsourcing, Middleware, Game Plan Outline.
Production Cycle: Design Production Cycle, Art Production Cycle, Engineering Production Cycle, Working Together.
Voiceover and Music: Planning for Voiceover, choosing a Sound Studio, Casting Actors, Recording Voiceover, Voiceover Checklist, Planning for Music, Working with a Composer, Licensing Music.

Learning Outcomes:

After completing this Unit, students will be able to

- Outline the Game plan. [L2]
- Define the production cycle. [L1]
- Make use of voiceover and music in game development. [L3]

Unit – 5 :Localization
Creating International Content, Localization-Friendly Code, Level of Localization, Localization Plan, Testing, Localization Checklist.

Testing and Code Releasing: Testing Schedule, Test Plans, Testing Pipeline, Testing Cycle, External Testing, Determining Code Release, Code Release Checklist, Gold Masters, Postmortems.

Marketing and Public Relations: Software Age Ratings, Working with Marketing, Packaging, Demos, Marketing Assets, Game Builds, Working with Public Relations, Asset Deliverable Checklist.

Learning Outcomes:

After completing this Unit, students will be able to

- Explain the importance of localization. [L2]
- Summarize Testing and code releasing [L2]
- Illustrate Marketing and public relations. [L2]

Course Outcomes:
Upon completion of the course, the students should be able to:

- Design games for commercialization (L6)
- Predict the trends in game development (L5)
- Design Game Plan and production cycle (L6)
- Dramatize the game playing environment (L4)

Text Book:

1. Heather Maxwell Chandler, and Rafael Chandler, "Fundamentals of Game Development", Jones& Bartlett Learning, 2011.

References:
1. Flint Dille and John Zuur Platten, The Ultimate guide to Video Game Writing, Loan Eagle publisher, 2008.
2. Adams, Fundamentals of Game Design, 3rd edition, Pearson Education India, 2015.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (IT)– IV-I Sem   **L   T   P   C**
                                                     3   0   0   3

(19A05704b) CYBER SECURITY
(Common to CSE & IT)

Course Objectives:

This course is designed to:
- Understand essential building blocks and basic concepts of cyber security
- Explore Web security and Network security
- Explain the measures for securing the networks and cloud
- Understand privacy principles and policies
- Describe the legal issues and ethics in computer security

UNIT I

Introduction: Introduction to Computer Security, Threats, Harm, Vulnerabilities, Controls, Authentication, Access Control, and Cryptography, Authentication, Access Control, Cryptography.

Programs and Programming: Unintentional (Non-malicious) Programming Oversights, Malicious Code—Malware, Countermeasures.

Learning Outcomes:

After completing this Unit, students will be able to

- Explain Vulnerabilities, threats and. Counter measures for computer security[L2]
- Interpret the design of the malicious code [L2]

UNIT II

Web Security: User Side, Browser Attacks, Web Attacks Targeting Users, Obtaining User or Website Data, Email Attacks.

Operating Systems Security: Security in Operating Systems, Security in the Design of Operating Systems, Rootkit.

Learning Outcomes:

After completing this Unit, students will be able to

- Outline the attacks on browser, Web and email. [L2]
- Explain the security aspects of Operating Systems. [L3]

UNIT III

Network Security: Network Concepts, Threats to Network Communications, Wireless Network Security, Denial of Service, Distributed Denial-of-Service Strategic Defenses: Security Countermeasures, Cryptography in Network Security, Firewalls, Intrusion Detection

and Prevention Systems, Network Management .
Cloud Computing and Security: Cloud Computing Concepts, Moving to the Cloud, Cloud Security Tools and Techniques, Cloud Identity Management, Securing IaaS.

Learning Outcomes:

After completing this Unit, students will be able to

- Identify the network security threats and attacks. [L3]
- Design the Counter measures to defend the network security attacks. [L6]
- Analyze the security tools and techniques for Cloud computing [L4]

UNIT IV
Privacy: Privacy Concepts, Privacy Principles and Policies, Authentication and Privacy, Data Mining, Privacy on the Web, Email Security, Privacy Impacts of Emerging Technologies, Where the Field Is Headed.
Management and Incidents: Security Planning, Business Continuity Planning, Handling Incidents, Risk Analysis, Dealing with Disaster.

Learning Outcomes:

After completing this Unit, students will be able to

- Interpret the need for Privacy and its impacts of Emerging Technologies. [L2]
- Explain how to handle incidents and deal with Disaster. [L2]

UNIT V
Legal Issues and Ethics: Protecting Programs and Data, Information and the Law, Rights of Employees and Employers, Redress for Software Failures, Computer Crime, Ethical Issues in Computer Security, Incident Analysis with Ethics, Emerging Topics: The Internet of Things, Economics, Computerized Elections, Cyber Warfare.

Learning Outcomes:

After completing this Unit, students will be able to

- Adapt legal issues and ethics in computer security. [L6]
- Elaborate on the Emerging topics. [L6]

Course Outcomes:
Upon completion of the course, the students should be able to:

- Illustrate the broad set of technical, social & political aspects of Cyber Security and security management methods to maintain security protection (L2)
- Assess the vulnerabilities and threats posed by criminals, terrorist and nation states to

national infrastructure (L5)
- Identify the nature of secure software development and operating systems (L3)
- Demonstrate the role security management in cyber security defense (l2)
- Adapt the legal and social issues at play in developing solutions.(L6)

Text Books:
1) Pfleeger, C.P., Security in Computing, Prentice Hall, 2010, 5th edition.
2) Schneier, Bruce. Applied Cryptography, Second Edition, John Wiley & Sons, 1996

Reference Books:
1) Rhodes-Ousley, Mark. Information Security: The Complete Reference, Second Edition, Information Security Management: Concepts and Practice, McGraw-Hill, 2013.
2) Whitman, Michael E. and Herbert J. Mattord. Roadmap to Information Security for IT and Infosec Managers. Boston, MA: Course Technology, 2011.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

	L	T	P	C
B.Tech (IT)– IV-I Sem	3	0	0	3

(19A27704a)   CORPORATE GOVERNANCE IN FOOD INDUSTRIES
OPEN ELECTIVE III

PREAMBLE

This text focuses on corporate governance, business ethics and emerging trends in food industries.

Course Objectives

- To understand the concepts of corporate governance in view of food industry

UNIT – I

Corporate Governance- A Conceptual Foundation: Concept, nature, issues and importance of corporate governance, origin and development of corporate governance, concept of corporate management, Different models of corporate governance, corporate governance in family business, corporate governance failure with examples.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Concept, nature, issues and importance of corporate governance
- origin and development of corporate governance, concept of corporate management
- Different models of corporate governance
- corporate governance in family business, corporate governance failure with examples

UNIT – II

Role Players: Role of various players viz. Role of shareholders their rights and responsibilities, Role of board of directors in corporate governance- executive and non executive directors, independent and nominee directors, Role of Auditors, audit committee, media.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Role of shareholders their rights and responsibilities

- Role of board of directors in corporate governance- executive and non executive directors, independent and nominee directors
- Role of Auditors, audit committee, media.

UNIT – III

Corporate governance in India and the Global Scenario: Corporate Governance practices /codes in India, UK, Japan, USA. Contributions of CII-recommendations on corporate governance by different committees in India, SEBI guidelines, Kumar Manglam Birla Committee, Naresh Chandra committee Report, OECD Principles, Cadbury Committee

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Corporate Governance practices /codes in India, UK, Japan, USA.
- Contributions of CII-recommendations on corporate governance by different committees in India, SEBI guidelines,
- Have detail study of committees like Kumar Manglam Birla Committee, Naresh Chandra committee Report, OECD Principles, Cadbury Committee

UNIT – IV

Emerging trends: Emerging Trends and latest developments in Corporate Governance. Corporate Governance initiative in India and Abroad, Corporate Governance Rating- Role of rating agencies in corporate governance. ICRA Corporate governance rating method for examining the quality and effectiveness of corporate governance.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Emerging Trends and latest developments in Corporate Governance.
- Corporate Governance initiative in India and Abroad,
- Corporate Governance Rating- Role of rating agencies in corporate governance
- ICRA Corporate governance rating method for examining the quality and effectiveness of corporate governance.

UNIT – V

Business ethics and corporate governance. Social responsibility and corporate governance. Corporate governance and value creation. Political economy of corporate governance.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Business ethics and corporate governance.
- Social responsibility and corporate governance.
- Corporate governance and value creation.
- Political economy of corporate governance.

Course Outcomes:

By the end of the course, the students will
- Attain knowledge on system of corporate governance in food industries.
- Get to know about business ethics and values.

TEXT BOOKS

1. Subhash Chandra Das, "Corporate Governance in India", PHI Pvt. Ltd., New Delhi(2008),
2. Dennis Campbell, "Susan Woodley Trends and Developments In Corporate Governance". (2004)

REFERENCES

1. Jayati Sarkar. "Corporate Governance in India". Sage Publications, New Delhi,2012.
2. Vasudha, Joshi "Corporate Governance The Indian Scenario". Foundations Books Pvt. Ltd. New Delhi. 2012,

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (IT)– IV-I Sem   **L   T   P   C**

                                                             3   0   0   3

(19A27704b)   PROCESS TECHNOLOGY FOR CONVENIENCE & RTE FOODS
OPEN ELECTIVE III

PREAMBLE

This text focuses on various aspects and technologies involved in processing of convenience and Read-to-eat foods.

Course Objectives:

- To understand the importance and demand for convenience foods in present day scenario
- To learn the various technical aspects of convenience and Read-to-eat foods.

UNIT – I

Overview of grain-based snacks: whole grains – roasted, toasted, puffed, popped and flakes Coated grains-salted, spiced and sweetened Flour based snack– batter and dough based products; savoury and farsans; formulated chips and wafers, papads.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Role of cereal based ingredients in snacks industries.
- Various technologies and equipments involved in Snacks industries

UNIT – II

Technology for fruit and vegetable based snacks: chips, wafers, papads etc. Technology of ready to eat fruits and vegetable based food products like, sauces, fruit bars, glazed candy etc. Technology of ready to eat canned value added fruits/vegetables and mixes and ready to serve beverages etc.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Role of Fruits and vegetables in convenience products.
- Processing of various Fruit and vegetable based products.

UNIT – III

Technology of ready- to- eat baked food products, drying, toasting roasting and flaking, coating, chipping. Extruded snack foods: Formulation and processing technology, colouring, flavouring and packaging. Technology for coated nuts – salted, spiced and sweetened products- chikkis, Sing bhujia.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Various methods involved in processing of ready to eat baked products
- Various methods involved in processing of extruded snack foods
- Technology involved in processing different coated nuts

UNIT IV

Technology for ready-to-cook food products- different puddings and curried vegetables etc. Technology for ready-to-cook and ready to eat meat and meat food products. Technology for preparation of instant cooked rice, carrot and other cereals based food products.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Technology involved in processing different ready to cook food products
- Technology involved in processing different ready to cook and ready to eat meat and meat products
- Technology involved in processing different instant cooked cereal products

UNIT – V

Technology of ready to eat instant premixes based on cereals, pulses etc. Technology for RTE puffed snack- sand puffing, hot air puffing, explosion puffing, gun puffing etc. Technology for preparation of traditional Indian dairy products.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Technology involved in processing different ready to eat instant premixes based on cereals and pulses and etc.
- Technology involved in processing different RTE puffed snacks

- Technology involved in processing different traditional dairy products

Course Outcomes:

By end of the course students will understand
- Technology for processing ready to eat and ready cook different products and equipment used for manufacturing of RTE products

TEXT BOOKS

1. Edmund WL. "Snack Foods Processing". AVI Publ.
2. Kamaliya M.K and Kamaliya K.B. 2001. Vol.1 and 2, "Baking Science and Industries", M.K.Kamaliya Publisher, Anand.

REFERENCES

1. Frame ND . "Technology of Extrusion Cooking". Blackie Academic1994. .
2. Gordon BR. "Snack Food", AVI Publ, 1997.
3. Samuel AM. "Snack Food Technology", AVI Publ. 1976.

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B.Tech (IT)– IV-I   **L   T   P   C**
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(19A54704a)   NUMERICAL METHODS FOR ENGINEERS
OPEN ELECTIVE-III
(ECE , CSE, IT & CIVIL)

Course objectives:

This course aims at providing the student with the knowledge on various numerical methods for solving equations, interpolating the polynomials, evaluation of integral equations and solution of differential equations.

UNIT-I:

Solution of Algebraic & Transcendental Equations:

Introduction-Bisection method-Iterative method-Regula falsi method-Newton Raphson method. System of Algebraic equations: Gauss Jordan method-Gauss Siedal method.

Learning Outcomes:

Students will be able to
- Calculate the roots of equation using Bisection method and Iterative method.
- Calculate the roots of equation using Regula falsi method and Newton Raphson method.
- Solve the system of algebraic equations using Gauss Jordan method and Gauss Siedal method.

UNIT-II:

Curve Fitting

Principle of Least squares- Fitting of curves- Fitting of linear, quadratic and exponential curves.

Learning Outcomes:

Students will be able to
- understand curve fitting
- understand fitting of several types of curves

UNIT-III:

Interpolation

Finite differences-Newton's forward and backward interpolation formulae – Lagrange's formulae. Gauss forward and backward formula, Stirling's formula, Bessel's formula.

Learning Outcomes:

Students will be able to
- Understand the concept of interpolation.
- Derive interpolating polynomial using newton's forward and backward formulae.
- Derive interpolating polynomial using lagrange's formulae.
- Derive interpolating polynomial using gauss forward and backward formulae.

UNIT-IV:
Numerical Integration
Numerical Integration: Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule

Learning Outcomes:

Students will be able to
- Solve integral equations using Simson's 1/3 and Simson's 3/8 rule.
- Solve integral equations using Trapezoidal rule.

UNIT-V:

Solution of Initial value problems to Ordinary differential equations
Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Modified Euler's Method-Runge-Kutta Methods.

Learning Outcomes:

Students will be able to
- Solve initial value problems to ordinary differential equations using Taylor's method.
- Solve initial value problems to ordinary differential equations using Euler's method and Runge Kutta methods.

Course Outcomes:

After the completion of course, students will be able to
- Apply numerical methods to solve algebraic and transcendental equations.
- Understand fitting of several kinds of curves.
- Derive interpolating polynomials using interpolation formulae.

- Solve differential and integral equations numerically.

Text Books:

1. B.S.Grewal, "Higher Engineering Mathematics", Khanna publishers.
2. Ronald E. "Probability and Statistics for Engineers and Scientists", Walpole,PNIE.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India

Reference Books:

1. B.V.Ramana, "Higher Engineering Mathematics", Mc Graw Hill publishers.
2. Alan Jeffrey, "Advanced Engineering Mathematics", Elsevier.

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B.Tech (IT)– IV-I   **L   T   P   C**
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<u>**HUMANITIES ELECTIVE-II**</u>

(19A52701a)   ORGANISATIONAL BEHAVIOUR

Course Objectives :

The objectives of this course are
- To make the student understand about the organizational behavior
- To enable them to develop self motivation, leadership and management
- To facilitate them to become powerful leaders
- Impart knowledge about group dynamics
- To make them understand the importance of change and development

Syllabus

UNIT-I

Organizational Behavior - Introduction to OB - Meaning and definition, scope - Organizing Process – Making organizing effective - Understanding Individual Behavior – Attitude - Perception - Learning - Personality Types

Learning Outcomes:

After completion of this unit student will
- Understand the concept of Organizational Behavior
- Contrast and compare Individual & Group Behavior and attitude
- Analyze Perceptions
- Evaluate personality types

UNIT-II

Motivation and Leading - Theories of Motivation - Maslow's Hierarchy of Needs - Hertzberg's Two Factor Theory - Leading - Leading Vs Managing

Learning Outcomes:

After completion of this unit student will
- Understand the concept of Motivation
- Understand the Theories of motivation

- Explain how employees are motivated according to Maslow's Needs Hierarchy
- Compare and contrast leading and managing

UNIT-III

Leadership and Organizational Culture and Climate - Leadership - Traits Theory–Managerial Grid - Transactional Vs Transformational Leadership - Qualities of good Leader - Conflict Management - Evaluating Leader - Women and Corporate leadership.

Learning Outcomes:

After completion of this unit student will
- Know the concept of Leadership
- Contrast and compare Traits theory and Managerial Grid
- Know the difference between Transactional and Transformational Leadership
- Evaluate the qualities of good leaders
- Emerge as the good leader

UNIT – IV

Group Dynamics - Types of groups - Determinants of group behavior - Group process – Group Development - Group norms - Group cohesiveness - Small Groups - Group decision making - Team building - Conflict in the organization – Conflict resolution

Learning Outcomes:

After completion of this unit student will
- Know the concept of Group Dynamics
- Contrast and compare Group behavior and group development
- Analyze Group decision making
- Know how to resolve conflicts in the organization

UNIT - V

Organizational Change and Development - Organizational Culture - Changing the Culture – Change Management – Work Stress Management - Organizational management – Managerial implications of organization's change and development

Learning Outcomes:

- After completion of this unit student will
- Know the importance of organizational change and development

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- Apply change management in the organization
- Analyze work stress management
- Evaluate Managerial implications of organization

Course outcomes:

At the end of the course, students will be able to
- Understand the nature and concept of Organizational behavior
- Apply theories of motivation to analyze the performance problems
- Analyze the different theories of leadership
- Evaluate group dynamics
- Develop as powerful leader

TEXT BOOKS:

1. Luthans, Fred, "Organisational Behaviour" , McGraw-Hill, 12 Th edition 2011 2. P Subba Rao, Organisational Behaviour, Himalya Publishing House 2017

REFERENCES BOOKS:

1. McShane, "Organizational Behaviour", TMH 2009
2. Nelson, "Organisational Behaviour", Thomson, 2009.
3. Robbins, P.Stephen, Timothy A. Judge, "Organisational Behaviour", Pearson 2009.
4. Aswathappa, "Organisational Behaviour", Himalaya, 2009

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (IT)– IV-I   **L   T   P   C**

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(19A52701b)   MANAGEMENT SCIENCE

Course objectives :

The objectives of this course are

- 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

Syllabus

UNIT- I

NTRODUCTION TO MANAGEMENT

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 - **Organisational Designs** - Line organization - Line & Staff Organization - Functional Organization - Matrix Organization - Project Organization - Committee form of Organization - Social responsibilities of Management.

Learning Outcomes:

 At the end if the Unit, the learners will be able to
- Understand the concept of management and organization
- Apply the concepts & principles of management in real life industry.
- Analyze the organization chart & structure for an enterprise.
- Evaluate and   interpret the theories and the modern organization theory.

UNIT II

OPERATIONS MANAGEMENT

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.

Learning Outcomes:

At the end of the Unit, the learners will be able to
- Understand the core concepts of Management Science and Operations Management
- Apply the knowledge of Quality Control, Work-study principles in real life industry.
- Evaluate Materials departments & Determine EOQ
- Analyze Marketing Mix Strategies for an enterprise.
- Create and design advertising and sales promotion

UNIT III

HUMAN RESOURCES MANAGEMENT (HRM)

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

Learning Outcomes:

At the end if the Unit, the learners will
- Understand the concepts of HRM in Recruitment, Selection, Training & Development
- Apply Managerial and operative Functions
- Analyze the need of training
- Evaluate performance appraisal
- Design the basic structure of salaries and wages

UNIT IV STRATEGIC & PROJECT MANAGEMENT

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

Learning Outcomes:

At the end of the Unit, the learners will be able to
- Understand Mission, Objectives, Goals & strategies for an enterprise
- Apply SWOT Analysis to strengthen the project
- Analyze Strategy formulation and implementation
- Evaluate PERT and CPM Techniques
- Creative in completing the projects within given time

UNIT V

CONTEMPORARY ISSUES IN MANAGEMENT

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.

Learning Outcomes:

 At the end if the Unit, the learners will be able to
- Understand modern management techniques
- Apply Knowledge in Understanding in modern
- Analyze CRM, MRP, TQM
- Evaluate Six Sigma concept and SCM

Course Outcomes:

At the end of the course, students 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.

TEXT BOOKS:

1. A.R Aryasri, "Management Science", TMH, 2013
2. Stoner, Freeman, Gilbert, Management, Pearson Education, New Delhi, 2012.

REFERENCES:

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (IT)– IV-I   **L   T   P   C**
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(19A52701c)   BUSINESS ENVIRONMENT

Course Objectives :

The objectives of this course are
- To make the student understand about the business environment
- To enable them in knowing the importance of fiscal and monitory policy
- To facilitate them in 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 markets

Syllabus

UNIT – I

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

Learning Outcomes:

After completion of this unit student will
- Understand the concept of Business environment
- Explain various types of business environment
- Know about the environmental analysis of business
- Understand the business process

UNIT – II

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.

Learning Outcomes:

After completion of this unit student will
- Understand the concept of public revenue and public Expenditure
- Explain the functions of RBI and its role
- Analyze the Monitory policy in India

- Know the recent trends and the role of Finance Commission in the development of our country
- Differentiate between Fiscal and Monitory Policy

UNIT – III

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.

Learning Outcomes:

After completion of this unit student will
- Understand the role of Indian international trade
- Understand and explain the need for Export and EXIM Policies
- Analyze causes for Disequilibrium and correction measure
- Differentiate between Bilateral and Multilateral Trade Agreements

UNIT – IV

WORLD TRADE ORGANIZATION - Nature and Scope - Organization and Structure - Role and functions of WTO in promoting world trade - Agreements in the Uruguay Round – TRIPS, TRIMS, and GATT - Disputes Settlement Mechanism - Dumping and Anti-dumping Measures.

Learning Outcomes:

After completion of this unit student will
- Understand the role of WTO in trade
- Analyze Agreements on trade by WTO
- Understand the Dispute Settlement Mechanism
- Compare and contrast the Dumping and Anti-dumping Measures.

UNIT – V

MONEY MARKETS AND CAPITAL MARKETS - 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.

Learning Outcomes:

After completion of this unit student will
- Understand the components of Indian financial system
- Know the structure of Money markets and Capital markets
- Analyze the Stock Markets
- Apply the knowledge in future investments
- Understand the role of SEBI in investor protection.

Course Outcomes:

At the end of the course, students will be able to
- Understand various types of business environment.
- Understand the role of WTO
- Apply the knowledge of Money markets in future investment
- Analyze   India's Trade Policy
- Evaluate fiscal and monitory policy
- Develop a personal synthesis and approach for identifying business opportunities

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.HPH2016.

REFERENCE BOOKS:

1. K. V. Sivayya, V. B. M Das (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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B.Tech (IT) – IV-I	L	T	P	C
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(19A52701d)   STRATEGIC MANAGEMENT

Course objectives :

The objectives of this course are
- To introduce the concepts of strategic management and understand its nature in
- competitive and organizational landscape
- To provide an understanding of internal and external analysis of a firm/individual
- To provide understanding of strategy formulation process and frame work
- Impart knowledge of Corporate culture
- Encourage the student in understanding SWOT analysis BCG Matrix

Syllabus

UNIT: I
Introduction of Strategic Management: meaning, nature, importance and relevance. The Strategic Management Process: – Corporate, Business and Functional Levels of strategy. Vision, mission and purpose –Business definition, objectives and goals – Stakeholders in business and their roles in strategic management. Balance scorecard.

Learning Outcomes:

After completion of this unit student will
- Understand the meaning and importance of strategic management
- Explain Strategic Management Process and Corporate, Business
- Know about the Business definition, objectives and goals
- Understand Stakeholders their roles in strategic management

UNIT: II

External and Internal Analysis: The Strategically relevant components of a Company's External Environment Analysis, Industry Analysis - Porter's Five Forces model – Industry diving forces – Key Success Factors. Analyzing a company's resources and competitive position

Learning Outcomes:

After completion of this unit student will
- Understand the components of a Company's environment
- Explain External Environment Analysis, Industry Analysis
- Know how to analyze industry competition through the Porter's Five Forces model
- Analyze Key Success Factors in a company's competitive position

UNIT: III

Competitive Strategies: Generic Competitive Strategies: Low cost, Differentiation, Focus. Grand Strategies: Stability, Growth (Diversification Strategies, Vertical Integration Strategies, Mergers, Acquisition & Takeover Strategies, Strategic Alliances & Collaborative Partnerships), Retrenchment, Outsourcing Strategies. Tailoring strategy to fit specific industry – Life Cycle Analysis - Emerging, Growing, Mature & Declining Industries.

Learning Outcomes:

After completion of this unit student will
- Understand the Competitive Strategies
- Explain Stability, Growth Mergers, Acquisition & Takeover Strategies
- Know about the Retrenchment, Outsourcing Strategies
- Differentiate Life Cycle Analysis, Mature & Declining Industries

UNIT: IV

Strategy Implementation and control - Strategy implementation; Organization Structure – Matching structure and strategy. Behavioral issues in implementation – Corporate culture – Mc Kinsey's 7s Framework. Functional issues – Functional plans and policies – Financial, Marketing, Operations, Personnel, IT.

Learning Outcomes:

After completion of this unit student will
- Understand the Organization Structure
- Explain Matching structure and strategy
- Know about the Corporate culture
- Analyze Functional plans and policies

Unit: V
Strategy Evaluation: Strategy Evaluation – Operations Control and Strategic Control- Relationship between a Company's Strategy and its Business Model.- SWOT analysis – Value Chain Analysis –Benchmarking- Portfolio Analysis: BCG Matrix – GE 9 Cell Model.

Learning Outcomes:

After completion of this unit student will
- Understand the Operations Control and Strategic Control
- Explain Company's Strategy and its Business Model
- Know about the SWOT analysis
- Analyze BCG Matrix and GE 9 Cell Model

Course Outcomes:

At the end of the course, students will be able to
- Understand the relevance and importance of strategic management
- Explain industry driving forces
- Analyze the competitive strategy

- Evaluate strategy implementation and control
- Create SWOT Analysis

Suggested Text Books and References

TEXT BOOKS:
1. Arthur A. Thompson Jr., AJ Strickland III, John E Gamble, "Crafting and Executing Strategy", 18th edition, Tata McGraw Hill, 2012.
2. Subba Rao P, "Business Policy and Strategic Management" –HPH

REFERENCES:
1. Robert A. Pitts & David Lei, "Strategic Management: Building and Sustaining Competitive Advantage" 4th edition, Cengage Learning.
2. Hunger, J. David, "Essentials of Strategic Management" 5th edition, Pearson.
3. Ashwathappa, "Business Environment for Strategic Management", HPH.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (IT)– IV-I   **L   T   P   C**
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(19A52701e)   E-BUSINESS

Course Objectives:

- To provide knowledge on emerging concept on E-Business related aspect.
- To understand various electronic markets models which are trending in India
- To give detailed information about electronic payment systems net banking.
- To exact awareness on internet advertising, market research strategies and supply chain management.
- To understand about various internet protocols-security related concept.

SYLLABUS

UNIT – I

Electronic Business: Definition of Electronic Business - Functions of Electronic Commerce (EC) - Advantages of E-Commerce – E-Commerce and E-Business Internet Services Online Shopping-Commerce Opportunities for Industries.

Learning Outcomes:

After completion of this unit student will
- Understand the concept of E-Business
- Contrast and compare E-Commerce E-Business
- Analyze Advantages of E-Commerce
- Evaluate opportunities of E-commerce for industry

UNIT – II

Electronic Markets and Business Models:E-Shops-E-Malls E-Groceries - Portals - Vertical Portals-Horizontal Portals - Advantages of Portals - Business Models-Business to Business(B2B)-Business to Customers(B2C)-Business to Government(B2G)-Auctions-B2B Portals in India

Learning Outcomes:

After completion of this unit student will
- Understand the concept of business models
- Contrast and compare Vertical portal and Horizontal portals
- Analyze Advantages of portals
- Explain the B2B,B2C and B2G model

UNIT – III

Electronic Payment Systems: Digital Payment Requirements-Designing E-payment System-Electronic Fund Transfer (EFT)-Electronic Data Interchange (EDT)-Credit Cards-Debit Cards-E-Cash-Electronic Cheques -Smart Cards-Net Banking-Digital Signature.

Learning Outcomes:

After completion of this unit student will
- Understand the Electronic payment system
- Contrast and compare EFT and EDT
- Analyze debit card and credit card
- Explain the on Digital signature

UNIT – IV

E-Security: Internet Protocols - Security on the Internet –Network and Website Security – Firewalls –Encryption – Access Control – Secure Electronic transactions.

Learning Outcomes:

After completion of this unit student will
- Understand E-Security
- Contrast and compare security and network
- Analyze Encryption
- Evaluate electronic transitions

UNIT – V

E-Marketing: Online Marketing – Advantages of Online Marketing – Internet Advertisement – Advertisement Methods – Conducting Online Online Market Research– Data mining and Marketing Research Marketing Strategy On the Web – E-Customer Relationship

Management(e-CRM) –E- Supply Chain Management.(e-SCM) –New Trends in Supply Chain Management.

Learning Outcomes:

After completion of this unit student will
- Understand the concept of online marketing
- Analyze advantages of online marketing
- Compare the e-CRM and e-SCM
- Explain the New trends in supply chain management

Course Outcomes:

- They will be able to identify the priority of E-Commerce in the present globalised world.
- Will be able to understand E-market-Models which are practicing by the organization
- Will be able to recognize various E-payment systems & importance of net banking.
- By knowing E-advertisement, market research strategies, they can identify the importance of customer role.
- By understanding about E-security, they can ensure better access control to secure the information.

TEXT BOOKS:

3. C.S.V Murthy "E-Commerce", Himalaya publication house, 2002.
4. P.T.S Joseph, "E-Commerce" , 4th Edition, Prentice Hall of India 2011

REFERENCES:

5. KamaleshKBajaj,DebjaniNa, **"**E-Commerce", 2nd Edition TataMcGrwHills 2005
6. Dave Chaffey – "E-Commerce E-Management", 2nd Edition, Pearson, 2012.
7. Henry Chan, "E-Commerce Fundamentals and Application", Raymond Lee,Tharm Wiley India 2007
8. S. Jaiswall **"**E-Commerce", Galgotia Publication Pvt Ltd 2003.

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(19A05702P) SOFTWARE TESTING LAB

Course Objectives:
This course is designed to:

- Understand the fundamentals for various testing methodologies.
- Describe the principles and procedures for designing test cases.
- Explore debugging methods.

Sample problems on testing:
1. Write programs in 'C' Language to demonstrate the working of the following constructs:
   i) do...while ii) while….do iii) if…else iv) switch v) for
2. "A program written in 'C' language for Matrix Multiplication fails" Introspect the causes for its failure and write down the possible reasons for its failure.
3. Take any system (e.g. ATM system) and study its system specifications and report the various bugs.
4. Write the test cases for any known application (e.g. Banking application)
5. Create a test plan document for any application (e.g. Library Management System)
6. Study of any testing tool (e.g. Win runner)
7. Study of any web testing tool (e.g. Selenium)
8. Study of any bug tracking tool (e.g. Bugzilla, bugbit)
9. Study of any test management tool (e.g. Test Director)
10. Study of any open source-testing tool (e.g. Test Link)
11. Take a mini project (e.g. University admission, Placement Portal) and execute it. During the Life cycle of the mini project create the various testing documents* and final test report document.

Additional problems on testing:
1.Test the following using JUnit and CPP Unit:
 i)Sorting problems ii)Searching problems iii)Finding gcd of two integers iv)Finding factorial of a number.
2.Test web based forms using HTMLUnit.
3.Test database stored procedures using SQLUnit.
(Use sufficient number of test cases in solving above Problems)

*Note: To create the various testing related documents refer to the text "Effective Software Testing Methodologies by William E. Perry"

COURSE OUTCOMES
Upon completion of the course, the students should be able to:

- Demonstrate the basic testing procedures.(L2)
- formulate test cases and test suites (L6)
- Make use of the Selenium and Bugzilla tools to perform testing (L3)

- Construct and test simple programs. (L6)
- Demonstrate bug tracking (L2)

REFERENCE BOOKS:

1. Software Testing Concepts and Tools,P.Nageswara Rao,dreamtech press.
2. Software Testing Tools,Dr.K.V.K.K.Prasad,dreamtech Press.

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(19A05701P) INTERNET OF THINGS LABORATORY

(Common to CSE & IT)

Practicals:

1. Select any one development board (Eg., Arduino or Raspberry Pi) and control LED using the board.
2. Using the same board as in (1), read data from a sensor. Experiment with both analog and digital sensors.
3. Control any two actuators connected to the development board using Bluetooth.
4. Read data from sensor and send it to a requesting client. (using socket communication) Note: The client and server should be connected to same local area network.

5. Create any cloud platform account, explore IoT services and register a thing on the platform.
6. Push sensor data to cloud.
7. Control an actuator through cloud.
8. Access the data pushed from sensor to cloud and apply any data analytics or visualization services.
9. Create a mobile app to control an actuator.
10. Design an IoT based air pollution control system which monitors the air pollution by measuring carbon monoxide, ammonia, etc and gives alarm or sends message when the pollution level is more than permitted range.
11. Design an IoT based system which measures the physical and chemical properties of the water and displays the measured values.
12. Identify a problem in your local area or college which can be solved by integrating the things you learned and create a prototype to solve it (Mini Project).
13. Design a business model canvas for a digital display

Course outcomes:

At the end of the course, students will be able to

- Choose the sensors and actuators for an IoT application (L1)
- Select protocols for a specific IoT application (L2)
- Utilize the cloud platform and APIs for IoT application (L3)
- Experiment with embedded boards for creating IoT prototypes (L3)
- Design a solution for a given IoT application (L6)

Text Book:

1. Adrian McEwen, Hakim Cassimally - Designing the Internet of Things, Wiley Publications, 2012.
2. Alexander Osterwalder, and Yves Pigneur – Business Model Generation – Wiley, 2011

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.

Reference sites:

https://www.arduino.cc/

https://www.raspberrypi.org/

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(19A05801a) Dev Ops
(Professional Elective-IV)

Course Objectives:

This course is designed to:

- Adapt the software Engineering practices that combine Software Development and IT operations for Quality Software
- Enumerate the principles of continuous development and deployment, automation of configuration management, inter-team collaboration, and IT service agility

UNIT I

Phases of Software Development life cycle. Values and principles of agile software development.

Learning Outcomes:

After completing this Unit, students will be able to:

1. Illustrate the Phases of Software Development life cycle (L2)
2. Appraise theValues and principles of agile software development (L5)

UNIT II

Fundamentals of DevOps: Architecture, Deployments, Orchestration, Need, Instance of applications, DevOps delivery pipeline, DevOps eco system.

Learning Outcomes:

After completing this Unit, students will be able to:

- Explain the Fundamentals of Software development and operations (L2)
- Create the Instance of applications (L6)

UNIT III

DevOps adoption in projects: Technology aspects, Agiling capabilities, Tool stack implementation, People aspect, processes

Learning Outcomes:

After completing this Unit, students will be able to:

- Understand the Technology aspects and Agile capabilities (L2)
- Interpret the aspects in user's context (L5)

UNIT IV

CI/CD: Introduction to Continuous Integration, Continuous Delivery and Deployment , Benefits of CI/CD, Metrics to track CICD practices

Learning Outcomes:

After completing this Unit, students will be able to:

- Explain CI/CD and its benefits (L2)
- Demonstrate the Continuous Integration, Delivery and Deployment (L2)

UNIT V

Devops Maturity Model: Key factors of DevOps maturity model, stages of Devops maturity model, DevOps maturity Assessment

Learning Outcomes:

After completing this Unit, students will be able to:

- Identify the Key factors of maturity model (L3)
- Estimate the DevOps maturity Assessment (L6)

Course Outcomes:

At the end of the course, student will be able to
- Explain how DevOps will balance the needs throughout the SDLC(L2)
- Demonstrate how DevOps improves the collaboration and productivity by automation.(L2)
- Adapt DevOps in real time projects. (L6)
- Illustrate the continuous integration tools and monitoring tools (L2)

Text Books:
1) The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations, Gene Kim , John Willis , Patrick Debois , Jez Humb,1st Edition, O'Reilly publications, 2016.
2) What is Devops? Infrastructure as code, 1st Edition, Mike Loukides ,O'Reilly publications, 2012.

Reference Books:

1) Building a DevOps Culture, 1st Edition, Mandi Walls, O'Reilly publications, 2013.
2) The DevOps 2.0 Toolkit: Automating the Continuous Deployment Pipeline With Containerized Microservices, 1st Edition, Viktor Farcic, CreateSpace Independent Publishing Platform publications, 2016
3) Continuous Delivery: Reliable Software Releases Through Build, Test, and Deployment Automation, 1st Edition, Jez Humble and David Farley, 2010.
4) Achieving DevOps: A Novel About Delivering the Best of Agile, DevOps, and microservices, 1st Edition, Dave Harrison, Knox Lively, Apress publications, 2019

e-Resources:

1) https://www.javatpoint.com/devops
2) https://github.com/nkatre/Free-DevOps-Books-1/blob

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(19A05801b) DEEP LEARNING
Professional Elective-IV

Course Objectives:

This course is designed to:

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

UNIT I

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

Probability and Information Theory: Random Variables, Probability Distributions, Marginal Probability, Conditional Probability, Expectation, Variance and Covariance, Bayes' Rule, Information Theory. Numerical Computation: Overflow and Underflow, Gradient-Based Optimization, Constrained Optimization, Linear Least Squares.

Learning Outcomes:

After completing this Unit, students will be able to:

- Understand linear algebra in the deep learning context (L2)
- Utilize probability and information theory in machine/deep learning applications (L3)

UNIT II

Machine Learning: Basics and Underfitting, Hyper parameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood, Bayesian Statistics, Supervised and Unsupervised Learning, Stochastic Gradient Descent, Challenges Motivating Deep Learning. Deep Feedforward Networks: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and other Differentiation Algorithms.

Learning Outcomes:

After completing this Unit, students will be able to:

- Illustrate machine learning basics leads to deep learning(L2)
- Contrast super and unsupervised learning(L2)

UNIT III

Regularization for Deep Learning: Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop and Manifold Tangent Classifier. Optimization for Training Deep Models: Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms.

Learning Outcomes:

After completing this Unit, students will be able to:

- Evaluate Regularization Problems for Deep learning (L5)
- Apply optimization for Training Deep Learning models (L3)

UNIT IV

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

Learning Outcomes:

After completing this Unit, students will be able to:

- Appraise Basic Convolution Functions (L5)
- Develop Efficient Convolution Algorithms (L3)

UNIT V

Sequence Modeling: Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, Echo State Networks, LSTM, Gated RNNs, Optimization for Long-Term Dependencies, Auto encoders, Deep Generative Models.

Learning Outcomes:

After completing this Unit, students will be able to:

- Illustrate Recurrent and Recursive Neural Networks (L2)
- Apply Auto encoders and Deep Generative Models (L3)

Course Outcomes:
After completing this course, students will be able to:

- Apply linear algebra and probability theory in the deep learning applications(L3)
- Elaborate the challenges and motivations to Deep learning (L6)
- Differentiate the architectures of deep neural network (L4)
- Build a convolutional neural network (L6)
- Build and train RNN and LSTMs(L6)

Text Books:

1) Ian Goodfellow, Yoshua Bengio, 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, Douwe Osinga, O'Reilly, Shroff Publishers, 2019.

e-Resources:

1) https://keras.io/datasets/
2) http://deeplearning.net/tutorial/deeplearning.pdf
3) https://arxiv.org/pdf/1404.7828v4.pdf

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(19A05801c) AD HOC AND SENSOR NETWORKS

Course Objectives:
This course is designed to:

- Introduce the concepts of Adhoc and Sensor Networks.
- Explain Routing algorithms suitable for Adhoc Networks.
- Understand the transport protocols for Adhoc networks
- Familiarize with the security issues of adhoc and sensor networks

Unit I: IEEE 802 Networking Standard. Fundamentals of WLANs, IEEE 802.11 standard. What is Wireless Internet?, Mobile IP, Cellular and Adhoc Wireless Networks, Applications of Adhoc Networks, Issues in Ad Hoc Wireless Networks, Ad Hoc Wireless Internet.

Learning Outcomes:

After completing this Unit, students will be able to

- Explain different wireless networks. (L2)
- Examine wireless LAN Standard IEEE 802.11.(L4)

Unit II: Issues in Designing a MAC Protocol for Ad Hoc Wireless Networks, Design Goals of a MAC Protocol for Ad Hoc Wireless Networks, Classification of MAC Protocols, Contention-Based Protocols, Contention-Based Protocols with Reservation Mechanisms, Contention-Based MAC Protocols with Scheduling Mechanisms, MAC Protocols that used Directional Antennas, Other MAC Protocols.

Learning Outcomes:

After completing this Unit, students will be able to

- Identify the limitations of existing MAC protocols when applied to adhoc networks. (L3)
- Analyze the existing MAC Protocols for Adhoc networks.(L3)

Unit III: Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table-Driven Routing Protocols, On-Demand Routing Protocols, Hybrid Routing Protocols, Hierarchical Routing Protocols, Power-Aware Routing Protocols.

Learning Outcomes:

After completing this Unit, students will be able to

- Compare different routing protocols.(L2)

- Choose the routing protocol based on network characteristics.(L5)

Unit – IV Multicast Routing in Ad hoc Wireless Networks- Issues in Designing a Multicast Routing Protocol, Operation of Multicast Routing Protocols, An architecture reference model for multicast routing protocols, Classifications of Multicast Routing Protocols, Tree-Based Multicast Routing Protocols, Mesh-Based Multicast Routing Protocols, Summary of Tree and Mesh-Based Protocols. Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions. TCP over Ad Hoc Wireless Networks, Other Transport Layer Protocols for Ad Hoc Wireless Networks.

Learning Outcomes:

After completing this Unit, students will be able to

- Interpret the issues in designing a multicast Routing Algorithmd(L2)
- Propose new Transport protocols for adhoc networks(L6)

Unit V: Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad Hoc Wireless Networks.

Wireless Sensor Networks- Introduction, Sensor Network Architecture, Data Dissemination, Data Gathering, MAC Protocols for Sensor Networks, Location Discovery, Quality of a Sensor Network, Evolving Standards, Other issues.

Learning Outcomes:

After completing this Unit, students will be able to

- Define the sensor networks.(L1)
- Identify the need for security in Adhoc and Sensor networks.(L3)

Course outcomes:

Upon completion of the course, the students should be able to:

- List the design issues for Adhoc and sensor networks(L1)
- Analyze the use of TCP in Wireless networks.(L4)
- Justify the need for new MAC Protocols for Adhoc networks.(L5)
- Extend the existing protocols to make them suitable for Adhoc Networks.(L2)
- Evaluate the performance of Protocols in Adhoc and sensor networks.(L5)
- Design new Protocols for Adhoc and Sensor networks.(L6)

Text Book:

1. Murthy, C. Siva Ram, and B. S. Manoj. Ad hoc wireless networks: Architectures and protocols. Pearson Education India, 2004.

References:

1. Carlos De Morais Cordeiro, Dharma Prakash Agrawal "Ad Hoc & Sensor Networks: Theory and Applications", World Scientific Publishing Company, 2006.
2. Feng Zhao and Leonides Guibas, "Wireless Sensor Networks", Elsevier Publication - 2002.
3. Holger Karl and Andreas Willig "Protocols and Architectures for Wireless Sensor Networks",Wiley, 2005

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(19A01802a)   DISASTER MANGEMENT
OPEN ELECTIVE-IV

Course Objectives:

The objective of this course is 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. Understand how the phases of each are parallel and how they differ.
- Understand the 'relief system' and the 'disaster victim.'
- Describe the three planning strategies useful in mitigation.
- Identify the regulatory controls used in hazard management.
- Describe public awareness and economic incentive possibilities.
- Understand the tools of post-disaster management.

SYLLABUS

UNIT-I:

Natural Hazards And Disaster Management: 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.

Learning Outcomes:

After completing this Unit, students will be able to
- To know about the natural hazards and its management
- To understand about the global warming, cyclones and tsunamis

UNIT-II:

Man Made Disaster And Their Management Along With Case Study Methods Of The Following: 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.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the fire hazards and solid waste management
- To understand about the emerging infectious diseases and aids their management.

UNIT-III:

Risk and Vulnerability: 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.

Learning Outcomes:

After completing this Unit, students will be able to
- To know about the regulations of building codes and land use planning related to risk and vulnerability.
- To understand about the financial management of disaster and related losses

UNIT-IV:

Role Of Technology In Disaster Managements: 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.

Learning Outcomes:

After completing this Unit, students will be able to
- To know about the technological aspects of disaster management
- To understand about the factors for disaster reduction

UNIT-V:

Education and Community Preparedness: 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.

Learning Outcomes:

After completing this Unit, students will be able to
- To impart the education related to risk reduction in schools and communities

Course Outcomes:

Upon the successful completion of this course, the students will be able to:
- Affirm the usefulness of integrating management principles in disaster mitigation work
- Distinguish between the different approaches needed to manage pre- during and post-disaster periods
- Explain the process of risk management
- Relate to risk transfer

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.
3. Jagbir Singh "Disaster Management" – Future Challenges and Opportunities' I K International Publishing House Pvt. Ltd. (2007),

REFERENCE BOOKS

1. Harsh. K . Gupta "Disaster Management edited", Universities press, 2003.

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(19A01802b)   GLOBAL WARMING AND CLIMATE CHANGES
OPEN ELECTIVE-IV

Course Objectives:

The objective of this course is to:
- To know the basics, importance of global warming.
- To know the concepts of mitigation measures against global warming
- To know the impacts of climate changes

UNIT I

EARTH'S CLIMATE SYSTEM:
Introduction to environment, Ozone, ozone layer and its functions, Ozone depletion and ozone hole, Vienna convention and Montreal protocol, Green house gases and green house effect, Hydrological cycle and Carbon cycle, Global warming and its impacts

Learning Outcomes:

After completing this Unit, students will be able to
- To identity the importance of Ozone and effect of green house gases
- To know the effect of global warming

UNIT II

ATMOSPHERE & ITS COMPONENTS: Atmosphere and its layers-Characteristics of Atmosphere - Structure of Atmosphere - Composition of Atmosphere - Atmospheric stability - Temperature profile of the atmosphere - Temperature inversion and effects of inversion on pollution dispersion.

Learning Outcomes:

After completing this Unit, students will be able to
- To know about the layers of atmosphere and their characteristics

UNIT III

IMPACTS OF CLIMATE CHANGE : Causes of Climate change - Change of Temperature in the environment - Melting of ice and sea level rise - Impacts of Climate Change on various sectors - Projected impacts for different regions, uncertainties in the projected impacts and risk of irreversible changes.

Learning Outcomes:

After completing this Unit, students will be able to
- To know about the causes of climate change and its effects on various sectors.

UNIT IV

OBSERVED CHANGES AND ITS CAUSES: Climate change and Carbon credits-Clean Development Mechanism (CDM), CDM in India - Kyoto Protocol - Intergovernmental Panel on Climate Change (IPCC) - Climate Sensitivity - Montreal Protocol - United Nations Framework Convention on Climate Change (UNFCCC) - Global change in temperature and climate and changes within India

Learning Outcomes:

After completing this Unit, students will be able to
- To know about the causes of climate change and carbon credits, effect of change in temperature and climate on india.

UNIT V

CLIMATE CHANGE AND MITIGATION MEASURES: CDM and Carbon Trading - Clean Technology, biodiesel, compost, biodegradable plastics - Renewable energy usage as an alternative - Mitigation Technologies and Practices within India and around the world - Non-renewable energy supply to all sectors - Carbon sequestration - International and regional cooperation for waste disposalbiomedical wastes, hazardous wastes, e-wastes, industrial wastes, etc.,

Learning Outcomes:

After completing this Unit, students will be able to
- To know about the clean technology, use of renewable energy, mitigation technologies and their practices.

Course Outcomes

Upon the successful completion of this course, the students will be able to:
- An ability to apply knowledge of mathematics, science, and engineering
- Design a system, component or process to meet desired needs with in realistic constraints such as economic ,environmental ,social ,political ,ethical ,health and safety , manufacturability and sustainability
- An ability to identify, formulate, and solve engineering problems

REFERENCE BOOKS

1. Dash Sushil Kumar, "Climate Change – An Indian Perspective", Cambridge University Press India Private limited 2007.
2. Adaptation and mitigation of climate change-Scientific Technical Analysis. Cambridge University Press ,Cambridge,2006.
3. Atmospheric Science, J.M. Wallace and P.V. Hobbs, Elsevier / Academic Press 2006.
4. Jan C. van Dam, Impacts of "Climate Change and Climate Variability on ydrological Regimes", Cambridge university press ,2003.
5. David Archer, Global Warming: Understanding the Forecast, 2 nd ed. (Wiley, 2011
6. John Houghton, Global Warming: The Complete Briefing, 5th Edition, 2015, Cambridge Univ. Press. Useful

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B.Tech (IT)– IV-II Sem
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(19A02802a)   IoT APPLICATIONS IN ELECTRICAL ENGINEERING

(OE-IV)

Course Objectives:

- To learn about a few applications of Internet of Things
- To distinguish between motion less and motion detectors as IoT applications
- To know about Micro Electro Mechanical Systems (MEMS) fundamentals in design and fabrication process
- To understand about applications of IoT in smart grid
- To introduce the new concept of Internet of Energy for various applications

UNIT-I:

Sensors

Definitions, Terminology, Classification, Temperature sensors, Thermoresistive, Resistance, temperature detectors, Silicon resistive thermistors, Semiconductor, Piezoelectric, Humidity and moisture sensors. Capacitive, Electrical conductivity, Thermal conductivity, time domain reflectometer, Pressure and Force sensors: Piezoresistive, Capacitive, force, strain and tactile sensors, Strain gauge, Piezoelectric

Learning Outcomes:

After completing this Unit, students will be able to
- To know about basic principles of sensors and their classification
- To learn about various motion less sensors
- To understand about Piezoelectric sensor applications to detect temperature, pressure etc.
- To understand about Capacitive sensors to detect temperature, force and pressure etc.
- To know about concepts of tactile sensors, for a few applications

UNIT-II:

Occupancy and Motion detectors

Capacitive occupancy, Inductive and magnetic, potentiometric - Position, displacement and level sensors, Potentiometric, Capacitive, Inductive, magnetic velocity and acceleration sensors, Capacitive, Piezoresistive, piezoelectric cables, Flow sensors, Electromagnetic, Acoustic sensors - Resistive microphones, Piezoelectric, Photo resistors

Learning Outcomes:

After completing this Unit, students will be able to
- To know about Capacitive occupancy
- To understand about Motion detectors
- To distinguish between Potentiometric, inductive and capacitive sensors for a few applications
- To learn about a few velocity and acceleration sensors
- To know about various flow sensors

UNIT-III:

MEMS

Basic concepts of MEMS design, Beam/diaphragm mechanics, electrostatic actuation and fabrication, Process design of MEMS based sensors and actuators, Touch sensor, Pressure sensor, RF MEMS switches, Electric and Magnetic field sensors

Learning Outcomes:

After completing this Unit, students will be able to
- To understand about the basic concept of MEMS
- To know about electrostatic actuation
- To learn about process design of MEMS based sensors
- To learn about process design of MEMS based actuators
- To distinguish between RF switches with respect to electric and magnetic sensors

UNIT-IV:

IoT for Smart grid

Driving factors, Generation level, Transmission level, Distribution level, Applications, Metering and monitoring applications, Standardization and interoperability, Smart home

Learning Outcomes:

After completing this Unit, students will be able to
- To get exposure fundamental applications of IoT to Smart grid
- To learn about driving factors of IoT in Generation level
- To learn about driving factors of IoT in Transmission level
- To learn about driving factors of IoT in Distribution level
- To distinguish between metering level and monitoring applications
- To get introduced to the concept of Smart home

UNIT-V:

IoE: Concept of Internet of Energy, Evaluation of IoE concept, Vision and motivation of IoE, Architecture, Energy routines, information sensing and processing issues, Energy internet as smart grid

Learning Outcomes:

After completing this Unit, students will be able to
- To get exposed the new concept of internet of energy
- To learn about architecture of IoE
- To know about energy routines
- To learn about information sensing and processing issues
- To understand the use of energy internet as smart grid

Course Outcomes:

- To get exposed to recent trends in few applications of IoT in Electrical Engineering
- To understand about usage of various types of motionless sensors
- To understand about usage of various types of motion detectors
- To get exposed to various applications of IoT in smart grid
- To get exposed to future working environment with Energy internet

TEXT BOOKS:

1. Jon S. Wilson, "Sensor Technology Hand book", Newnes Publisher, 2004
2. Tai Ran Hsu, "MEMS and Microsystems: Design and manufacture", 1st Edition, Mc Grawhill Education, 2017
3. Ersan Kabalci and Yasin Kabalci, "From Smart grid to Internet of Energy", 1st Edition, Academic Press, 2019

REFERENCE BOOKS:

1. Raj Kumar Buyya and Amir Vahid Dastjerdi, "Internet of Things: Principles and Paradigms", Kindle Edition, Morgan Kaufmann Publisher, 2016
2. Yen Kheng Tan and Mark Wong, "Energy Harvesting Systems for IoT Applications": Generation, Storage and Power Management, 1st Edition, CRC Press, 2019
3. RMD Sundaram Shriram, K. Vasudevan and Abhishek S. Nagarajan, "Internet of Things", Wiley, 2019

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(19A02802b)   SMART ELECTRIC GRID

(OE-IV)

Course Objectives:

- To learn about recent trends in grids as smart grid
- To understand about smart grid architecture and technologies
- To know about smart substations
- To learn about smart transmission systems
- To learn about smart distribution systems

UNIT-I:

Introduction to Smart Grid

Working definitions of Smart Grid and Associated Concepts – Smart Grid Functions – Traditional Power Grid and Smart Grid – New Technologies for Smart Grid – Advantages – Indian Smart Grid – Key Challenges for Smart Grid

Smart Grid Architecture: Components and Architecture of Smart Grid Design – Review of the proposed architectures for Smart Grid. The fundamental components of Smart Grid designs – Transmission Automation – Distribution Automation – Renewable Integration

Learning Outcomes:

After completing this Unit, students will be able to
- To understand basic definitions and architecture of Smart grid
- To learn about new technologies for smart grid
- To know about fundamental components of smart grid
- To understand key challenges of smart grid
- To understand the need for integration of Renewable energy sources

UNIT-II:

Smart grid Technologies

Characteristics of Smart grid, Micro grids, Definitions, Drives, benefits, types of Micro grid, building blocks, Renewable energy resources, needs in smart grid, integration impact, integration standards, Load frequency control, reactive power control, case studies and test beds

Learning Outcomes:

After completing this Unit, students will be able to
- To know about basic characteristic features of smart grid technologies
- To understand about definition, types, building blocks of Microgrids
- To know about integration requirements, standards of renewable energy sources in Microgrids
- To understand Load frequency and reactive power control of Microgrid
- To understand about Microgrid through a case study

UNIT-III:

Smart Substations

Protection, Monitoring and control devices, sensors, SCADA, Master stations, Remote terminal unit, interoperability and IEC 61850, Process level, Bay level, Station level, Benefits, role of substations in smart grid, Volt/VAR control equipment inside substation

Learning Outcomes:

After completing this Unit, students will be able to
- To know about protection, monitor and control devices in Smart substations
- To know about the importance of SCADA in substations
- To understand about interoperability and IEC 61850
- To know about role of substations in Smart grid
- To understand about Volt/VAR control equipment inside substation

UNIT-IV:

Smart Transmission

Energy Management systems, History, current technology, EMS for the smart grid, Wide Area Monitoring Systems (WAMS), protection & Control (WAMPC), needs in smart grid, Role of WAMPC smart grid, Drivers and benefits, Role of transmission systems in smart grid, Synchro Phasor Measurement Units (PMUs)

Learning Outcomes:

After completing this Unit, students will be able to
- To know about Energy Management Systems in smart transmission systems
- To understand about WAMPC
- To know about role of transmission systems in Smart grid
- To know about Synchro Phasor Measurement units

UNIT-V:

Smart Distribution Systems

DMS, DSCADA, trends in DSCADA and control, current and advanced DMSs, Voltage fluctuations, effect of voltage on customer load, Drivers, objectives and benefits, voltage-VAR control, VAR control equipment on distribution feeders, implementation and optimization, FDIR - Fault Detection Isolation and Service restoration (FDIR),faults, objectives and benefits, equipment, implementation

Learning Outcomes:

After completing this Unit, students will be able to
- To know about DSCADA in Smart Distribution Systems
- To distinguish between current and advanced DMSs
- To know about occurrence of voltage fluctuations
- To understand about VAR control and equipment on distribution feeders
- To know about FDIR objectives and benefits

Course Outcomes:

- To be able to understand trends in Smart grids
- To understand the needs and roles of Smart substations
- To understand the needs and roles of Smart Transmission systems
- To understand the needs and roles of Smart Distribution systems
- To distinguish between SCADA and DSCADA systems in practical working environment

Text Books:

1. Stuart Borlase, "Smart Grids - Infrastructure, Technology and Solutions", 1st edition,CRC Press, 2013
2. Gil Masters, "Renewable and Efficient Electric Power System", 2nd edition, Wiley–IEEE Press, 2013.

Reference Books:

1. A.G. Phadke and J.S. Thorp, "Synchronized Phasor Measurements and their Applications", Springer Edition, 2e, 2017.
2. T. Ackermann, "Wind Power in Power Systems", Hoboken, NJ, USA, John Wiley, 2e, 2012.

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B.Tech (IT) – IV-II Sem
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(19A03802a)   ENERGY CONSERVATION AND MANAGEMENT
OPEN ELECTIVE-IV

Course Objective:

- Familiarize present energy scenario, and energy auditing methods.
- Explain components of electrical systems, lighting systems and improvements in performance.
- Demonstrate different thermal systems, efficiency analysis, and energy conservation methods.
- Train on energy conservation in major utilities.
- Instruct principles of energy management and energy pricing.

UNIT I

Introduction: Energy – Power – Past & Present Scenario Of World; National Energy Consumption Data – Environmental Aspects Associated With Energy Utilization –Energy Auditing: Need, Types, Methodology And Barriers. Role Of Energy Managers. Instruments For Energy Auditing.

Learning Outcomes

At the end of this unit, the student will be able to
- Infer energy consumption patterns and environmental aspects of energy utilization. (l2)
- Outline energy auditing requirements, tools and methods. (l2)
- Identify the function of energy manager. (l3)

UNIT II

Electrical Systems: Components Of EB Billing – HT And LT Supply, Transformers, Cable Sizing, Concept Of Capacitors, Power Factor Improvement, Harmonics, Electric Motors – Motor Efficiency Computation, Energy Efficient Motors, Illumination – Lux, Lumens, Types Of Lighting, Efficacy, LED Lighting And Scope Of Economy In Illumination.

Learning Outcomes

At the end of this unit, the student will be able to
- Outline components of electricity billing, transmission and distribution. (l2)
- Analyze performance characteristics of transformers, capacitors, and electric motors. (l4)
- Examine power factor improvements, and electric motor efficiency. (l4)

- Evaluate lighting systems. (L4)

UNIT III

Thermal Systems: Stoichiometry, Boilers, Furnaces and Thermic Fluid Heaters – Efficiency Computation and Encon Measures. Steam: Distribution & Usage: Steam Traps, Condensate Recovery, Flash Steam Utilization, Insulators & Refractories.

Learning Outcomes

At the end of this unit, the student will be able to
- Determine efficiency of boilers, furnaces and other thermal systems. (l5)
- Recommend energy conservation measures in thermal systems. (l5)
- Justify steam systems in energy conservation. (l4)

UNIT IV

Energy Conservation In Major Utilities: Pumps, Fans, Blowers, Compressed Air Systems, Refrigeration And Air Conditioning Systems – Cooling Towers – D.G. Sets.

Learning Outcomes

At the end of this unit, the student will be able to
- Explain energy conservation measures in major utilities. (l2)
- Apply performance test criteria for fans, pumps, compressors, hvac systems. (l3)
- Assess energy conservation in cooling towers and d.g. sets. (l5)

UNIT V

Energy Management: Principles of Energy Management, Energy demand estimation, Organising and Managing Energy Management Programs, Energy pricing.

Learning Outcomes

At the end of this unit, the student will be able to
- Describe principles of energy management. (l2)
- Assess energy demand and forecast. (l5)
- Organize energy management programs. (l6)
- Design elements of energy pricing. (l6)

Course Outcomes:

At the end of this course, the student will be able to:
- Explain energy utilization and energy auditing methods.(l2)
- Analyze electrical systems performance of electric motors and lighting systems.(l4)
- Examine energy conservation methods in thermal systems.(l4)
- Estimate efficiency of major utilities such as fans, pumps, compressed air systems, hvac and d.g. Sets. (l4)
- Elaborate principles of energy management, programs, energy demand and energy pricing. (l6)

TEXT BOOKS:

1. Energy Manager Training Manual (4 Volumes) Available At www.energymanagertraining.com, A Website Administered By Bureau Of Energy Efficiency (BEE), A Statutory Body Under Ministry Of Power, Government Of India, 2004.

REFERENCES:

1. Witte. L.C., P.S. Schmidt, D.R. Brown, "Industrial Energy Management and Utilisation" Hemisphere Publ, Washington, 1988.
2. Callaghn, P.W. "Design And Management For Energy Conservation", Pergamon Press, Oxford, 1981.
3. Dryden. I.G.C., "The Efficient Use Of Energy" Butterworths, London, 1982
4. Murphy. W.R. And G. Mc KAY, "Energy Management", Butterworths, London 1987.
5. Turner, W. C., Doty, S. and Truner, W. C., "Energy Management Hand book", 7th edition, Fairmont Press, 2009.
6. De, B. K., "Energy Management audit & Conservation", 2nd Edition, Vrinda Publication, 2010.
7. Smith, C. B., "Energy Management Principles", Pergamon Press, 2007.

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(19A03802b) NON-DESTRUCTIVE TESTING
OPEN ELECTIVE-IV

Course Objectives

- Introduce basic concepts of non destructive testing.
- Familiarize with characteristics of ultrasonic test, transducers, rejection and effectiveness.
- Describe concept of liquid Penetrant, eddy current and magnetic particle tests, its applications and limitations.
- Explain the principles of infrared and thermal testing, applications and honey comb and sandwich structures case studies.
- Impart NDE and its applications in pressure vessels, casting and welded constructions.

UNIT I

Introduction to non-destructive testing: Radiographic test**,** Sources of X and Gamma Rays and their interaction with Matter, Radiographic equipment, Radiographic Techniques, Safety Aspects of Industrial Radiography.

Learning outcomes:

At the end of this unit, the student will be able to

- Explain non destructive testing techniques (L2)
- Summarize the basic concepts of Radiographic test   (L2)
- Outline the concepts of sources of X and Gamma Rays (L2)
- Explain the radiographic techniques (L2)
- Discuss the safety aspects of industrial radiography. (L4)

UNIT II

Ultrasonic test: Principle of Wave Propagation, Reflection, Refraction, Diffraction, Mode Conversion and Attenuation, Sound Field, Piezo-electric Effect , Ultrasonic Transducers and their Characteristics, Ultrasonic Equipment and Variables Affecting Ultrasonic Test, Ultrasonic Testing, Interpretations and Guidelines for Acceptance, Rejection - Effectiveness and Limitations of Ultrasonic Testing.

Learning outcomes:

At the end of this unit, the student will be able to

- Explain the principle of ultrasonic test. (l2)
- Analyze the performance of wave propagation, reflection, refraction, diffraction and sound field in ultrasonic test. (l4)
- Discuss the characteristics of ultrasonic transducers. (l4)
- Outline the limitations of ultrasonic testing. (l2)

UNIT III

Liquid Penetrant Test: Liquid Penetrant Test, Basic Concepts, Liquid Penetrant System, Test Procedure, Effectiveness and Limitations of Liquid Penetrant Testing**.**
Eddy Current Test: Principle of Eddy Current, Eddy Current Test System, Applications of Eddy Current-Testing Effectiveness of Eddy Current Testing.
Magnetic Particle Test: Magnetic Materials, Magnetization of Materials, Demagnetization of Materials, Principle of Magnetic Particle Test, Magnetic Particle Test Equipment, Magnetic Particle Test Procedure, Standardization and Calibration, Interpretation and Evaluation, Effective Applications and Limitations of the Magnetic Particle Test.

Learning Outcomes:

At the end of this unit, the student will be able to
- Illustrate the procedure of Liquid Penetrant, eddy current and magnetic particle tests.(L2)
- Outline the limitations of Penetrant, eddy current and magnetic particle tests. (L2)
- Explain the effectiveness of Penetrant, eddy current and magnetic particle tests. (L2)
- Apply the applications of Magnetic particle test. (L3)

UNIT IV

Infrared And Thermal Testing: Introduction and fundamentals to infrared and thermal testing–Heat transfer –Active and passive techniques –Lock in and pulse thermography–Contact and non contact thermal inspection methods–Heat sensitive paints –Heat sensitive papers –-thermally quenched phosphors liquid crystals –techniques for applying liquid crystals –other temperature sensitive coatings –Inspection methods –Infrared radiation and infrared detectors–thermo mechanical behavior of materials–IR imaging in aerospace applications, electronic components, Honey comb and sandwich structures–Case studies.

Learning Outcomes:

At the end of this unit, the student will be able to
- Discuss the fundamentals of thermal testing. (l6)
- Explain the techniques of liquid crystals, active and passive. (l2)
- Illustrate thermal inspection methods. (l2)
- Outline the limitations of thermal testing. (l2)
- Explain the applications of honey comb and sandwich structures. (l2)

UNIT V

Industrial Applications of NDE: Span of NDE Activities Railways, Nuclear, Non-nuclear and Chemical Industries, Aircraft and Aerospace Industries, Automotive Industries, Offshore Gas and Petroleum Projects, Coal Mining Industry, NDE of pressure vessels, castings, welded constructions

Learning Outcomes:

At the end of this unit, the student will be able to
- Illustrate applications of NDE. (L2)
- Explain the applications of Railways, Nuclear and chemical industries. (L2)
- Outline the limitations and disadvantages of NDE. (L2)
- Explain the applications of NDA of pressure vessels, casting and welding constructions (L2)

Course Outcomes

At the end of the course, student will be able to
- Explain various methods of non-destructive testing. (l3)
- Apply relevant non-destructive testing method different applications. (l3)
- Explain the applications of railways, nuclear and chemical industries. (l2)
- Outline the limitations and disadvantages of nde. (l2)
- Explain the applications of nda of pressure vessels, casting and welding constructions   (l2)

TEXT BOOKS:

1. J Prasad, GCK Nair , "Non destructive test and evaluation of Materials", Tata mcgraw-Hill Education Publishers, 2008.
2. Josef Krautkrämer, Herbert Krautkrämer, "Ultrasonic testing of materials", 3rd edition, Springer-Verlag, 1983.
3. X. P. V. Maldague, "Non destructive evaluation of materials by infrared thermography", 1st edition, Springer-Verlag, 1993.

REFERENCES:

1. Gary L. Workman, Patrick O. Moore, Doron Kishoni, "Non-destructive, Hand Book, Ultrasonic Testing", 3rd edition, Amer Society for Nondestructive, 2007.
2. ASTM Standards, Vol 3.01, Metals and alloys

Social Relevant Projects

1. Solid waste conversion into energy (Gasification)
2. Plastic waste into fuel.
3. Bio-gas digester.
4. Development of mechanisms for farmers.
5. Smart irrigation for saving water.
6. Mechanized water segregation.
7. Applications of solar technologies for rural purpose.
8. Power generation from wind turbine.
9. Applications of drones for agriculture.
10. Solar drying.

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(19A04802a)   INTRODUCTION TO IMAGE PROCESSING

OPEN ELECTIVE-IV

Course Objectives:

- To interpret fundamental concepts of digital image processing.
- To exemplify image enhancement.
- To interpret fundamental concepts of color image processing.
- To assess image compression techniques for digital images.
- To summarize segmentation for digital images.

UNIT-I:

INTRODUCTION TO DIGITAL IMAGE PROCESSING

Introduction: Digital image representation, Fundamental steps in image processing, Elements of digital image processing, Elements of visual perception, Simple image model, Sampling and Quantization, Basic relationships between pixels, Image transformations.
Applications: Medical imaging, Robot vision, Character recognition, Remote sensing.

Learning Outcomes:

At the end of this unit, the student will be able to
- Understand the fundamental concepts of image processing, Sampling process and basis relationships between pixels (L1)
- Explain the elements of Digital Image Processing (L2)

UNIT–II:

IMAGE ENHANCEMENT

Need for image enhancement, Point processing, Histogram processing, Spatial filtering-Smoothing and Sharpening.

Learning Outcomes:

At the end of this unit, the student will be able to
- Understand the need for enhancement process (L1)

- Explain the terminology involved in enhancement process (L2)

UNIT-III:

COLOR IMAGE PROCESSING

Colour fundamentals, Colour models, Color transformations, Pseudo colour image processing, Full colour image processing.

Learning Outcomes:

At the end of this unit, the student will be able to
- Understand the need for enhancement process (L1)
- Explain the terminology involved in enhancement process (L2)

UNIT–IV:

IMAGE COMPRESSION

Redundancies, Fidelity criteria, Image compression model, Lossless compression: Huffman coding, Arithmetic coding. Lossy compression: Lossy Predictive Coding, JPEG Compression Standard.

Learning Outcomes:

At the end of this unit, the student will be able to
- Understand the need for image compression (L1)
- Explain the image compression and various types of compression techniques
   (L2)

UNIT–V:

IMAGE SEGMENTATION

Detection of discontinuities: point, line and edge detection, Edge linking and Boundary detections: Local Processing, Global processing via Hough transform, Thresholding, Region oriented segmentation: Region growing, Region splitting and merging.

Learning Outcomes:

At the end of this unit, the student will be able to
- Understand the principle of image segmentation and its importance (L1)
- Explain the image compression and various types of compression techniques (L2)

- Analyze the various terminologies involved in image segmentation like edge, boundary detection etc. (L3)

Course Outcomes:

- Interpret fundamental concepts of digital and color image processing.
- Exemplify image enhancement.
- Analyze the various terminologies involved in image segmentation like edge, boundary detection etc. Assess image compression techniques for digital images.
- Summarize segmentation techniques for digital images.

TEXT BOOKS:

1. Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing", 3rd Edition, Pearson Education, 2011.

REFERENCE BOOKS:

1. S Jayaraman, S Esakkirajan and T Veerakumar, "Digital Image Processing", TMH, 2011.
2. S. Sridhar, "Digital Image Processing", 2nd Edition, Oxford Publishers, 2016.

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B.Tech (IT)– IV-II Sem

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(19A04802b)   PRINCIPLES OF CELLULAR AND MOBILE COMMUNICATIONS
OPEN ELECTIVE-IV

Course Objectives:

- To understand the concepts and operation of cellular systems.
- To apply the concepts of cellular systems to solve engineering problems.
- To analyse cellular systems for meaningful conclusions.
- To evaluate suitability of a cellular system in real time applications.
- To design cellular patterns based on frequency reuse factor.

UNIT-I:

Introduction to Cellular Mobile Systems

Why cellular mobile communication systems? A basic cellular system, Evolution of mobile radio communications, Performance criteria, Characteristics of mobile radio environment, Operation of cellular systems. Examples for analog and digital cellular systems.

Learning Outcomes:

At the end of the unit, the student should be able to
- Understand the conceptsand operation of cellular systems (L1).
- Analyze the characteristics of mobile radio environment (L3).

UNIT-II:

Cellular Radio System Design

General description of the problem, Concept of frequency reuse channels, Cochannel interference reduction, Desired C/I ratio, Cell splitting and sectoring.

Learning Outcomes:

At the end of the unit, the student should be able to
- Understand the concept of frequency reuse and cochannel interference in cellular systems (L1).
- Apply the concept of cellular systems to solve engineering problems (L2).
- Analyze the design problems of cellular systems (L3).
- Design of cellular patterns based frequency reuse factor (L5).

UNIT-III:

Handoffs and Dropped Calls

Why handoffs and types of handoffs, Initiation of handoff, Delaying a handoff, Forced handoffs, Queuing of handoffs, Power-difference handoffs, Mobile assisted handoff and soft handoff, Cell-site handoff, Intersystem handoff. Introduction to dropped call rate.

Learning Outcomes:

At the end of the unit, the student should be able to
- Understand why handoff is required (L1).
- Apply handoff techniques to solve engineering problems (L2).
- Compare various types of handoffs (L3).

UNIT-IV:

Multiple Access Techniques for Wireless Communications

Introduction, Frequency Division Multiple Access, Time Division Multiple Access, Code Division Multiple Accessand Space Division Multiple Access.

Learning Outcomes:

At the end of the unit, the student should be able to
- Understand various types of multiple access techniques (L1).
- Apply the concept of multiple access to solve engineering problems (L2).
- Compare various types of multiple access techniques (L3).

UNIT-V:

Digital Cellular Systems

Global System for Mobile Systems, Time Division Multiple Access Systems, Code Division Multiple Access Systems. Examples for 2G, 3G and 4G systems. Introduction to 5G system.

Learning Outcomes:

At the end of the unit, the student should be able to
- Understand operation of various types of digital cellular systems (L1).
- Compare various types of digital cellular systems (L3).
- Evaluate suitability of a cellular system in real time applications (L4).

Note: The main emphasis is on qualitative treatment. Complex mathematical treatment may be avoided.

Course Outcomes:

At the end of the course, the student should be able to
- Understand the concepts and operation of cellular systems (L1)
- Apply the concepts of cellular systems to solve engineering problems (L2).
- Analyse cellular systems for meaningful conclusions, Evaluate suitability of a cellular system in real time applications (L3).
- Design cellular patterns based on frequency reuse factor (L4).

TEXT BOOKS:

2. William C. Y. Lee, "Mobile Cellular Telecommunications", 2ndEdition, McGraw-Hill International, 1995.
3. Theodore S. Rappaport, "Wireless Communications – Principles and Practice", 2ndEdition, PHI, 2004.

REFERENCES:

3. Aditya K. Jagannatham "Principles of Modern Wireless Communications Systems – Theory and Practice", McGraw-Hill International, 2015.

Blooms' Learning levels:
L1: Remembering and Understanding
L2: Applying
L3: Analyzing, Evaluating
L4: Designing, Creating

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(19A04802c)   INDUSTRIAL ELECTRONICS
OPEN ELECTIVE-IV

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 Ultrasonics and its application**.**

UNIT I

Scope of industrial Electronics, Semiconductors, Merits of semiconductors, crystallinestructure, Intrinsic semiconductors, Extrinsic semiconductors, current flow insemiconductor, Open-circuited p-n junction, Diode resistance, Zener diode,Photoconductors and junction photo diodes, Photo voltaic effect, Light emitting diodes(LED).

Learning Outcomes:

At the end of this unit, the student will be able to
- Understand the importance of Electronics and semiconductor devices in industry, operation of semiconductor devices (L1)
- Describe the working of semiconductor diodes (L1)

UNIT II

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, Lettersymbols 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.

Learning Outcomes:

At the end of this unit, the student will be able to
- Understand the working of Transistor and its different configurations (L1)
- Describe the working of CE, CC, CB configurations (L1)

UNIT III

AC to DC converters- Introduction, Classification of Rectifiers, Half wave Rectifiers, Fullwave 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, Shortperiod Accuracy of Regulators, Long period .Accuracy of Voltage Regulator, Principle ofautomatic voltage Regulator, Simple D.C. Voltage stabilizer using Zener diode, D.C.Voltage Regulators, Series Voltage Regulators, Complete series voltage regulatorcircuit, Simple series voltage regulator.

UNIT IV

Resistance welding controls: Introduction, Resistance welding process, Basic Circuitfor A.C. resistance welding, Types of Resistance welding, Electronic welding controlused in Resistance welding, Energy storage welding. **Induction heating:** Principle ofinduction heating, Theory of Induction heating merits of induction heating, Application ofinduction heating, High frequency power source of induction heating. **Dielectricheating**: Principle of dielectric heating, theory of dielectric heating, dielectric propertiesof typical materials, electrodes used in dielectric heating, method of coupling ofelectrodes to the R.F. generator, Thermal losses in Dielectric heating, Applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the principle of operation of Resistance welding, Induction heating and Dielectric heating (L1)
- Apply the process of Resistance welding, Induction heating and Dielectric heating in the industry (L2)

UNIT V:

Ultrasonics: Introduction, Generation of Ultrasonic waves, Application of Ultrasonicwaves, Ultrasonic stroboscope, ultrasonic as means of communication, ultrasonic flawdetection, 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 ultrasoni8c waves, cuttingand machining of hard materials by ultrasonic vibrations, Degassing of liquids byultrasonic waves, Physio-chemical effects of ultrasonics, chemical effects ofultrasonics, Thermal effects of Ultrasonics, soldering and welding by ultrasonics,Ultrasonic Drying

Learning Outcomes:

At the end of this unit, the student will be able to
- Understand the principle of operation of Ultrasonics and its applications (L1)
- Analyze the thermal effects of Ultrasonics, soldering and welding by ultrasonics,Ultrasonic Drying in the industry (L3)

Course Outcome:

- Understand the semi-conductor devices and their switching characteristics.
- Apply the Ultrasonic waves with different applications
- Analyze the thermal effects of Ultrasonics, soldering and welding by ultrasonics,Ultrasonic Drying in the industry, Interpret the characteristics of AC to DC converters,
- Develop the practical applications Electronics in industries.

TEXT BOOKS:

1. G. K. Mithal, "Industrial Electronics", Khanna Publishers, Delhi, 2000.
2. J.Gnanavadivel, R.Dhanasekaran, P.Maruthupandi, "Industrial Electronics",Anuradha Publications, 2011.

REFERENCE BOOKS:

1. F. D. Petruzulla, "Industrial Electronics", McGraw Hill, Singapore, 1996.
2. M. H. Rashid, "power Electronics Circuits, Devices and Application", PHI, 3rdedition, 2004.
3. G. M. Chute and R. D. Chute, "Electronics in Industry", McGraw Hill Ltd,Tokyo, 1995.

B.Tech (IT)–IV-II   **L   T   P   C**
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(19A04802d)   ELECTRONIC INSTRUMENTATION
OPEN ELECTIVE-IV

Course Objectives:

This course will enable students to:
- To introduce various measuring instruments and their functionality
- To teach various measurement metrics for performance analysis
- To explain principles of operation and working of different electronic instruments
- To familiarize the characteristics, operations, calibrations and applications of the different oscilloscopes and signal generators.
- To provide exposure to different types of transducers

UNIT – I

Measurement and Error: Definitions, Accuracy, Precision, Resolution and Significant Figures, Types of Errors, Measurement error combinations. (Text 2)
Ammeters: DC Ammeter, Multi-range Ammeter, The Ayrton Shunt or Universal Shunt, Requirements of Shunt, Extending of Ammeter Ranges, RF Ammeter (Thermocouple), Limitations of Thermocouple. (Text 1)
Voltmeters and Multi-meters: Introduction, Basic Meter as a DC Voltmeter, DC Voltmeter, Multi range Voltmeter, Extending Voltmeter Ranges, Loading, AC Voltmeter using Rectifiers. True RMS Voltmeter, Multi-meter. (Text 1)

Learning Outcomes:

At the end of this unit, the student will be able to
- Explain the importance of measurement system (L1)
- Examine the characteristics of different Instruments (L2)
- Illustrate different types of errors that may occur in instruments during measurements (L2)

UNIT – II

Digital Voltmeters: Introduction, RAMP technique, Dual Slope Integrating Type DVM, Integrating Type DVM, Most Commonly used principles of ADC, Successive Approximations, - Digit, Resolution and Sensitivity of Digital Meters, General Specifications of DVM, (Text 1)
Digital Instruments: Introduction, Digital Multi-meters, Digital Frequency Meter, Digital Measurement of Time, Universal Counter, Digital Tachometer, Digital pH Meter, Digital Phase Meter, Digital Capacitance Meter, (Text 1)

Learning Outcomes:

At the end of this unit, the student will be able to
- Explain working of digital measuring Instruments (L2)
- Compare the various measuring techniques for measuring voltage (L4)

UNIT – III

Oscilloscopes: Introduction, Basic principles, CRT features, Block diagram of Oscilloscope, Simple CRO, Vertical Amplifier, Horizontal Deflecting System, Sweep or Time Base Generator, Measurement of Frequency by Lissajous Method, Digital Storage Oscilloscope. (Text 1)
Signal Generators: Introduction, Fixed and Variable AF Oscillator, Standard Signal Generator, Laboratory Type Signal Generator, AF sine and Square Wave Generator, Function Generator, (Text 1)

Learning Outcomes:

At the end of this unit, the student will be able to
- Describe functions of basic building of CRO (L1)
- Measure parameters viz. Amplitude, frequency and time period using CRO (L2)
- Classify signal generators and describe its characteristics (L2)

UNIT – 4

Measuring Instruments: Field Strength Meter,Stroboscope, Phase Meter, Q Meter, Megger. (Text 1)
Bridges: Introduction, Wheatstone's bridge, Kelvin's Bridge; AC bridges, Capacitance Comparison Bridge, Inductance Comparison Bridge, Maxwell's bridge, Wien's bridge. (Text 1)

Learning Outcomes:

At the end of this unit, the student will be able to
- Describe function of various measuring Instruments. (L1)
- Describe how unknown capacitance and inductance can be measured using bridges (L1)
- Select appropriate bridge for measuring R, L and C parameters (L2)

UNIT – 5

Transducers: Introduction, Electrical transducers, Selecting a transducer, Resistive transducer, Resistive position transducer, Strain gauges, Resistance thermometer, Thermistor, Inductive transducer, LVDT, Piezoelectric transducer, Photo cell, Photo voltaic cell, Semiconductor photo diode and transistor. (Text 1)

Learning Outcomes:

At the end of this unit, the student will be able to
- Explain the importance of transducer (L1)
- Illustrate different measuring techniques in transducers to measure physical quantities.(L2)
- Select the appropriate transducer for the measurement of physical parameters (L2)

Course outcomes:

- Learn different types of errors in measurement, calibration process and standards, various methods for measurement of non-electrical quantities, Understand the different methods for measurement of various electrical quantities.
- Familiarize the dynamics of instrument systems, various passive and active transducers
- Compare the various measuring techniques for measuring voltage (L4)

TEXT BOOKS:

- H. S. Kalsi, "Electronic Instrumentation", McGraw Hill, 3rd Edition, 2012, ISBN:9780070702066.
- A. D. Helfrick and W.D. Cooper, "Modern Electronic Instrumentation and Measuring Techniques", Pearson, 1st Edition, 2015, ISBN: 9789332556065.

REFERENCE BOOKS:

- David A. Bell, "Electronic Instrumentation & Measurements", Oxford University Press PHI 2nd Edition, 2006 ISBN 81-203-2360-2.
- A. K. Sawhney, "Electronics and Electrical Measurements", Dhanpat Rai &Sons. ISBN - 81-7700-016-0

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(19A05802a)) BLOCKCHAIN TECHNOLOGY

Course Objectives:

This course is designed to:

- Understand the philosophy of Blockchain and the cutting edge technology behind its functions
- Illustrate how to setup Ethereum tools
- Explain the key vocabulary and concepts used in Blockchain for Business

UNIT-I
Blockchain concepts: Blockchain, Blockchain application example: Escrow, Blockchain stack, from web 2.0 to the next generation decentralized web, domain specific Blockchain application, Blockchain benefits and challenges.
Blockchain application templates: Blockchain application components, design methodology for Blockchain applications, Blockchain applications templates

Learning Outcomes:

After completing this Unit, students will be able to

- Outline the benefits and challenges of Block chain(L2)
- Design the Blockchain applications(L6)

UNIT-II
Setting up Ethereum development tools: Ethereum clients,Ethereum languages, TestRPC, Mist Ethereumwalle, meta mask, web3 JavaScript API, truffle.
Ethereum Accounts: Ethereum Accounts, keypairs, working with EOA Accounts, working with contract accounts.

Learning Outcomes:

After completing this Unit, students will be able to

- Illustrate the use of Ethereum development tools(L2)
- Create Ethereum accounts and work with them (L6)

UNIT-III
Smart contracts: Smart contract, structure of a contract, setting up and interacting with a contract using Geth client, setting up and interacting with a contract using Mist Wallet

Learning Outcomes:

After completing this Unit, students will be able to

- Make use of of smart contracts(L3)
- Distinguish setting up and interacting with a contract using Geth client and Mist Wallet.(L4)

UNIT-IV
Smart contracts (continued): Smart contract examples, Smart contract patterns.
Decentralized Applications: implementing Dapps, case studies,

Learning Outcomes:

After completing this Unit, students will be able to

- Illustrate the Smart contract examples and patterns(L2)
- Develop Decentralized applications.(L6)

UNIT-V
Mining: Concensus on Blockchain network, mining, Block validation, state storage in Ethereum.

Learning Outcomes:

After completing this Unit, students will be able to

- Define Concensus on Blockchain network(L1)
- Demonstrate State Storage in Ethereum(L2)

Course outcomes:
Upon completion of the course, the students should be able to:

- Create customized blockchain solutions (L6)
- Make use of the specific mechanics of Ethereum(L3)
- Experiment with Smart contracts (L3)
- Develop Enterprise applications using Blockchain(L6)

Text book:

1. Arshadeepbahga, Vijay madisetti, "Blockchain Applications A hands-on approach", VPT 2017.
2. *Chandramouli Subramanian*, Asha A George, Abhilash K A and MeenaKarthikeyan, "Blockchain Technology", Universty Press, 2021

References:

1. Imran Bashir, "Mastering Blockchain" Packt Publishing Ltd, March 2017.
2. Melanie swan, "Blokchain blueprint for a new economy", O'REILLY

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(19A05802b) MEAN STACK TECHNOLOGIES

Course Objectives:
This course is designed to:

- Translate user requirements into the overall architecture
- Implement new systems and manage the projects
- Write optimized front end code using HTML and JavaScript
- Monitor the performance of web applications & its infrastructure
- Design and implement Robust and Scalable Front End Applications

UNIT I

Introduction to Web: Internet and World Wide Web, Domain name service, Protocols: HTTP, FTP, SMTP. Html5 concepts, CSS3, Anatomy of a web page. XML: Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX Approaches.

Learning Outcomes:

After completing this Unit, students will be able to

- Summarize the protocols related to Internet & WWW(L2)
- Compare and contrast XML and HTML(L5)

UNIT II

JavaScript: The Basic of JavaScript: Objects, Primitives Operations and Expressions, Control Statements, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions. Angular Java Script Angular JS Expressions: ARRAY, Objects, $eval, Strings, Angular JS Form Validation & Form Submission, Single Page Application development using Angular JS.

Learning Outcomes:

After completing this Unit, students will be able to

- Illustrate the importance of JavaScript(L2)
- Develop applications using Angular JS(L6)

UNIT III

Node.js: Introduction, Advantages, Node.js Process Model, Node JS Modules. Express.js: Introduction to Express Framework, Introduction to Nodejs , What is

Nodejs, Getting Started with Express, Your first Express App, Express Routing, Implementing MVC in Express, Middleware, Using Template Engines, Error Handling , API Handling , Debugging, Developing Template Engines, Using Process Managers, Security & Deployment.

Learning Outcomes:

After completing this Unit, students will be able to

- Explain the Node JS modules(L2)
- Make use of MVC in Express(L3)

UNIT IV
RESTful Web Services: Using the Uniform Interface, Designing URIs,
Web Linking, Conditional Requests. React Js: Welcome to React, Obstacles and Roadblocks, React's Future, Keeping Up with the Changes, Working with the Files, Pure React, Page Setup, The Virtual DOM, React Elements, ReactDOM, Children, Constructing Elements with Data, React Components, DOM Rendering, Factories.

Learning Outcomes:

After completing this Unit, students will be able to

- Outline the RESTful Web Services(L2)
- Assess the future of React Js(L5)

UNIT V
Mongo DB: Introduction, Architecture, Features, Examples, Database Creation & Collection in Mongo DB. Deploying Applications: Web hosting & Domains, Deployment Using Cloud Platforms.

Learning Outcomes:

After completing this Unit, students will be able to

- Explain the features and architecture of Mongo DB (L2)
- Create and collect Database in MongDB(L6)

Course Outcomes

After the completion of the course, student will be able to
- List the Basic Concepts of Web & Markup Languages(L1)
- Develop web Applications using Scripting Languages & Frameworks(L6)
- Make use of Express JS and Node JS frameworks(L3)
- Illustrate the uses of web services concepts like restful, react js (L2)
- Deploying applications using Cloud Platforms (L6)

Text Books:
1) Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
2) Web Technologies, Uttam K Roy, Oxford
3) Pro Mean Stack Development, ELadElrom, Apress
4) Restful Web Services Cookbook, Subbu Allamraju, O'Reilly
5) JavaScript & jQuery the missing manual, David sawyer mcfarland, O'Reilly
6) Web Hosting for Dummies, Peter Pollock, John Wiley Brand

Reference Books:
1) Ruby on Rails up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly (2006).
2) Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012).
3) Web Technologies, HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
4) An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning.
5) Express.JS Guide,The Comprehensive Book on Express.js, Azat Mardan, Lean Publishing.

e-Resources:
1) http://www.upriss.org.uk/perl/PerlCourse.html

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(19A27802a)   FOOD PLANT UTILITIES & SERVICES
OPEN ELECTIVE - IV

PREAMBLE

This subject focuses on different utilities like water, steam, electricity and its properties, production of consumption of these sources in the food plant.

OBJECTIVES

- To give brief idea about the utilities that are required/used in food industry and their sources and importance.

UNIT – I

Introduction Classification of various utilities and services in food industry. Water use in Food Processing Industry Water supply system: Pumps of different types, operational aspects, piping system for fresh water, chilled water etc., fittings and control, water requirement for cleaning and processing, water quality, water purification and softening Unit

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Water use in Food Processing Industry
- Water supply system: Pumps of different types, operational aspects, piping system for fresh water, chilled water etc.,
- fittings and control, water requirement for cleaning and processing,
- water quality, water purification and softening Unit

UNIT – II

Water use in food processing: Different types of water requirements in food processing plants, types of water use, waste water sources, water wastage minimization, water loadings per unit mass of raw material. Water conservation: Water and waste water management, economic use of water, water filtration and recirculation.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Different types of water requirements in food processing plants,
- types of water use, waste water sources, water wastage minimization,
- water loadings per unit mass of raw material
- Water and waste water management, economic use of water,
- water filtration and recirculation

UNIT – III

Steam uses in Food Industry Steam uses in food industry: Food processing operations in which steam is used, temperature, pressure and quantity of steam required in various food processing operations   Steam generation system: Components of a boiler system, fuels used in boilers, energy analysis for a steam generation system, heat loss from boiler system, boiler design consideration.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Food processing operations in which steam is used
- Temperature, pressure and quantity of steam required in various food processing operations
- Components of a boiler system, fuels used in boilers, energy analysis for a steam generation system
- Heat loss from boiler system, boiler design consideration.

UNIT – IV

Waste-Heat Recovery in Food Processing Facilities Quantity and quality of waste heat in food processing facilities, waste heat utilization, heat exchangers for waste heat recovery, heat pumps for waste heat recovery. Waste Disposal and its Utilization Industrial waste, sewage, influent, effluent, sludge, dissolved oxygen, biological oxygen demand, chemical oxygen demand.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Waste-heat recovery in food processing facilities
- Quantity and quality of waste heat in food processing facilities,

- Waste heat utilization, heat exchangers for waste heat recovery, heat pumps for waste heat recovery.
- Waste disposal and its utilization industrial waste, sewage, influent, effluent, sludge,
- Dissolved oxygen, biological oxygen demand, chemical oxygen demand

UNIT – V

Planning and Design of Service Facilities in Food Industry Estimation of utilities requirements: Lighting, ventilation, drainage, CIP system, dust removal, fire protection etc. Maintenance of facilities: Design and installation of piping system, codes for building, electricity, boiler room, plumbing and pipe colouring, maintenance of the service facilities. Services required in offices, laboratories, locker and toilet facilities, canteen, parking lots and roads, loading docks, garage, repair and maintenance shop, ware houses etc.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Planning and Design of Service Facilities in Food Industry Estimation of utilities requirements: Lighting, ventilation, drainage, etc.
- Maintenance of facilities: Design and installation of piping system, codes for building, electricity, plumbing, maintenance of the service facilities.
- Services required in offices, laboratories, locker and toilet facilities, canteen, parking lots and roads, repair and maintenance shop, ware houses etc

Course Outcomes

By end of the course, students will understand the following
- Various utilities and services used in food industry and its applications in food industry namely water, steam, electricity and etc.

TEXT BOOKS

1. Lijun Wang. "Energy Efficiency and Management in Food Processing Facilities". CRC Press. 2008,
2. M. E. Casper. "Energy-saving Techniques for the Food Industry". Noyes Data Corporation. 1977,

REFERENCES

1. P.L. Ballaney, "Thermal Engineering in SI Units", 23rd Edition, Khanna Publishers, Delhi, 2003.
2. C.P. Arora. "Refrigeration and Air Conditioning". 3rd Edition, Tata McGraw Hill Publishing Co. Ltd. New Delhi. 2008,
3. W. E. Whitman, "A Survey of Water Use in the Food Industry", S. D. Holdsworth. Published by British Food Manufacturing Industries Research Association.
4. Chilton's Food Engineering. 1979, Chilton Co Publishers.

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(19A27802b)   NUTRACEUTICALS AND FUNCTIONAL FOODS

OPEN ELECTIVE – IV

PREAMBLE

This course will cover the classification, brief history and the impact of nutraceuticals and functional foods on health and disease prevention. Nutraceuticals to be covered in the course include isoprenoids, isoflavones, flavanoids, carotenoids, lycopene, garlic, omega 3 fatty acids, sphingolipids, vitamin E and antioxidants, herbal products in foods. Also marketing issues related to functional foods and nutraceuticals as well as stability testing will be reviewed.

Course Objectives:

- To understand the interrelationship between nutraceuticals and health maintenance.
- Cite the evidence supporting the efficacy and safety of nutraceutical and functional food products
- To explain the metabolic consequences of nutraceuticals and functional foods.
- Describe the physiologic and biochemical changes associated with consumption of nutraceuticals

UNIT – I

Introduction, definition, Modification in the definition of nutraceuticals. Classification of nutraceuticals, Nutraceuticals market scenario, formulation considerations. Challenges for Nutraceuticals.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Classification of nutraceuticals,
- Nutraceuticals market scenario and formulation considerations.
- Challenges for Nutraceuticals.

UNIT – II

Nutraceuticals value of spices and seasoning – Turmeric, Mustard, Chilli, Cumin, Fenugreek, Black Cumin, Fennel, Asafoetidia, Garlic, Ginger, Onion, Clove, Cardamom etc., Nutraceuticals from Fruits And Vegetables – Mango, Apple, Grapes, Bel, Banana, Broccoli, Tomato, Bitter Melon, Bitter Orange etc.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Nutraceuticals value of spices and seasoning – Turmeric, Mustard, Chilli, Etc.
- Nutraceuticals from Fruits and Vegetables – Mango, Apple, Grapes, Tomato etc.

UNIT – III

Omega -3 fatty acids from fish- Typical properties, structural formula, functional category. CLA-typical properties, structural formula, functional category. Application in Nutraceuticals. Calcium, chromium, copper, iodine, iron, magnesium, Zn- mechanism of action, bioavailability, uses and deficiency, dietary sources.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Properties of Omega -3 fatty acids from fish and structures
- Application in Nutraceuticals. Calcium, iodine, iron, Zn- mechanism of action, bioavailability, uses and deficiency, dietary sources.

UNIT – IV

Definition, classification – Type of classification (Probiotics, probiotics and synbiotics: Taxonomy and important features of probiotic microorganisms. Health effects of probiotics including mechanism of action. Probiotics in various foods: fermented milk products, non-milk products etc. Prebiotics. Definition, chemistry, sources, metabolism and bioavailability, effect of processing, physiological effects, effects on human health and potential applications in risk reduction of diseases, perspective for food applications for the following: Non-digestible carbohydrates/oligosaccharides: Dietary fibre, Resistant starch, Gums.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Probiotics, probiotics and synbiotics: important features of probiotic microorganisms.

- Non-digestible carbohydrates/oligosaccharides: Dietary fibre and etc.

UNIT – V

Phytosterol, Fatty Acids, Carotenoids, Anthocyanins, Carotenoids, Amino Acids, Water Soluble Vitamins, Free radical biology and antioxidant activity of nutraceuticals. Regulations of Nutraceuticals and Functional Foods in India and rest of the world.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Phytosterol, Fatty Acids, Carotenoids, Anthocyanins, Free radical biology and antioxidant activity of nutraceuticals.
- Regulations of Nutraceuticals and Functional Foods in India and rest of the world.

Course Outcomes

- Students will get know the nutraceuticals and its active components in different foods, regulations on nutraceuticals in India.

TEXT BOOKS

1. "Handbook of Nutraceuticals and Functional Foods. Yashwant Pathak, Vol. 1. (Ingredients, formulations, and applications)" CRC Press 2005.
2. "Handbook of Nutraceuticals and Functional Foods". Robert Wildman, 2nd Edition. CRC Press 2001.

REFERENCES

1. B. Shrilakshmi, "Dietetics", 5th Edition, New Age International (P) Ltd., New Delhi, 2005.
2. A. E. Bender, "Nutrition and Dietetic Foods", Chem. Pub. Co. New York, 2nd Edition, 2004.
3. P. S. Howe, "Basic Nutrition in Health and Disease", 2nd Edition, W. B. Saunders Company, London, 2003.
4. Kramer, "Nutraceuticals in Health and Disease Prevention", Hoppe and Packer, Marcel Dekker, Inc., NY 2001.
5. Bao and Fenwick, "Phytochemicals in Helath and Disease", Marcel Decker, Inc. NY 2004.

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(19A54802a) MATHEMATICAL MODELING & SIMULATION

OPEN ELECTIVE-IV

Course Objective:

This course focuses on what is needed to build simulation software environments, and not just building simulations using preexisting packages.

UNIT-I:

Simulation Basics-Handling Stepped and Event-based Time in Simulations-Discrete versus Continuous Modeling-Numerical Techniques-Sources and Propagation of Error

Learning Outcomes:

Students will be able to
- Understand computer simulation technologies and techniques.

UNIT-II

Dynamical, Finite State, and Complex Model Simulations-Graph or Network Transitions Based Simulations-Actor Based Simulations-Mesh Based Simulations-Hybrid Simulations

Learning Outcomes:

Students will be able to
- implement and test a variety of simulation and data analysis.

UNIT-III

Converting to Parallel and Distributed Simulations-Partitioning the Data-Partitioning the Algorithms-Handling Inter-partition Dependencies

Learning Outcomes:

Students will be able to
- Understand concepts of modeling layers of society's critical infrastructure networks.
- Understand partitioning the data.

UNIT-IV

Probability and Statistics for Simulations and Analysis-Introduction to Queues and Random Noise-Random Variates Generation-Sensitivity Analysis

Learning Outcomes:

Students will be able to
- Understand Queues and Random noise.
- Understand sensitivity analysis.

UNIT-V

Simulations Results Analysis and Viewing Tools-Display Forms: Tables, Graphs, and Multidimensional Visualization-Terminals, X and MS Windows, and Web Interfaces-Validation of Model Results

Learning Outcomes:

Students will be able to
- Build tools to view and control simulations and their results.

Course Outcomes:

After the completion of course, student will be able to
- Understand basic Model Forms.
- Understand basic Simulation Approaches.
- Evaluate handling Stepped and Event-based Time in Simulations.
- Distinguish Discrete versus Continuous Modeling.
- Apply Numerical Techniques.
- Calculate Sources and Propagation of Error.

TEXT BOOKS:

1. JN Kapur, "Mathematical modelling", Newage publishers
2. Kai Velten, "Mathematical Modeling and Simulation: Introduction for Scientists and Engineers" Wiley Publishers.