

# ANURAG UNIVERSITY

## B.Tech. CSE

**B. TECH IV YEAR I SEM**

**(7<sup>th</sup>Semester)**

**5 T +2 L + Mini project**

Serial No	Course Code	Category	Course Title	Hours per week			Credits
				L	T	P	
1	A57054	HSS&MC	Managerial Economics and Financial Analysis	2	1	0	3
2	A57055	PCC	Cryptography and Information Security	3	1	0	4
3	A57056	PEC-III	1. Deep Learning	3	1	0	4
	A57057		2. Mobile Application Development				
	A57058		3. Software Testing				
	A57059		4. Data Science and Visualization				
4	A57060	PEC - IV	1. Fundamentals of Cloud Computing	3	0	0	3
	A57061		2. Natural Language Processing				
	A57062		3. Web Mining				
5	A57063	PEC-V	1. Cyber Forensics	3	0	0	3
	A57064		2. Human Computer Interaction				
	A57065		3. Fundamentals of Blockchain Technology				
6	A57209	PCC	Cryptography and Information Security-Lab	0	0	3	1.5
7	A57210	PEC-III-Lab	1. Deep Learning Lab	0	0	3	1.5
	A57211		2. Mobile Application Development Lab				
	A57212		3. Software Testing Lab				
	A57213		4. Data Science and Visualization Lab				
8	A57230	PROJ	Industry Oriented Mini Project	0	0	4	2
<b>Total</b>							<b>22</b>

**B.TECH IV YEAR II SEM****2T +3 L/P**

<b>Subject Code</b>	<b>Course Code</b>	<b>Category</b>	<b>Course Title</b>	<b>Hours per week</b>			<b>Credits</b>
				<b>L</b>	<b>T</b>	<b>P</b>	
1	A58001	OEC-II	1. Technical and Business Communication Skills	2	1	0	3
	A58019		2. Digital Media Literacy				
	A58010		3. Value Engineering				
2	A58005	OEC-III	1. Negotiation Skills	2	1	0	3
	A58008		2. Project Management				
	A58021		3. Stress Management				
3	A58201	PROJ	Seminar	0	0	4	2
4	A58202		Comprehensive Viva-Voce	0	0	0	2
5	A58203	PROJ	Project	0	0	20	10
			<b>Total</b>				<b>20</b>

## ANURAG UNIVERSITY

IV Year B.Tech CSE I SEM

L	T/P	C
		2 1/0 3

### MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS (HSS&MC)

#### Course Objectives:

The objective of this course is to familiarize the student with the concepts of managerial economics and financial accounting, demand and cost concepts, market structures, pricing and financial ratios

#### Course Outcomes:

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

1. Describe the concept of demand and its determinants in managerial decisions
2. Know the cost concepts and breakeven analysis in production
3. Identify various market structures and different pricing strategies
4. Have knowledge of capital budgeting techniques in financial decisions
5. Have knowledge of Ratios in solving of business problems

#### Unit-I

**Introduction to Managerial Economics:** Definition, nature and scope of managerial economics, demand analysis- demand determinants, Law of Demand and its exceptions.

**Elasticity of Demand:** Definition, types, measurement and significance of elasticity of demand. demand forecasting, methods of demand forecasting.

#### Unit-II

**Theory of Production and Cost Analysis:** Production Function – Isoquants and Iso costs, MRTS, Least Cost Combination of Inputs.

**Cost Analysis:** Cost concepts, Opportunity cost, Breakeven Analysis (BEA) – determination of breakeven point, managerial significance and limitations of BEA.

### Unit –III

**Market structures:** Types of competition, features of perfect competition, monopoly and monopolistic competition, price - output determination in perfect competition

**Objectives and Policies of Pricing:** objectives of pricing, methods of pricing - cost plus pricing, marginal cost pricing, going rate pricing, limit pricing, market skimming pricing, penetration pricing, two - part pricing, block pricing, peak load pricing, cross subsidization.

### Unit –IV

**Capital and Capital Budgeting:** Capital and its significance. Types of capital. estimation of fixed and working capital requirements. Methods and sources of raising finance. Nature and scope of capital budgeting, features of capital budgeting proposals. Methods of capital Budgeting: Payback Method. Accounting Rate of Return (ARR) and Net Present Value Method

### Unit –V

**Introduction to Financial Accounting:** Definition of Accounting, Double-Entry Book Keeping, Journal, Ledger, and Trial Balance, Final Accounts.

**Ratio Analysis:** Computation, Analysis and Interpretation of Liquidity Ratios Activity Capital Structure Ratios and Profitability Ratios.

### TEXT BOOKS:

1. Arya Sri: Managerial Economics and Financial Analysis, TMH,2009
2. Varshney&Maheswari: Managerial Economics, Sultan Chand, 2014

### REFERENCES:

1. R. K. Sharma & Shashi K Gupta, Financial Management, Kalyani Publishers, 2020
2. V. Rajasekaran & R. Lalitha, Financial Accounting, Pearson Education, 2010.
3. Domnick Salvatore, Managerial Economics in a Global Economy, 9e, Oxford Univ Press, 2018.
4. S N Maheshwari, CA Sharad K Maheshwari & Dr Suneel K Maheshwari, Financial Accounting, 6/e, Vikas Publications, 2018

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## CRYPTOGRAPHY AND INFORMATION SECURITY

(PCC)

### Prerequisites:

Fundamentals of Networking, Mathematical Fundamentals

### Course Objectives

1. Understand fundamentals of cryptography and classic encryption techniques.
2. Compare and analyze encryption Algorithms
3. Summarize Authentication Functions using MAC and Hash
4. Analyze security importance of various web Applications
5. Categorize various types of Intruders and Viruses

### Course Outcomes

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

1. Assess fundamentals of cryptography and classic encryption techniques.
2. Compare various encryption Algorithms.
3. Summarize authentication functions using MAC and Hash
4. Outline security importance of various web applications.
5. Categorize various types of intruders and viruses.

### Unit I:

Security Concepts: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security  
Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques symmetric and asymmetric key cryptography, steganography.

## Unit II :

Symmetric key Ciphers: DES structure, DES Analysis, Security of DES, variants of DES, Block cipher modes of operation , AES structure, Analysis of AES , Key distribution

Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Analysis of RSA, Diffie-Hellman Key exchange.

## Unit III:

Message Authentication and Hash Functions: Authentication requirements and functions, MAC and Hash Functions, MAC Algorithms: Secure Hash Algorithm, Whirlpool, HMAC, Digital signatures, X.509, Kerberos.

## Unit IV

Security at layers (Network, Transport, Application): IPsec, Secure Socket Layer(SSL), Transport Layer Security(TLS), Secure Electronic Transaction(SET), Pretty Good Privacy(PGP), S/MIME.

## Unit V

Intruders, Virus and Firewalls: Intruders, Intrusion detection, password management, Virus and related threats, Countermeasures, Firewall design principles, Types of firewalls.

## Text Books:

1. B.Forouzan, Cryptography and Network Security,Tata McGraw-Hill.
2. William Stallings, Cryptography and Network Security, Pearson Education,4th Edition

## Reference Books:

1. C K Shyamala, N Harini, Dr T R Padmanabhan, Cryptography and Network Security : Wiley India, 1st Edition.
2. Bernard Menezes, Network Security and Cryptography: CENGAGE Learning
3. AtulKahate, Cryptography and Network Security: McGraw Hill, 2nd Edition

## Reference Links:

- 1.<http://www.cs.iit.edu/~cs549/cs549s07/lectures.htm>
2. <http://williamstallings.com/Extras/Security-Notes/>
3. <http://williamstallings.com/NetworkSecurity/styled/>

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### DEEP LEARNING

(PEC-III)

#### Prerequisites:

Basic Mathematics, P&S, Python, Machine Learning

#### Course Objectives:

1. To advance in training techniques for neural networks
2. To understand various CNN Architectures
3. To understand various RNN Methodologies
4. To custom train Autoencoder Models and implement them.
5. To apply Transfer Learning to solve problems

#### Course outcomes:

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

1. Have a good understanding of the fundamental issues and basics of deep learning
2. Understand the concept of CNN to apply it in the Image classification problems
3. Learning and understanding the working of various RNN methods
4. Learning and understanding the working of various Autoencoders methods
5. Use Transfer Learning to solve problems with high dimensional data including image and speech

#### UNIT I :

**Deep Learning:** Fundamentals, Introduction, Building Block of Neural Networks, Layers, MLPs, Forward pass, backward pass, class, trainer and optimizer, The Vanishing and Exploding Gradient Problems, Difficulties in Convergence, Local and Spurious Optima, Preprocessing, Momentum, learning rate Decay, Weight Initialization, Regularization, Dropout, SoftMax, Cross Entropy loss function, Activation Functions.

#### UNIT II:

**CNN:** Introduction, striding and padding, pooling layers, structure, operations and prediction of CNN with layers, CNN -Case study with MNIST, CNN VS Fully Connected

### UNIT III:

**RNN:** Handling Branches, Layers, Nodes, Essential Elements-Vanilla RNNs, GRUs, LSTM

### UNIT IV:

**Autoencoders:** Denoising Autoencoders, Sparse Autoencoders, Deep Autoencoders, Variational Autoencoders, GANS

### UNIT V:

Transfer Learning- Types, Methodologies, Diving into Transfer Learning, Challenges

### Text Books:

1. Seth Weidman, "Deep Learning from Scratch", O'Reilly Media, Inc., 2019
2. Ian Goodfellow, Yoshua Bengio and Aaron Courville, "Deep Learning" , MIT Press, 2015
3. Dipanjan Sarkar, Raghav Bali, "Transfer Learning in Action", Manning Publications, 2021

### Reference Books:

1. Giancarlo Zaccone, Md. Rezaul Karim, Ahmed Menshawy "Deep Learning with TensorFlow: Explore neural networks with Python", Packt Publisher, 2017.
2. Antonio Gulli, Sujit Pal, "Deep Learning with Keras", Packt Publishers, 2017.
3. Francois Chollet, "Deep Learning with Python", Manning Publications, 2017.



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### **MOBILE APPLICATION DEVELOPMENT**

**(PEC-III)**

#### **Course Objectives:**

1. Outline the usage of Android development framework.
2. Analyze the main components of an Android application and its entire life Cycle.
3. Develop database programming using SQLite.
4. Identify the use of location-based service in android applications.
5. Design SMS and MMS applications using Intents.

#### **Course Outcomes:**

At the end of this Mobile Application Development course, students will be able to:

1. Analyze the architecture of android and current trends in mobile operating systems.
2. Apply suitable software tools and APIs for the design of User Interfaces to a particular mobile application.
3. Design applications for mobile devices using SQLite Database.
4. Apply the location-based services in android applications.
5. Summarize the Monitoring changes to the phone, network, data connectivity and SIM states.

#### **UNIT I:**

Introduction to Android, Features of Android, The development framework: Understanding the Android Software Stack, Android Application Architecture; the Dalvik Virtual Machine, Creating First Android Application, Types of Android Applications, Android Development Tools: The Android Virtual Device Manager, Android Emulator, The Dalvik Debug Monitor Service.

## UNIT II:

**Creating applications and Activities:** Introduction to the application Manifest File, Using the Manifest Editor, Externalizing Resources: Creating Resources - Simple Values, Drawables, Layouts, Menus, Animations. The Android Activity Life cycle. **Building User Interfaces:** Fundamental Android UI design, Introducing Layouts: Defining Layouts, Using Layouts to Create Device Independent User Interfaces, Optimizing Layouts.

## UNIT III:

**Databases and Content Providers:** Introduction to Android Databases, Introducing SQLite, Content Values and Cursors, working with SQLite Databases- Creating Content Providers, Using Content Providers - Introducing the Content Resolver, Querying Content Providers, Adding, Deleting, and Updating Content

## UNIT IV:

**Maps and Location based services:** Using the location-based services, selecting a Location Provider, selecting a Location provider, finding current location; **Creating Map-Based Activities:** Introducing Map View and Map Activity, Creating a Map-Based Activity

## UNIT V:

**Telephony and SMS:** Using telephony - Initiating Phone Calls, Accessing Telephony Properties and Phone State, Introducing SMS and MMS - Using SMS and MMS in Your Application, Sending SMS and MMS from Your Application Using Intents, Sending SMS Messages Using the SMS Manager.

## Text Book:

1. Reto Meier, Professional Android 4 Application Development, 1<sup>st</sup> Edition, Wrox Press, Wiley Publishing, 2014.

## Reference Books:

1. Pradeep Kothari, Android Application Development (with Kitkat Support), Black Book, 2014, Dreamtech Press publisher, Kogent Learning Inc., 2014
2. Erik Hellman, Android Programming: Pushing the Limits, 1st Edition, Wiley Publications, 2014.
3. Mike Wolfson, Android Developer Tools Essentials, O'Reilly Edition, 1st Edition, 2013.

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### SOFTWARE TESTING

(PEC-III)

#### Course Objectives:

1. To gain knowledge on testing in software development life-cycle, software testing process levels and testing terminologies
2. To learn techniques and algorithms for test case design
3. To understand various issues involved with applying test criteria during software development
4. To comprehend how to develop the many testing criteriato be applied with a variety of technologies.

#### Course Outcomes:

At the end of this course students will be able to:

1. Understand Software Testing terminology, various activitiesof Test Engineerand Test coverage criteria
2. Design Test cases from graphs
3. Design Test cases from logical expressions
4. Design Test cases from partitions of the input space and syntax
5. Test Object-Oriented and Web Application Softwares

#### Unit – I

**Activities of a Test Engineer:** Testing Levels Based on Software Activity, Beizer’s Testing Levels Based on Test Process , Maturity Automation of Test Activities, Software Testing Limitations and Terminology, Coverage Criteria for Testing: Infeasibility and Subsumption, Characteristics of a Good Coverage Criterion, Older Software Testing Terminology

## Unit – II

**Graph Coverage:** Graph Coverage: Graph Coverage Criteria, Graph Coverage for Source Code, Graph Coverage for Design Elements, Graph Coverage for Specifications, Graph Coverage for Use Cases, Representing Graphs Algebraically

## Unit – III

**Logic Coverage:** Logic Predicates and Clauses, Logic Expression Coverage Criteria: Active Clause Coverage, Inactive Clause Coverage, Infeasibility and Subsumption, Making a Clause Determine a Predicate, Finding Satisfying Values. Structural Logic Coverage of Programs, Specification-Based Logic Coverage, Logic Coverage of Finite State Machines, Disjunctive Normal Form Criteria

## Unit – IV

**Input Space Partitioning:** Input Domain Modeling, Combination Strategies Criteria, Constraints among Partitions

**Syntax-Based Testing:** Syntax-Based Coverage Criteria, Program-Based Grammars, Integration and Object-Oriented Testing, Specification-Based Grammars, Input Space Grammars

## Unit – V

**Practical Considerations:** Regression Testing, Integration and Testing, Test Process, Test Plans, Identifying Correct Outputs

**Engineering Criteria for Technologies:** Testing Object-Oriented Software, Testing Web Applications and Web Services, Testing Graphical User Interfaces, Real-Time Software and Embedded Software

## Text Books

1. Paul Ammann and Jeff Offutt, Introduction to Software Testing, Cambridge University Press, 2008.
2. Software Testing techniques - Boris Beizer, Second Edition, Dreamtech Press
3. Software Testing Tools – Dr. K.V.K.K.Prasad, Dreamtech Press

## Reference Books

1. Glenford J. Myers, The Art of Software Testing, Second edition, 2008.
2. Paul C. Jorgensen, Software Testing: A Craftsman's Approach, Fourth edition, CRC Press, 2014.
3. Lisa Crispin and Janet Gregory, Agile Testing: A Practical Guide for Testers and Agile Teams, Addison-Wesley, 2009.

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<b>DATA SCIENCE AND VISUALIZATION</b>			
<b>(PEC-III)</b>			

### Prerequisites:

Programming knowledge

### Course Objectives:

1. To provide an overview and best practices of data visualization
2. To introduce the data types, relationships, and Data Science Process.
3. To provide the basic principles for data visualization.
4. To introduce the storytelling for effective data presentation.
5. To introduce a trends in market research and data visualization dashboards,

### Course Outcomes:

At the conclusion of the course, students should be able to:

1. Identify the skill sets needed for best practices of data visualization and Data Science
2. Understands different phases in data science process and significance data types, relationships
3. Identify principles of data visualization.
4. Apply the storytelling for effective data presentation
5. Evaluate trends in business using data visualization dashboards.

### Unit I:

Introduction: What is data visualization? History, The data visualization process, Why is data visualization so important in reports and statements? Explaining, Exploring, Analyzing.

Data Science Definition – Big Data and Data Science Hype – Why data science – The Current Landscape – Skill sets required for Data Scientist

### Unit II:

Data types: Quantitative, Qualitative, relationships: Ranking, Deviation, Nominal comparisons, Correlation, Partial and total relationships, Series over time.

Data Science Process: Research Goals- Retrieving data- Cleansing, integrating, and transforming data- Exploratory data analysis- Build the models

### Unit III:

Basic principles for data visualization, Visualization formats: Bar chart, Histograms, Pie charts, Scatter plots, Heat maps, Line charts, Bubble charts, Radar charts, Waterfall charts, Tree maps, Area charts

Layout and design: communicative elements, Prioritize patterns in your visualizations: Gestalt

### Unit IV:

Storytelling for social and market communication, Data storytelling, A basic recipe for storytelling in your presentations and final reports, Trends in market research and data visualization dashboards, Scrolly telling.

### Unit V:

Application of Data Visualization, Applications of Data Science, Next-generation data scientists. Visualizing data tools: HTML5 CANVAS: Linear interpolations, A Simple Column Chart, Animations, Google Charts API Basics, D3.js, and Dashboard using Tableau, Future of data visualization,.

### Text Books:

1. Chun-houh Chen, Wolfgang Härdle, Antony Unwin, "Handbook of Data Visualization", Springer, 2008.
2. Pérez, J. and Vialcanet, G., Visualize It: A Comprehensive Guide to Data Visualization, 2013.
3. Introducing Data Science, Davy Cielen, Arno D. B. Meysman, Mohamed Ali, Manning Publications Co., 1st edition, 2016.

### Reference Books:

1. E. Tufte, "The Visual Display of Quantitative Information", Second Edition, Graphics Press, 2007.
2. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O'Reilly. 2014.
3. Ward, Grinstein Keim, "Interactive Data Visualization: Foundations, Techniques, and Applications", Natick: A K Peters, Ltd.
4. Ben Fry, "Visualizing data: Exploring and explaining data with the processing environment", O'Reilly, 2008.
5. A Julie Steele and Noah Iliinsky, "Designing Data Visualizations: Representing Informational Relationships", O'Reilly.
6. Andy Kirk, Data Visualization: A Successful Design Process, PAKT.
7. Scott Murray, "Interactive Data Visualization for Web", O'Reilly.
8. Nathan Yau, "Data Points: Visualization that means something", Wiley, 2013.

### Web references:

1. Visualization through Tableau <http://www.tableausoftware.com/public>
2. Gap Minder and Google Motion Charts ([www.gapminder.org](http://www.gapminder.org)).

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### FUNDAMENTALS OF CLOUD COMPUTING

(PEC-IV)

#### Prerequisites:

Computer Organization and Computer Networks.

#### Course Objectives:

1. This course provides an insight into cloud computing

#### Course Outcomes:

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

1. Understand different Computing Paradigms and Virtualization
2. Learn the fundamentals of Cloud Computing.
3. Understand various service delivery models of a cloud computing architecture.
4. Demonstrate the ways in which the cloud can be programmed and deployed
5. Identify applications that can deploy on a Cloud environment.

#### Unit I:

**Computing Paradigms:** High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing

**Virtualization:** Introduction to Virtualization, Approaches in Virtualization, Hypervisor and Its Role, Types of Virtualization

## Unit II:

**Cloud Computing Fundamentals:** Motivation for Cloud Computing, Defining Cloud Computing, 5-4-3 Principles of Cloud computing, Cloud Ecosystem, Requirements for Cloud Services.

## Unit III:

**Cloud Computing Architecture and Management:** Cloud architecture, Layer, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications on the Cloud, Managing the Cloud, Migrating Application to Cloud.

## Unit IV:

**Cloud Deployment Models:** Private cloud, Public Cloud, Community Cloud, Hybrid Cloud.

**Cloud Service Models:** Infrastructure as a Service, Platform as a Service, Software as a Service.

## Unit V:

**Cloud Service Providers:** EMC, Google, Amazon Web Services, Microsoft, Windows Azure, IBM, Cloud Models, IBM, Sales force.

**Open-Source Support for Cloud:** Open-Source Tools for IaaS, Open-Source Tools for PaaS, Open-Source Tools for SaaS.

## Text Books:

1. Essentials of cloud Computing: K. Chandrasekhran, CRC press, 2014

## Reference Books:

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier, 2012.
3. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD, rp 2011.



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### **NATURAL LANGUAGE PROCESSING**

**(PEC-IV)**

#### **Pre-requisites:**

**Artificial Intelligence, Machine Learning, Python Programming**

#### **Course Objectives:**

1. To learn the fundamentals of Natural Language Processing
2. To understand the semantic aspects and similarity measures
3. To understand the aspects of context-free grammar and perform parsing
4. To understand and identify different word senses and find their relationship
5. To apply the NLP techniques in understanding discourses

#### **Course Outcomes:**

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

6. Solve problems involving regular expressions and N grams
7. Evaluate Vector models
8. Perform parsing operations
9. Build and analyze applications with semantic roles involving selectional restrictions
10. Utilize NLP learning algorithms in understanding a discourse

#### **UNIT I:**

##### **REGULAR EXPRESSIONS AND N-GRAM MODELS**

Regular Expressions - Regular Expressions, Corpora, Text Normalization, Minimum Edit Distance

Ngram Models - Ngrams, Evaluating Language models, Generalization, Smoothing

## **UNIT II :**

Lexical Semantics, Vector semantics, Words and Vectors, Cosine for measuring similarity, TF-IDF, PMI

Visualising Embeddings, Semantic Properties of Embeddings, Bias and Embeddings

## **UNIT III :**

Constituency Grammar - Constituency, Context free grammar, Grammar Rules for English, Treebanks, Grammar Equivalence and Normal Form, Lexicalized Grammar

Parsing - Ambiguity, CKY Parsing

## **UNIT IV:**

### **WORD SENSES AND SEMANTIC ROLE**

Word senses, Relation between senses, WordNet, Word Sense Disambiguation  
Semantic Roles, Diathesis alternations, Problems with thematic roles, Proposition Bank, FrameNet, Semantic Role Labelling, Selectional Restrictions

## **UNIT V :**

### **COREFERENCE RESOLUTION AND DISCOURSE COHERENCE**

Coreference Resolution - Coreference Phenomena, coreference Tasks and datasets, Architecture of coreference algorithm, Gender bias in coreference

Discourse Coherence - Coherence Relation, Discourse Structure Parsing, Centering and Entity based Coherence, Representation model for local coherence, Global coherence

### **Text Books:**

1. Daniel Jurafsky, James H. Martin, "Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech", Pearson Publication, 2014.
2. Steven Bird, Ewan Klein and Edward Loper, "Natural Language Processing with Python", First Edition, OReilly Media, 2009

### **Reference Books:**

- 1 James Allen, "Natural Language Understanding", 2nd Edition, Benjamin, Cummings publishing company, 1995.
- 2 Rajesh Arumugam, Rajalingappaa Shanmugamani, "Hands-On Natural Language Processing with Python", Packt Publishing Ltd., 2018
- 3 Deepti Chopra, Nisheeth Joshi, Iti Mathur "Mastering Natural Language Processing with Python" First Edition, Packt Publishing, 2016

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3	0	3

### WEB MINING

(PEC-IV)

#### Pre-requisites:

Probability & Statistics, Basics of Internet Knowledge

#### Course Objectives:

1. To describe web mining and understand the need for web mining.
2. Differentiate between Web mining and data mining
3. Understand the different methods to introduce structure to web-based data.
4. To understand how information is retrieved from Social media & WWW

#### Course Outcome:

By the end of the course, Student will be able to:

1. Identify the difference between Web mining & Data Mining.
2. Learn the methods of data extraction and Processing.
3. Learn the social network data mining.
4. Understand the concepts of Information Retrieval System from Web.
5. Do text processing, Language Processing.

#### Unit-I:

**Introduction:** A brief history of web and hypertext data, Topic directories, clustering and classification.

**Web data extraction and processing:** Web crawling and indexing, Hyperlink analysis, resources discovery and vertical portals. Structured and unstructured data mining.

#### Unit-II:

**Infrastructure: Crawling the web:** HTML, HTTP Basics, engineering large- scale crawlers.

DNS Catching, Perfecting and resolutions.

**Multiple current fetches:** Multithreading, Link extraction and Normalization.Txt repository.Similarity and clustering

#### Unit-III:

**Mining social network data:** Social Network Analysis, Information propagation in social network, Community discovery in social networks, expert finding in social networks, Link prediction in social networks. **Mining user generated contents:** The Social Web, Mining micro blogging data, Mining social tagging data.

#### Unit-IV:

**Information Retrieval:** Basic Concepts of Information Retrieval, Information Retrieval Methods – Boolean Model, Vector Space Model and Statistical Language Model, Relevance Feedback, Evaluation Measures, Text and Web Page Preprocessing – Stopword Removal, Stemming, Web Page Preprocessing, Duplicate Detection, Inverted Index and Its Compression – Inverted Index, Search using Inverted Index, Index Construction, Index Compression, Latent Semantic Indexing – Singular Value Decomposition.

#### Unit-V:

**Opinion Mining:** motivation and problem definition, Research issues on Opinion Mining, Natural Language Processing, Text processing and Opinion Mining resources.

Opinion Mining – Sentiment Classification – Classification based on Sentiment Phrases, Classification Using Text Classification Methods, Feature based Opinion Mining and Summarization – Problem Definition, Object feature extraction.

#### Text Books:

1. SoumenChakrabarti, "Mining the Web: Discovering Knowledge from Hypertext Data" Second edition, Morgan Kauffmann.
2. Bing Liu " Web Data Mining: Exploring hyperlinks, contents and usage data " , Springer Second Edition.

#### Reference Books:

1. "Mining the Social Web" by Mathew A. Russell, Mikhail Klassen" 3<sup>rd</sup> Edition, O Reilly publication.
2. "Mining the World Wide Web: An Information Search Approach." by Chang, G., Healey, M. J., McHugh, J. A. M., Wang, J. T. L. Kluwer Academic Publishers.
3. "Web mining: Applications & Techniques" by Antony Scime.

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	<b>3</b>	<b>0</b>	<b>3</b>
<b>CYBER FORENSICS</b>			
<b>(PEC-V)</b>			

### Course Objectives:

1. Create a document review, retention, and destruction policy.
2. Write an acceptable use policy and employer privacy statement.
3. List and describe the generally accepted computer forensic procedures.
4. Explain and list the various legislation and regulations that impact technology.
5. Analyze forensic analysis reports

### Course Outcomes:

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

1. Perform a forensic investigation by following guidelines to secure the crime or corporate scene.
2. Learn what legal issues are involved and what rights the person of interest has.
3. Perform digitally and court approved images of evidence to be used in a court of law.
4. Learn how to document and store evidence.
5. Learn how to analyze evidence using commercial forensic software and also how to create a report of the said evidence.

### UNIT-I

**Computer Forensics and Investigations:** What is computer Forensics? Use of computer forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceeding, Computer Forensics services, Benefits of Professional

Forensics Methodology, Steps taken by Computer Forensics Specialists.

**Types of Computer Forensics Technology:** Types of Military Computer Forensic Technology, Types of law Enforcement-Computer forensic Technology.

### UNIT-II

**Computer Forensics Evidence and capture:** Data Recovery Defined Data Backup and Recovery, The Role of Back-up in Data Recovery, The Data Recovery Solution

**Evidence Collection and Data Seizure:** Why Collection Evidence? Collection Options, Obstacles, Types of Evidence, The Rules of Evidence, General Procedure, Collection and Archiving, Methods

of Collection, Artifacts, Collection Steps.

### UNIT-III

**Controlling Communication:** The Chain of Custody duplication and Preservation of Digital

Evidence: Preserving the Digital Crime Scene, Computer Evidence Processing Steps, Legal Aspects of Collection and Preserving Computer Forensics Evidence.

**Computer Image Verification and Authentication:** Special Needs of Evidential Authentication

**Computer Forensics analysis and validation:** Determining what data to collect and analyze, validating forensic data, addressing data-hiding techniques, performing remote acquisitions

### UNIT-IV

**Network Forensics:** Network forensics overview, performing live acquisitions, developing standard procedures for network forensics using network tools.

**Processing Crime and Incident Scenes:** Identifying Digital Evidence, Collecting the Evidence in Private-Sector Incident Scenes, Processing law Enforcement Crime Scenes, Preparing for a Search, securing a Computer Incident or Crime Scene, Storing Digital evidence, obtaining a Digital Hash.

### UNIT-V

**E-mail Investigations:** Exploring the Role of E-mail in Investigations, Exploring the Role of Client and Server in E-mail, Investigating Email Crimes and Violations, Understanding Email Servers, Using Specialized Email Forensics Tools,

**Mobile Device Forensics:** Understanding Mobile Device Forensics, Understanding Acquisition Procedure for Cell Phones and Mobile Devices

### TEXT BOOKS:

1. John R.Vacca, Computer Forensics, Computer Crime Investigation, Firewall Media, New Delhi, 2005
2. Nelson, Phillips, Enfinger, Stuart, Computer Forensics and Investigations, Cengage Learning, 2009

### REFERENCES:

1. Keith J. Jones, Richard Bejtich, Curtis W Rose, Real Digital Forensics, Addison Wesley Pearson Education, 2006
2. Tony Sammesand Bairn Jenkinson, Forensic Compiling A Practitioner's Guide, Springer International edition, 2013
3. Christopher L.T. Brown, Computer Evidence Collection & Presentation, Firewall Media, 2005

# ANURAG UNIVERSITY

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## HUMAN COMPUTER INTERACTION

(PEC-V)

### Prerequisites:

Web Technologies

### Unit – I

**Introduction:** Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design. The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

### Unit – II

**Design process** – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, and understanding business functions.

### Unit – III

**Screen Designing** : Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

### Unit – IV

**Windows** – New and Navigation schemes selection of window, selection of devices based and screen based controls. Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

### Unit – V

**Software tools** – Specification methods, interface – Building Tools. Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers.

### Text Books

1. The essential guide to user interface design: Wilbert O Galitz, Wiley Dreama Tech 2007
2. Designing the user interface design: Ben Shneiderman 3rd Edition, Pearson Education Asia 2001

### Suggested / Reference Books

1. Human – Computer Interaction. ALAN DIX, JANET FINCAY, GRE GORYD, ABOWD, RUSSELL BEALG, PEARSON.
2. Interaction Design PRECE, ROGERS, SHARPS. Wiley Dreamtech,

### Other Resources

1. <http://courses.iicm.tugraz.at/hci/hci.pdf>
2. <http://www.prenhall.com/behindthebook/0132240858/pdf>
3. <http://ebooksfile.com/pdf/Zz2/human-computer-interaction-sample-exam-questions.pdf>
4. <http://nptel.ac.in/courses.php?disciplineId=106>



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### **FUNDAMENTALS OF BLOCKCHAIN TECHNOLOGY**

**(PEC-V)**

#### **Pre-Requisites:**

Object Oriented Programming Through Java, Basic Knowledge Of Computer Security, Data Structures

#### **Course Objectives:**

1. Identify different components and types of Blockchain.
2. Learn Smart Contracts for public Blockchain
3. Apply Ethereum tool for Deploying the Smart Contract
4. Interpret Private Blockchain System
5. Analyse the impact of Blockchain in business

#### **Course Outcomes:**

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

1. Summarize types and applications of Blockchain
2. Understand Smart Contracts for Public Blockchain System
3. Illustrate the design and deployment of smart contract through Ethereum
4. Apply Private Blockchain System in different Networks
5. Categorize different Business Applications of Blockchain

#### **UNIT I:**

**Fundamentals of Blockchain:** Origin of Blockchain, Blockchain Solution, Components of Blockchain, Block in a Blockchain, The Technology and the Future.

**Blockchain Types and Consensus Mechanism:** Decentralization and Distribution, Types of Blockchain, Consensus Protocol

#### **UNIT II:**

Blockchain, EthereumBlockchain

**Smart Contracts:** Smart Contract, Characteristics of a Smart Contract

**Ethereum Solidity:** Introduction, Datatype, operator, enum, arrays, loops

### UNIT III:

**Ethereum Solidity:** Mapping, Structure, State Modifiers, Exception Handling in Solidity, Inheritance, Compile and Deploy the Smart Contract. Introduction to Truffle IDE and metamask.

### UNIT IV:

Private Blockchain System: Key Characteristics of Private Blockchain, Why We Need

Private Blockchain, Private Blockchain Examples, Private Blockchain and Open Source, E-commerce Site Example, Various Commands (Instructions) in E-commerce Blockchain, Smart Contract in Private Environment, State Machine, Different Algorithms of Permissioned Blockchain, Byzantine Fault, Multichain.

### UNIT V:

Application of Blockchain: Blockchain in Banking and Finance, Blockchain in

Education, Blockchain in Energy, Blockchain in Healthcare, Blockchain in Real-estate, Blockchain in Supply Chain, The Blockchain and IoT.

Limitations and Challenges of Blockchain: Blockchain Implementation – Limitations, Blockchain Implementation – Challenges

### Text Books:

1. Josh Thompson, 'Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming', Create Space Independent Publishing Platform, 2017
2. BlockchainTechnology:ChandramouliSubramanian,Asha A George,Abhilash K A and MeenaKarthikeyan,Published by University Press

### Reference Books

1. Mastering Bitcoin: Unlocking Digital Cryptocurrencies, by Andreas Antonopoulos  
Blockchain by Melanie Swa, O'Reilly
2. Philipp Hacker, IoannisLianos (2019). Regulating Blockchain: Techno-Social and Legal Challenges, OUP Oxford. (ISBN-13: 978-0198842187).

### Reference Link

1. Zero to Blockchain - An IBM Redbooks course, by Bob Dill, David Smits - <https://www.redbooks.ibm.com/Redbooks.nsf/RedbookAbstracts/crse0401.html>

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### CRYPTOGRAPHY AND INFORMATION SECURITY LAB

#### PC LAB

#### Course Outcomes

1. Implement port Scanning
2. Investigate Security of Network
3. Analyze Packet Protocols ,IP Spoofing
4. Implement Various Encryption Algorithms
5. Implement Brute Force Algorithm

#### Week 1

1. Installation of NetCat.

#### Week 2

2. Implement port scanning with NetCat

#### Week 3

3. Perform the following using NetCat
  - Banner Grabbing .
  - Chat Interface
  - File Transfer

#### Week 4

4. Installation of Network Miner

#### Week 5

5. Perform an experiment to sniff packets and IPs using Network

#### Week 6

6. perform Sniffing of Web Browser User-Agents.

#### Week 7

6. Implement Simple Data Encryption Standard (SDES) Algorithm through C program

#### Week 8,9

7. Implement Diffie–Hellman key exchange algorithm through C program.

#### Week 10

8. Installation of cryptool 2

#### Week 11

9. Implement DES algorithm using cryptool 2

#### Week 12

10. Implement RSA algorithm using cryptool 2

#### Week 13

11. Implement HASH algorithm using cryptool 2

#### Week 14

12. Implement SHA1 algorithm using crpty tool 2

#### Week 15

13. Implement brute force algorithm in C .

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### **Deep Learning Lab (PEC-III LAB)**

#### **Prerequisites:**

DM, P&S, Python, AI, ML

#### **List of Programs:**

1. Implementation of Linear Regression
2. Deep learning Packages Basics: TensorFlow, Keras and PyTorch
3. Implementation of Neural network
4. Face recognition using CNN
5. Sentiment Analysis using LSTM
6. Language Modeling using RNN
7. Sentiment Analysis using GRU
8. Image Classification with Transfer Learning

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### MOBILE APPLICATION DEVELOPMENT LAB

(PEC-III LAB)

#### Course Outcomes:

At the end of this Mobile Application Development Lab course, students will be able to:

1. Develop user interfaces for the Android platform.
2. Implement various mobile applications using Emulators.
3. Create a database for mobile applications using SQLite Database.
4. Perform location-based services in android applications.
5. Create telephony and SMS for android applications.

#### List of Experiments:

1. Develop an Application that Uses GUI Components, Font and Colors
2. Develop an Application that Uses Layout Managers and Event Listeners.
3. Develop a Native Calculator Application.
4. Write an Application that Draws Basic Graphical Primitives on The Screen.
5. Develop an Application that Makes Use of Database.
6. Develop a Native Application that Uses GPS Location Information.
7. Implement an Application that Writes Data to The SD Card.
8. Implement an Application that Creates an Alert Upon Receiving A Message.
9. Write a Mobile Application that Creates Alarm Clock

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### SOFTWARE TESTING LAB (PEC-III LAB)

#### Prerequisites:

Data Structure, Object Oriented Programming, Web technologies

#### Course Objectives:

1. Manual testing using functional test
2. White box test case design based on path ,data, and logic
3. Explore Regression and Integration testing
4. Testing of Object-Oriented and Web Applications Softwares

#### Course Outcomes:

At the end of this course students will be able to:

1. Performed Manual testing based on test cases
2. Design and execute Test cases of Path and Data coverage Criteria
3. Design and execute Test cases of Data and Logic coverage Criteria
4. Performed Regression and integration Testing
5. Testing Object-Oriented and Web Applications Software

#### List of Programs:

## Week 1

Write functional test cases of ATM and perform manual testing to find faults and failures

## Week2

Design and execute Edge and Node coverage Test cases of Student grade Assignment computer program

## Week 3

Design and implement a program that will compute all paths (edge and Node) in a graph, it will be to accept a graph as input by reading a list of nodes, initial nodes, final nodes, and edges.

## Week 4

Write Program to Reducing Graphs to Path Expressions of give Control Flow graph

Write Program to Find Maximum and Minimum number of test cases of give Control Flow graph

## Week 5

Design and execute all du path test cases of Pattern matching of two strings

## Week 6

Design and execute complete set of coupling du-pairs of compute the quadratic root for two numbers

## Week 7



Design and execute Predicate coverage (PC) and Clause coverage (CC) Test cases of Quadratic program

Week 8

Design and execute Combinatorial coverage (CoC) Correlated active clause coverage Test cases of Quadratic program

Week 9

Design and execute Data partition based test case of Quadratic program

Week 10

Demonstrate Java mutation tool

Week 11

Demonstrate the Regression and Integration testing

Week 12

Demonstrate and execute all Object-Oriented Testing Criteria

Week 13-14

Demonstrate and execute all web application Testing Criteria

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### DATA SCIENCE AND VISUALIZATION LAB

(PEC-III LAB)

#### Prerequisites:

Some exposure to programming.

#### Course Objectives:

1. To acquire in-depth understanding of the data visualization techniques.
2. To empower students with tools and techniques for handling and analyzing data.
3. To empower students with tableau tool for managing and interpreting data.
4. To strengthen the analytical and problem solving skill through developing real time applications.

#### Course Outcomes

At the end of the course, students should be able to:

1. Understand data visualization concepts related to different applications.
2. Apply different techniques for accessing data sources.
3. Create different charts, stories using Tableau.
4. Create powerful business dashboards using Tableau.

#### Programming Languages/Tools:

- Tableau Desktop. Tableau's data visualization software is provided through the Tableau for teaching program at <http://www.tableau.com/data-visualizationsoftware>

#### List of Experiments:

Week 1:

Introduction to Tableau interface / Installation of Tableau.

**Week 2-Week 3:**

Apply accessing, importing data/connecting to external Sources using Tableau. Graphs and Layouts, Colors, Size, Text and Typography, Shape, Lines.

**Week 4-Week6:**

Charting in Tableau: Colors, Shapes, and Sizes, Dual Line Charts, Tableau Tooltip. Bar Charts, Line Graphs, Pie Charts, Maps, Scatter Plots, Gantt Charts, Bubble Charts, Histograms, Bullet Charts, Heat Maps and Highlight Tables, Tree maps and Box-and-Whisker Plots.

**Week 7:**

Multivariate visualization on given dataset using Tableau.

**Week 8:**

Maps and Geographic Data Analysis using Tableau.

**Week 9-Week 12:**

Creating dashboards and stories: Hierarchies, Actions, Filters, and Parameters using Tableau. Connecting/publishing data using Tableau Public Server.

**Week 13-Week 16:**

Study projects on selected applications using data visualization. Submission of abstract, introduction, related work, and progress, Final report, final presentations and videos

**References:**

1. Nandeshwar, A. (2015), Tableau Data Visualization Cookbook, Mumbai: PACKT / Shroff Publishers.
2. <https://public.tableau.com/en-us/s/resources>