



# **Scheme of Instruction & Syllabi of Bachelor of Technology (Cloud Computing)**

**(With effect from academic session 2023-24)**

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**STUDY AND EVALUATION SCHEME**  
**(With effective from academic session 2023-2024)**  
**BTech. in Cloud Computing**  
**YEAR IV, SEMESTER VII**

Sl. No.	Category	Course Code	Course Title/ Subjects	Hours per week			Evaluation Scheme		Total	Credits
				L	T	P	CA	EE		
THEORY										
1	Professional Elective		Elective-IV	3	0	0	25	50	75	3
2	Professional Elective		Elective-V	3	0	0	25	50	75	3
3	Professional Elective		Elective-VI	3	0	0	25	50	75	3
4	Open Elective		Open Elective-II	3	0	0	25	50	75	3
5	Humanities & Social Science	BCSICT 701	Economics for Engineers	3	0	0	25	50	75	3
PRACTICALS AND PROJECTS										
6	Professional Elective		Elective-IV lab	0	0	2	10	15	25	1
7	Project	BCSICT702	Project -II	0	0	10	25	100	125	5
8	Summer Training	BCSICT703	Summer Project Seminar-III	0	0	2	10	15	25	1
			TOTAL	19	0	14	200	450	650	26
L-Lecture, T- Tutorial , P- Practical ,CA- Continuous Assessment, EE- End Semester Examination										

Course code	Elective – IV
BCSICT701	Cyber Forensics
BCSICT702	Web Security and SDLC
BCSICT703	Cloud Security

Course code	Elective - V
BCSICT704	Hybrid Cloud Computing
BCSICT705	Cloud Web Services
BCSICT706	Cloud Computing Solutions

Course code	Elective – VI
BCSICT707	Cloud Architectural Patterns
BCSICT708	Automation and Configuration Management
BCSICT709	Infrastructure Containers

Course code	Open Elective - II
BCSICT710	Artificial Intelligence
BCSICT711	Big Data Analytics
BCSICT712	Data Science

Course code	Elective – IV Lab
BCSICT713	Cyber Forensics Lab
BCSICT714	Web Security and SDLC Lab
BCSICT715	Cloud Security Lab

**STUDY AND EVALUATION SCHEME**  
**(With effective from academic session 2023-2024)**  
**BTech. in Cloud Computing**  
**YEAR III, SEMESTER VIII**

Sl. No.	Category	Course Code	Course Title/ Subjects	Hours per week			Evaluation Scheme		Total	Credits
				L	T	P	CA	EE		
PRACTICALS AND PROJECTS										
1	Summer Training	BCSAI 801	Industrial Training/Internship	0	0	12	50	100	150	6
2	Project	BCSAI802	Project	0	0	12	50	100	150	6
3	Professional Elective	BCSAI803	Elective VII	3	0	0	25	50	75	3
			TOTAL	3	0	24	125	250	375	15
L-Lecture, T- Tutorial , P- Practical ,CA- Continuous Assessment, EE- End Semester Examination										

	<b>Elective-VII</b>
BCSAI803	Agile Technology
BCSAI804	Metaverse
BCSAI805	Blockchain Technology

### **Module-I**

Introduction to Digital Forensics, Definition and types of cybercrimes, electronic evidence and handling,  
electronic media, collection, searching and storage of electronic media, introduction to internet crimes,  
hacking and cracking, credit card and ATM frauds, web technology, cryptography, emerging digital crimes  
and modules.

### **Module-II**

Definition and Cardinal Rules, Data Acquisition and Authentication Process, Windows Systems-FAT12,  
FAT16, FAT32 and NTFS, UNIX file Systems, mac file systems, computer artifacts, Internet Artifacts, OS Artifacts and their forensic applications

### **Module-III**

Introduction to Forensic Tools, Usage of Slack space, tools for Disk Imaging, Data Recovery, Vulnerability  
Assessment Tools, Encase and FTK tools, Anti Forensics and probable counters, retrieving information,  
process of computer forensics and digital investigations, processing of digital evidence, digital images,  
damaged SIM and data recovery, multimedia evidence, retrieving deleted data: desktops, laptops and mobiles, retrieving data from slack space, renamed file, ghosting, compressed files.

#### **Text & References:**

C. Altheide & H. Carvey Digital Forensics with Open Source Tools, Syngress, 2011. ISBN: 9781597495868.

Selected readings from various sources as assigned

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

## **BCSICT702 Web Security and SDLC**

### **MODULE I**

Introduction to Security and its type, Security ,Web vulnerabilities and its type,  
Web Basics: HTML, CSS, HTTP, Navigation,,how to build secure web applications,Detecting and  
Defending Against Third-Party Tracking on the Web

### **MODULE II**

Network Attacks & HTTPS X-Domain communication ,Limitations of HTTPS, Cross-site Scripting (XSS),  
SQL Injection, OS Command Injection, HTTP Header Injection,Automated Discovery of Parameter  
Pollution Vulnerabilities in Web Applications

### **MODULE III**

Request Authorization Flaws,Insecure Web Logic, Logic Flaws, HTTP Pollution, HTTP Parameter  
Tampering,Cookie Flaws and Server Misconfiguration, Attacks on User Interfaces,web exploitation, web  
browser design flaws,User Privacy Flaws, Browser & Device Fingerprinting, User Tracking Flaws,  
Browser Caching Flaws, Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype  
Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.

## BCSICT703 Cloud Security

### MODULE I

**SECURITY CONCEPTS** :Confidentiality, privacy, integrity, authentication, non-repudiation, availability, access control, defence in depth, least privilege, how these concepts apply in the cloud, what these concepts mean and their importance in PaaS, IaaS and SaaS. e.g. User authentication in the cloud; Cryptographic Systems- Symmetric cryptography, stream ciphers, block ciphers, modes of operation, public-key cryptography, hashing, digital signatures, public-key infrastructures, key management, X.509 certificates, OpenSSL

### MODULE II

**MULTI-TENANCY ISSUES** : Isolation of users/VMs from each other. How the cloud provider can provide this; Virtualization System Security Issues- e.g. ESX and ESXi Security, ESX file system security, storage considerations, backup and recovery; Virtualization System Vulnerabilities- Management console vulnerabilities, management server vulnerabilities, administrative VM vulnerabilities, guest VM vulnerabilities, hypervisor vulnerabilities, hypervisor escape vulnerabilities, configuration issues, malware (botnets etc).

### MODULE III

**VIRTUALIZATION SYSTEM-SPECIFIC ATTACKS** :Guest hopping, attacks on the VM (delete the VM, attack on the control of the VM, code or file injection into the virtualized file structure), VM migration attack, hyperjacking

**TECHNOLOGIES FOR VIRTUALIZATION-BASED SECURITY ENHANCEMENT** :IBM security virtual server protection, virtualization-based sandboxing; Storage Security- HIDPS, log management, Data Loss Prevention. Location of the Perimeter

**LEGAL AND COMPLIANCE ISSUES** :Responsibility, ownership of data, right to penetration test, local law where data is held, examination of modern Security Standards (eg PCIDSS), how standards deal with cloud services and virtualization, compliance for the cloud provider vs. compliance for the customer

### REFERENCES

1. Tim Mather, Subra Kumaraswamy, ShahedLatif, "Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance" O'Reilly Media; 1 edition [ISBN: 0596802765], 2009.
2. Ronald L. Krutz, Russell Dean Vines, "Cloud Security" [ISBN: 0470589876], 2010.
3. John Rittinghouse, James Ransome, "Cloud Computing" CRC Press; 1 edition [ISBN: 1439806802], 2009.
4. J.R. ("Vic") Winkler, "Securing the Cloud" Syngress [ISBN: 1597495921] 2011
- Cloud Security Alliance, "Security Guidance for Critical Areas of Focus in Cloud Computing" 2009.
6. VMware "VMware Security Hardening Guide" White Paper, June 2011 .
7. Cloud Security Alliance 2010, "Top Threats to Cloud Computing" Microsoft 2013.
8. Timothy Grance; Wayne Jansen;NIST "Guidelines on Security and Privacy in Public Cloud Computing", 2011.
9. Evelyn Brown NIST "Guide to Security for Full Virtualization Technologies", 2011.
10. Peter Mell, Timothy Grance, NIST "The NIST Definition of Cloud Computing " 2011.
11. William Hau, Rudolph Araujo et al "How Virtualization Affects PCI DSS", [www.foundstone.com](http://www.foundstone.com).
12. Chenxi Wang "Compliance with Clouds: Caveat Emptor", [www.forrester.com/2010](http://www.forrester.com/2010).

## **CSICT704 Hybrid Cloud Computing**

### **MODULE-I**

#### **Books**

1. “Hybrid Cloud Computing” by Gerard Blokdyk, Createspace Independent Pub, 2017



## BCSICT705 Cloud Web Services

### MODULE I

Introduction to Cloud Computing, Cloud Service Delivery Models (IAAS, PAAS, SAAS), Cloud Deployment Models (Private, Public, Hybrid and Community), Cloud Computing Security, Case Study. Introduction to Amazon Web Services, Why Amazon? Use Cases, AWS Storage Options, AWS Compute Options, AWS Database Options, AWS Workflow Automation and Orchestration Options, AWS Systems Management And Monitoring Options, AWS Virtual Private Cloud Introduction, Pricing Concepts.[8]

### MODULE II

Introduction To EC2, Instance Types And Uses, Auto scaling Instances, Amazon Machine Images (AMIS), Modifying Existing Images, Creating New Images of Running Instances, Converting An Instance Store AMI To An EBS AMI, Instances Backed By Storage Types, Elastic IPS, Elastic Load Balancing[7]

### MODULE III

Introduction to Elastic Beanstalk, Deploying Scalable Application On AWS, Selecting And Launching An Application Environment, Provisioning Application Resources with Cloud formation, Introduction to CloudWatch, Describe Amazon Cloud Watch metrics and alarms, AWS Messaging Services(SNS,SQS,SES). Introduction to AWS Security, Describe Amazon Identity and Access Management (IAM), AWS Directory Service, AWS Key Management Service, Securing Data at Rest and In Motion[9]

### MODULE IV

Amazon Storage, S3 Storage Basics, Buckets and Objects, Creating A Web Server Using S3 Endpoints, Managing Voluminous Information with EBS, Glacier Storage Service , Describe Amazon Dynamo, Understand key aspects of Amazon RDS, Launch an Amazon RDS instance.[8]

### MODULE V

Introduction to AWS Networking , Access Control Lists (ACLs), Setting Up a Security Group, Setting Up VPC And Internet Gateway, Setting Up A VPN, Setting Up A Customer Gateway For VPN, Setting Up Dedicated Hardware For VPC, Scenario 1: VPC With A Public Subnet Only (Standalone Web), Scenario 2: VPC with Public And Private Subnets (3 Tier App), Scenario 3: VPC With Public And Private Subnets And Hardware VPN Access (Web On The Cloud, Database and App On Prem) Scenario 4: VPC With A Private Subnet Only And Hardware VPN Access. (Extension Of Your Corporate Network), Route53 for DNS System, Cloud front, Case Study[8]

#### Reference Books:

1. Joe Baron, HishamBaz , Tim Bixler , Biff Gaut , Kevin E. Kelly , Sean Senior , John Stamper , “AWS Certified Solutions Architect Official Study Guide: Associate Exam, John Wiley and Sons Publications, 2017
2. YohanWadia , “AWS Certified Solutions Architect Official Study Guide: Associate Exam, John Packt Publishing, 2016
3. Bernald Golden, “Amazon Web Services for Dummies”, John Wiley & Sons, 2013

## **BCSICT 706 Cloud Computing Solutions**

### **MODULE I**

Introduction to cloud computing, Cloud Computing Architecture, Virtualization environment in cloud computing, classification of virtualization environment.

### **MODULE II**

Cloud computing data storage, Cloud database, Cloud-Based data storage, Cloud computing implementation, security and application, Security paradigms in cloud computing, Application of wireless sensor network in cloud, Applications of mobile cloud computing, Big data in cloud computing.

### **MODULE III**

Cloud computing simulator tools, CloudSim, Open FaaS, OpenNebula, OpenStack, Euclayptus

#### **Books**

1. “Cloud Computing Solutions: Architecture, Data Storage, Implementation and Security”,  
by Souvik Pal, Dac-Nhuong Le, Prasant Kumar Pattnaik, Wiley 2022

## **BCSICT707 Cloud Architectural patterns**

### **Module I**

Scalability Primer, Horizontally Scaling Compute Pattern, Queue-Centric Workflow Pattern, Auto-Scaling Pattern

### **Module II**

Eventual Consistency Primer, MapReduce Pattern, Database Sharding Pattern, Multitenancy and Commodity Hardware Primer, Busy Signal Pattern, Node Failure Pattern

### **Module III**

Network Latency Primer, colocate pattern, Valet Key Pattern, CDN Pattern, Multisite Deployment Pattern

#### **Books**

1. "Cloud Architecture Patterns" by Bill Wilder, O'Reilly 2012
2. "Cloud Computing Patterns" by "Christoph Fehling, Springer

**BCSICT708**  
**Automation and Configuration Management**

**Module I**

Introduction to AWS Systems Manager, Using SSM RUN command for EC2 configuration Management, Using SSM session manager for EC2 console access, Overview on SSM Patching and Automation, Introduction to AWS Simple Storage Service(S3), Introduction to Elastic File System (EFS), Introduction to Storage Gateway and Deploying it, Introduction to AWS Glacier and creating vaults, Introduction to FSx and AWS Backup

**Module II**

Introduction to AWS IAM (Identity & Access Management), Creating Users, Roles, Groups and Security Policies, Restricting User Access and Cross Account Roles, Deploy AWS AD Directory Service, Create AWS Organization, Integration AWS Active Directory Service with Single Sign On, Introduction to AWS Resource Access manager(RAM), Inspector and Guard Duty, Introduction AWS Certificate Manager

**Module III**

Introduction to Automation & Configuration Tools, Introduction to Terraform., Understanding Terraform Vs CloudFormation, Deploying & Destroying AWS environment with Terraform., Introduction to Packer.

<b>BCSICT709 Infrastructure Containers</b>
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**Module I**

Introduction to Container Services, Installing and configuring Docker, Understand Docker Hub and download images, Creating containers on Docker pushing images to Docker Hub.

**Module II**

Introduction to ECR and ECS, Creating a repository in ECR and uploading the images, Create ECS Cluster with EC2 Machines.

**Module III**

Creating Task Definitions for deploying containers, Deploy Tasks and Services on ECS Cluster.

## **BCSICT710 ARTIFICIAL INTELLIGENCE**

### **Unit I**

Introduction: Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Processing.

### **Unit II**

Introduction to Search : Searching for solutions, Uniformed search strategies, Informed search strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha - Beta pruning

### **Unit III**

Knowledge Representation & Reasoning: Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks.

### **Unit IV**

Machine Learning : Supervised and unsupervised learning, Decision trees, Statistical learning models, Learning with complete data - Naive Bayes models, Learning with hidden data - EM algorithm, Reinforcement learning,

### **Unit V**

Pattern Recognition : Introduction, Design principles of pattern recognition system, Statistical Pattern recognition, Parameter estimation methods - Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA), Classification Techniques – Nearest Neighbor (NN) Rule, Bayes Classifier, Support Vector Machine (SVM), K – means clustering.

Text books: 1. Stuart Russell, Peter Norvig, “Artificial Intelligence – A Modern Approach”, Pearson Education  
2. Elaine Rich and Kevin Knight, “Artificial Intelligence”, McGraw-Hill  
3. E Charniak and D McDermott, “Introduction to Artificial Intelligence”, Pearson Education 4. Dan W. Patterson, “Artificial Intelligence and Expert Systems”, Prentice Hall of India

## BCSICT711 Big Data Analytics

### **UNIT I : INTRODUCTION TO BIG DATA AND HADOOP**

Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Introduction to Infosphere BigInsights and Big Sheets.

### **UNIT II : HDFS(Hadoop Distributed File System)**

The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.

### **UNIT III : Map Reduce**

Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.

### **Unit IV : Hadoop Eco System**

Pig : Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators. Hive : Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions. Hbase : HBasics, Concepts, Clients, Example, Hbase Versus RDBMS. Big SQL : Introduction

### **UNIT V : Data Analytics with R**

Machine Learning : Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering. Big Data Analytics with BigR.

#### **Text Books**

- Tom White “ Hadoop: The Definitive Guide” Third Edit on, O’reily Media, 2012.
- Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.

#### **References**

- Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
- Jay Liebowitz, “Big Data and Business Analytics” Auerbach Publications, CRC press (2013)
- Tom Plunkett, Mark Hornick, “Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop”, McGraw-Hill/Osborne Media (2013), Oracle press.
- Anand Rajaraman and Jeffrey David Ulman, “Mining of Massive Datasets”, Cambridge University Press, 2012.
- Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley & sons, 2012.
- Glen J. Myat, “Making Sense of Data”, John Wiley & Sons, 2007
- Pete Warden, “Big Data Glossary”, O’Reily, 2011.
- Michael Mineli, Michele Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.
- ArvindSathi, “BigDataAnalytics: Disruptive Technologies for Changing the Game”, MC Press, 2012
- Paul Zikopoulos ,Dirk DeRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corigan , "Harness the Power of Big Data The IBM Big Data Platform ", Tata McGraw Hill Publications, 2012.

## BCSICT712 Data Science

### Unit – I: Introduction

Introduction to Data Science – Evolution of Data Science – Data Science Roles – Stages in a Data Science Project – Applications of Data Science in various fields – Data Security Issues.

### Unit – II: Data Collection and Data Pre-Processing

Data Collection Strategies – Data Pre-Processing Overview – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization.

### Unit – III: Exploratory Data Analytics

Descriptive Statistics – Mean, Standard Deviation, Skewness and Kurtosis – Box Plots – Pivot Table – Heat Map – Correlation Statistics – ANOVA.

### Unit – IV: Model Development

Simple and Multiple Regression – Model Evaluation using Visualization – Residual Plot – Distribution Plot – Polynomial Regression and Pipelines – Measures for In-sample Evaluation – Prediction and Decision Making.

### Unit – V: Model Evaluation

Generalization Error – Out-of-Sample Evaluation Metrics – Cross Validation – Overfitting – Under Fitting and Model Selection – Prediction by using Ridge Regression – Testing Multiple Parameters by using Grid Search.

#### REFERENCES:

1. Jojo Moolayil, “Smarter Decisions : The Intersection of IoT and Data Science”, PACKT, 2016.
2. Cathy O’Neil and Rachel Schutt , “Doing Data Science”, O’Reilly, 2015.
3. David Dietrich, Barry Heller, Beibei Yang, “Data Science and Big data Analytics”, EMC 2013
4. Raj, Pethuru, “Handbook of Research on Cloud Infrastructures for Big Data Analytics”, IGI Global.



## **BCSICT713 Cyber Forensics Lab**

List of Programs:

1. Physical Collection of electronic evidence using forensic standards
2. Dismantling and re-building PCs in order to access the storage media safely
3. Boot sequence and Power On Self-Test mode analysis
4. Examination of File systems of Windows, Linux and Mac
5. Analysing Word processing and Graphic file format
6. Network data sniffing and analysing
7. Password and encryption techniques
8. Internet forensic and Malware analysis
9. Data recovery techniques for hard drive
10. Data recovery techniques for Pen drive and CD

## BCSICT714 Web Security and SDLC Lab

A) List Of Experiment:

Do the following 8 exercises for any two projects of your choice:

1. Development of problem statement.
2. Preparation of Software Requirement Specification Document, Design Documents and Testing Phase related documents.
3. Preparation of Software Configuration Management and Risk Management related documents.
4. Study and usage of any Design phase CASE tool
5. Performing the Design by using any Design phase CASE tools.
6. Develop test cases for unit testing and integration testing
7. Develop test cases for various white box and black box testing techniques.

B) Implement the following Substitution & Transposition Techniques concepts: a) Caesar Cipher b) Rail fence row & Column Transformation

C) Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript. Consider the end user as one of the parties (Alice) and the JavaScript application as other party (bob).

D) Demonstrate intrusion detection system using any tool (snort or any other s/w).

## **BCSICT715 Cloud Security Lab**

List of Programs:

1. Study the basic cloud architecture and represent it using a case study
2. Enlist Major difference between SAAS PAAS & IAAS also submit a research done on various companies in cloud business and the corresponding services provided by them , tag them under SAAS PAAS & IAAS.
3. Study and present a report on Jolly cloud.
4. Present a report on obstacles and vulnerabilities in cloud computing on generic level
5. Present a report on Amazon cloud services.
6. Present a report on Microsoft cloud services.
7. Present a report on cost management on cloud
8. Enlist and explain legal issues involved in the cloud with the help of a case study
9. Explain the process of migrating to cloud with a case study.
10. Present a report on google cloud and cloud services.

## BCSICT 701 Economics for Engineers

### MODULE -I

Economic Decisions Making – Overview, Problems, Role, Decision making process. 2. Engineering Costs & Estimation – Fixed, Variable, Marginal & Average Costs, Sunk Costs, Opportunity Costs, Recurring And Nonrecurring Costs, Incremental Costs, Cash Costs vs Book Costs, Life-Cycle Costs; Types Of Estimate, Estimating Models - Per- Unit Model, Segmenting Model, Cost Indexes, Power-Sizing Model, Improvement & Learning Curve, Benefits. 3. Cash Flow, Interest and Equivalence: Cash Flow – Diagrams, Categories & Computation, Time Value Of Money, Debt repayment, Nominal & Effective Interest. 4. Present Worth Analysis : End-Of-Year Convention, Viewpoint Of Economic Analysis Studies, Borrowed Money Viewpoint, Effect Of Inflation & Deflation, Taxes, Economic Criteria, Applying Present Worth Techniques, Multiple Alternatives.

### MODULE-II

5. Cash Flow & Rate Of Return Analysis – Calculations, Treatment of Salvage Value, Annual Cash Flow Analysis, Analysis Periods; Internal Rate Of Return, Calculating Rate Of Return, Incremental Analysis; Best Alternative Choosing An Analysis Method, Future Worth Analysis, Benefit-Cost Ratio Analysis, Sensitivity And Breakeven Analysis. Economic Analysis In The Public Sector - Quantifying And Valuing Benefits & drawbacks. 6: Uncertainty In Future Events - Estimates And Their Use In Economic Analysis, Range Of Estimates, Probability, Joint Probability Distributions, Expected Value, Economic Decision Trees, Risk, Risk vs Return, Simulation, Real Options

### MODULE-III

. 7. Depreciation - Basic Aspects, Deterioration & Obsolescence, Depreciation And Expenses, Types Of Property, Depreciation Calculation Fundamentals, Depreciation And Capital Allowance Methods, Straight-Line Depreciation Declining Balance Depreciation, Common Elements Of Tax Regulations For Depreciation And Capital Allowances. 8. Replacement Analysis - Replacement Analysis Decision Map, Minimum Cost Life Of A New Asset, Marginal Cost, Minimum Cost Life Problems. 9. Inflation And Price Change – Definition, Effects, Causes, Price Change With Indexes, Types of Index, Composite vs Commodity Indexes, Use of Price Indexes In Engineering Economic Analysis, Cash Flows that inflate at different Rates. 10. Accounting – Function, Balance Sheet, Income Statement, Financial Ratios Capital Transactions, Cost Accounting, Direct and Indirect Costs, Indirect Cost Allocation.

#### Books

1. James L.Riggs, David D. Bedworth, Sabah U. Randhawa : Economics for Engineers 4e , Tata McGraw-Hill
2. Donald Newnan, Ted Eschembach, Jerome Lavelle : Engineering Economics Analysis, OUP
3. John A. White, Kenneth E. Case, David B. Pratt : Principle of Engineering Economic Analysis, John Wiley
4. Sullivan and Wicks: Engineering Economy, Pearson
5. R. Paneer Seelvan: Engineering Economics, PHI
6. Michael R Lindeburg : Engineering Economics Analysis, Professional Pubmywbut.com