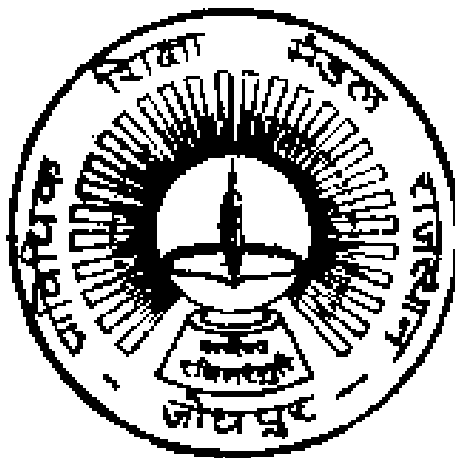# GOVERNMENT OF RAJASTHAN
BOARD OF TECHNICAL EDUCATION RAJASTHAN
JODHPUR

SEMESTER SCHEME-2020-21

(SESSION 2021-2022 & ONWARDS)

TEACHING AND EXAMINATION SCHEME AND SYLLABUS

CLOUD COMPUTING AND BIG DATA

(CB)

....

Board of Technical Education, Rajasthan
W-6 Residency Road,
Jodhpur

GOVERNMENT OF RAJASTHAN
BOARD OF TECHNICAL EDUCATION RAJASTHAN, JODHPUR
TEACHING AND EXAMINATION SCHEME
(SEMESTER SCHEME-2022-23)
FOR DIPLOMA **III SEMESTER (CLOUD COMPUTING AND BIG DATA) (CB)**
SESSION 2022-2023 & ONWARDS

Subject Category	Subject Code	Subjects	Distribution of Time				Distribution of Max. Marks/ Duration							Total Marks	Credits
			Hours per week				End Semester Exam				Internal Assessment				
			L	T	P	Tot	TH	Hrs.	PR	Hrs.	CT	TU/Assi	PR(S)		
PC	*CB 3001	Computer Programming	4	--	--	4	60	3	--	--	20	20	--	100	4
PC	$CB 3002	Information Security	4	--	--	4	60	3	--	--	20	20	--	100	4
PC	*CB 3003	Data Structures	2	--	--	2	60	3	--	--	20	20	--	100	2
PC	**CB 3004	Computer System Organisation	3	1	--	4	60	3	--	--	20	20	--	100	4
PC	CB 3005	Introduction to Cloud Computing	4	--	--	4	60	3	--	--	20	20	--	100	4
PC	*CB 3006	Computer Programming Lab	--	--	4	4	--	--	40	3	--	--	60	100	2
PC	CB 3007	Introduction to Cloud Computing lab	--	--	4	4	--	--	40	3	--	--	60	100	2
PC	*CB 3008	Data Structures Lab	--	--	2	2	--	--	40	3	--	--	60	100	1
SI	CB 3009	Summer Internship – I (4 weeks after II Sem.)	--	--	--	--	--	--	100	--	--	--	--	100	2
VS	+CB 3333	Anandam (Joy of Giving)	--	--	1	1	--	--	--	--	--	--	100	100	2
		Students Centered Activities	0	0	3	3	--	--	--	--	--	--	--	--	--
		Total	17	1	14	32	300	--	220	--	100	100	280	1000	27

Grand Total : | 1000 | 27

1.   L   : Lecture
2.   T   : Tutorial
3.   P   : Practical
4.   TH   : Marks for End Semester Exam for Theory

5.   PR   : Marks for End Semester Exam for Practical
6.   CT   : Marks for class tests (Internal Assessment)
7.   TU/Assi : Marks for tutorials/Assignment (Internal Assessment)
8.   PR(S)   : Marks for practical and viva (Internal Assessment)

1. +CB 3333 is same in all branches of Engineering

2. *CB 3001, *CB 3003, CB *3006, *CB 3008 are same as CS/IT/ CI 3001, CS/IT/ CI 3003, CS/IT/ CI 3006, CS/IT/ CI 3008 respectively

3. $CB 3002 is same as CI 3002

4. **CB 3004 is same as CS/CI 3004

Student Centered Activities will be graded as A, B, C & D on the basis of attendance and interest of the student in learning.

GOVERNMENT OF RAJASTHAN
BOARD OF TECHNICAL EDUCATION RAJASTHAN, JODHPUR
TEACHING AND EXAMINATION SCHEME
FOR DIPLOMA **IV SEMESTER (CLOUD COMPUTING AND BIG DATA) (CB)**
(SEMESTER SCHEME-2022-23)
SESSION 2022-2023 & ONWARDS

Subject Category	Subject Code	Subjects	Distribution of Time				Distribution of Max. Marks/ Duration							Total Marks	Credits
			Hours per week				End Semester Exam				Internal Assessment				
			L	T	P	Tot	TH	Hrs	PR	Hrs.	CT	TU/Assi	PR(S)		
PC	$CB 4001	Operating Systems	3	--	--	3	60	3	--	--	20	20	--	100	3
PC	CB 4002	Introduction to Big Data	3	--	--	3	60	3	--	--	20	20	--	100	3
PC	*CB 4003	Computer Networks	2	--	--	2	60	3	--	--	20	20	--	100	2
PC	CB 4004	Introduction to DBMS & MySQL	3	--	--	3	60	3	--	--	20	20	--	100	3
PC	^CB 4005	Web Technologies	2	--	--	2	60	3	--	--	20	20	--	100	2
PE	CB 4006	**Programme Elective-I** **CB 40061-** System Administration Using Linux **CB 40062-** Internet of Things	3	--	--	3	60	3	---	---	20	20	--	100	3
PC	CB 4007	Introduction to BIG Data Lab	--	--	4	4	--	--	40	3	--	--	60	100	2
PC	CB 4008	Introduction to DBMS& MySQL Lab	--	--	2	2	--	--	40	3	--	--	60	100	1
PC	CB 4009	Network & System Admin Lab	--	--	2	2	--	--	40	3	--	--	60	100	1
PC	^CB 4010	Web Technologies Lab	--	--	2	2	--	--	40	3	--	--	60	100	1
PR	CB 4011	Minor Project	--	--	4	4	--	--	40	--	--	--	60	100	2
AU	+CB 4222	Essence of Indian Knowledge and Tradition	2	--	--	2	--	--	--	--	--	--	--	--	--
VS	+CB 4444	Anandam (Joy of Giving)	--	--	1	1	--	--	--	--	--	--	100	100	2
		Students Centered Activities	0	0	3	3	--	--	--	--	--	--	--	--	--
		Total	**18**	**0**	**18**	**36**	**360**	**--**	**200**	**--**	**120**	**120**	**400**	**1200**	**25**
		Grand Total :												**1200**	**25**

1.   L   : Lecture
2.   T   : Tutorial
3.   P   : Practical
4.   TH   : Marks for End Semester Exam for Theory

5.   PR   : Marks for End Semester Exam for Practical
6.   CT   : Marks for class tests (Internal Assessment)
7.   TU/Assi : Marks for tutorials/Assignment (Internal Assessment)
8.   PR(S)   : Marks for practical and viva (Internal Assessment)

1. +CB 4222 and +CB 4444 are same in all branches of Engineering

2. $CB 4001 is same as CS/IT 4001

3. *CB4003 is same as CS/CI/IT 4003

4. ^CB 4005 and ^CB 4010 are same as CS/CI 4005 and CS/CI 4010 respectively

Student Centered Activities will be graded as A, B, C & D on the basis of attendance and interest of the student in learning

Note: Students will go for 6 Weeks   Summer Internship in the Summer Vacations after Fourth Semester. The assessment of the Summer Internship will be done in Fifth Semester

GOVERNMENT OF RAJASTHAN
BOARD OF TECHNICAL EDUCATION RAJASTHAN, JODHPUR
TEACHING AND EXAMINATION SCHEME
FOR DIPLOMA **V SEMESTER (CLOUD COMPUTING AND BIG DATA) (CB)**
(SEMESTER SCHEME-2022-23)
SESSION 2022-2023 & ONWARDS

Subject Category	Subject Code	Subjects	Distribution of Time				Distribution of Max. Marks/ Duration							Total Marks	Credits
			Hours per week				End Semester Exam				Internal Assessment				
			L	T	P	Tot	TH	Hrs.	PR	Hrs.	CT	TU/Assi	PR(S)		
PC	CB 5001	Advance Cloud Computing	3	--	--	3	60	3	--	--	20	20	--	100	3
PC	CB 5002	Big Data Analytics	3	--	--	3	60	3	--	--	20	20	--	100	3
OE	+CB 5100	**Open Elective-I** +**CB 51001-** Economic PoliCBes in India +**CB 51002-** Engineering Economics & Accountancy	3	--	--	3	60	3	--	--	20	20	--	100	3
PE	CB 5003	**Programme Elective - II** CB50031- Scripting Language (Python) **CB 50032-** Cyber Forensics	4	--	--	4	60	3	--	--	20	20	--	100	4
PE	CB 5004	**Programme Elective - III** **CB50041**-Cloud Computing Tools **CB 50042-** Big Data & Cloud Computing: Security & Privacy	3	--	--	3	60	3	--	--	20	20	--	100	3
PE	CB 5005	**Programme Elective – II Lab** $**CB50051**- Scripting Language (Python) Lab $**CB 50052-** Cyber Forensics Lab	--	--	4	4	--	--	40	4	--	--	60	100	2
PE	CB5006	**Programme Elective – III Lab** **CB 50061-**Cloud Computing Tools Lab **CB 50062-** Big Data & Cloud Computing: Security & Privacy Lab	--	--	4	4	--	--	40	4	--	--	60	100	2
SI	CB 5007	Summer Internship – II (6 weeks after IV Sem.)	--	--	--	--	--	--	100	--	--	--	--	100	3
PR	CB 5008	Major Project	--	--	2	2	--	--	--	--	--	--	--	--	--
VS	+CB 5555	Anandam (Joy of Giving)	--	--	1	1	--	--	--	--	--	--	100	100	2
		Students Centered Activities	0	0	3	3	--	--	--	--	--	--	--	--	--
		Total	**15**	**0**	**14**	**29**	**300**		**180**		**100**	**100**	**220**	**900**	**25**

Grand Total : | **900** | **25** |

1. L : Lecture
2. T : Tutorial
3. P : Practical
4. TH : Marks for End Semester Exam for Theory

5. PR : Marks for End Semester Exam for Practical
6. CT : Marks for class tests (Internal Assessment)
7. TU/Assi : Marks for tutorials/Assignment (Internal Assessment)
8. PR(S) : Marks for practical and viva (Internal Assessment)

1 +CB 51001, +CB 51002 and +CB 5555 are same in all branches of Engineering

2. $CB50051 and $CB50052 are same as CI 50051and CI 50052respectively

Note:Major Project will be continued and Assessed in VI Semester

GOVERNMENT OF RAJASTHAN
BOARD OF TECHNICAL EDUCATION RAJASTHAN, JODHPUR
TEACHING AND EXAMINATION SCHEME
(SEMESTER SCHEME-2022-23)
FOR DIPLOMA **VI SEMESTER (CLOUD COMPUTING AND BIG DATA) (CB)**
SESSION 2022-2023 & ONWARDS

Category	Subject Code	Subjects	Distribution of Time				Distribution of Max. Marks/ Duration							Total Marks	Credits
			Hours per week				End Semester Exam				Internal Assessment				
			L	T	P	Tot	TH	Hrs.	PR	Hrs.	CT	TU/Assi.	PR(S)		
HS	+CB 6111	+Entrepreneurship and Start-ups	3	1	--	4	60	3	--	--	20	20	--	100	4
OE	+CB 6200	**Open Elective-II** +**CB 62001-** Project Management +**CB 62002-** Renewable Energy Technologies	3	--	--	3	60	3	--	--	20	20	--	100	3
PE	+CB 6300	**Open Elective-III** +**CB 63001-** Product Design +**CB 63002-** Disaster Management	3	--	--	3	60	3	--	--	20	20	--	100	3
AU	+CB 6333	Indian Constitution	2	--	--	2	--	--	--	--	--	--	--	--	--
PR	CB 6001	Major Project	--	--	6	6	--	--	40	--	--	--	60	100	4
SE	CB 6002	Seminar	1	--	--	1	--	--	--	--	--	--	100	100	1
VS	+CB 6666	Anandam (Joy of Giving)	--	--	1	1	--	--	--	--	--	--	100	100	2
		Students Centered Activities	0	0	3	3	--	--	--	--	--	--	--	--	--
		Total	12	1	10	23	180	--	40	--	60	60	260	600	17
													Grand Total :	600	17

1.　L　　: Lecture
2.　T　　: Tutorial
3.　P　　: Practical
4.　TH　: Marks for End Semester Exam for Theory

5.　PR　　: Marks for End Semester Exam for Practical
6.　CT　　: Marks for class tests (Internal Assessment)
7.　TU/Assi : Marks for tutorials/Assignment (Internal Assessment)
8.　PR(S)　: Marks for practical and viva (Internal Assessment)

1. +CB 6111, +CB 62001, +CB 62002, +CB 63001, +CB 63002, +CB 6333 and +CB 6666 are same in all branches of Engineering

Student Centered Activities will be graded as A, B, C & D on the basis of attendance and interest of the student in learning.

GOVERNMENT OF RAJASTHAN
BOARD OF TECHNICAL EDUCATION RAJASTHAN JODHPUR

SEMESTER SCHEME-2020-21

III SEMESTER
(SESSION 2021-2022 & ONWARDS)

COMPUTER PROGRAMMING

Course Code	CB 3001(Same as CS/ IT/CI 3001)
Course Title	Computer Programming
Number of Credits	4 (L: 4; T: 0; P: 0)
Prerequisites	-
Course Category	PC

COURSE OBJECTIVES

To enable student, develop structured solutions to problems and implementing them using computers. This involves two parts:

- Formulating a solution for a given problem as a well-defined sequence of actions, and

- Expressing solution in a machine-readable form or a programming language. For the second part, we will learn the common units of programming languages. The first part can only be learned through the repeated practice of solving problems.

COURSE OUTCOMES

Student should be able to computationally formulate basic problems and write code snippets to execute them. The focus of the course as mentioned above should be on example-based learning. The basic nitty-gritties can be skipped; however, the application part should be clear. For instance, when to use an array, when to use loop and when to use conditional statements.

COURSE CONTENTS

The language of choice will be C. The focus will be on problem solving and problem where these ideas can be applied. The main focus of the class will to take examples of problems where these ideas can be employed.

1. **Introduction to Problem Solving**
   - 1.1.   Computational way of thinking
   - 1.2.   Variables
   - 1.3.   Representation

2. **Operators and Formatting**
   - 2.1.   Introduction to Operators
     - 2.1.1. Arithmetic Operators
     - 2.1.2. Relational Operators
     - 2.1.3. Logical and Bitwise Operators
   - 2.2.   Input, Output, Formatting and File I/O

3. **Control Statements**
   - 3.1.   Conditional Statements
   - 3.2.   Repeat Statements
     - 3.2.1. Loops
     - 3.2.2. Nested Loops

4. **Arrays**
   - 4.1.   Arrays and Memory Organization
   - 4.2.   Strings
   - 4.3.   Multidimensional Arrays
   - 4.4.   Functions and Parameter Passing

5. **Recursion**
   - 5.1.   Introduction to Recursion
   - 5.2.   Recursive solutions

REFERENCES
   1. Let Us C, Yashavant Kanetkar
   2. Problem Solving and Programming in C, R.S. Salaria, Khanna Publishing House
   3. C Programming Absolute Beginner's Guide, Dean Miller and Greg Perry
   4. The C Programming Language, Kernighan and Ritchie, Prentice Hall of India
   5. Programming in ANSI C, E. Balagurusamy, Tata McGraw-Hill
   6. C Programming & Data Structures, B. A. Fouruzan and R. F. Gilberg, CENGAGE Learning.
   7. Outline of Programming with C, Byron Gottfried, Schaum, McGraw-Hill

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INFORMATION SECURITY

Course Code	CB 3002 (Same as CI 3002)
Course Title	Information Security
Number of Credits	4 (L: 4, T: 0, P: 0)
Prerequisites	-
Course Category	PC

COURSE OBJECTIVES

To learn basic concepts of information security and cryptography. Students will also learn CIA triad, various threats and attacks and security technologies.

COURSE OUTCOMES

After completing this course, students should be able to:
- Demonstrate the importance of information security in a computer-driven world
- Understand the CIA triad of Confidentiality, Integrity and Availability
- Understand defined threats and attacks
- Explain the usage of Common Key cryptography and Public Key cryptography
- Plan for Security technologies & implement best practices

COURSE CONTENTS

1. **Introduction**
   1.1   The History of Information Security
   1.2   What is security: Key concepts, characteristics of information
   1.3   CNSS Security Model
   1.4   Components of an Information System
   1.5   CIA Triad
   1.6   Security in the SDLC
   1.7   Need for Security

2. **Threats and Attacks**
   2.1   Malware
   2.2   Social Engineering Attacks
   2.3   Network Threats
   2.4   Physical Security: Introduction, Physical Access Controls

3. **Planning for Security**
   3.1   Introduction
   3.2   Information Security Planning and Governance
   3.3   Information Security Policy, Standards
   3.4   Information Security Best Practices

4. **Security Technology**
   4.1   Access Control
   4.2   Firewalls
   4.3   Protecting Remote Connections in Remote Access
   4.4   Virtual Private Networks (VPNs)
   4.5   Intrusion Detection and Prevention Systems
   4.6   Honeypots, Honeynets, and Padded Cell Systems

5. **Cryptography**
   5.1   Introduction & Terminology
   5.2   Cipher Methods: Substitution Cipher, Transposition Cipher
   5.3   Cryptography Tools: Public Key Infrastructure, Digital Signatures & Digital Certificates

REFERENCES

1. Principles of Information Security, Sixth Edition, Michael E. Whitman & Herbert J. Mattord, Cengage Learning
2. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole, Published by Wiley India Pvt. Ltd, second edition.

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DATA STRUCTURES

Course Code	CB 3003(Same as CS/ IT/CI 3003)
Course Title	Data Structures
Number of Credits	2 (L: 2, T: 0, P: 0)
Prerequisites	-
Course Category	PC

COURSE OBJECTIVES

To provide strong foundation for implementing programming language to formulate, analyze and develop solutions related to various data structures problems.

COURSE OUTCOMES
Have a good understanding of Data Structures and its applications in algorithms.

COURSE CONTENTS

1. **Introduction to Data Structures**
    1.1.   Basic Terminology
    1.2.   Classification of Data Structures
    1.3.   Operations on Data Structures

2. **Linear Data Structures**
    2.1.   Stacks
        2.1.1. Introduction to Stacks
        2.1.2. Array Representation of Stacks
        2.1.3. Operations on a Stack
        2.1.4. Applications of Stacks
                2.1.4.1. Infix-to-Postfix Transformation
                2.1.4.2. Evaluating Postfix Expressions.
    2.2.   Queues
        2.2.1. Introduction to Queues
        2.2.2. Array Representation of Queues
        2.2.3. Operations on a Queue
        2.2.4. Types of Queues
                2.2.4.1. DeQueue
                2.2.4.2. Circular Queue
        2.2.5. Applications of Queues-Round Robin Algorithm

3. **Linked Lists**
    3.1.   Introduction to Linked List
        3.1.1. Singly Linked List
                3.1.1.1. Representation in Memory
                3.1.1.2. Operations on a Single Linked List
    3.2.   Circular Linked Lists
    3.3.   Doubly Linked Lists
    3.4.   Linked List Representation and Operations of Stack
    3.5.   Linked List Representation and Operations of Queue

4. **Non Linear Data Structures**
    4.1.   TREES
        4.1.1. Basic Terminologies
        4.1.2. Definition and Concepts of Binary Trees
        4.1.3. Representations of a Binary Tree using Arrays and Linked Lists
        4.1.4. Operations on a Binary Tree
                4.1.4.1. Insertion
                4.1.4.2. Deletion
                4.1.4.3. Traversals
        4.1.5. Types of Binary Trees.
    4.2.   GRAPHS
        4.2.1. Graph Terminologies
        4.2.2. Representation of Graphs
                4.2.2.1. Set

4.2.2.2. Linked
4.2.2.3. Matrix
4.2.3. Graph Traversals

REFERENCES
1. Data Structures, R.S. Salaria, Khanna Book Publishing, New Delhi
2. Data Structures Using C, Reema Thareja, Oxford University Press India.
3. Classic Data Structures, Samanta Debasis, Prentice Hall of India.
4. Fundamentals of Data Structure in C, Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan, University Press, India.
5. Data Structures: A Pseudo code approach with C, Richard F. Gilberg, Behrouz A. Forouzan, CENGAGE Learning, India.
6. Data Structures and Algorithms: Concepts, Techniques and Applications, G.A.V. Pai, McGraw-Hill Education, India.

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COMPUTER SYSTEM ORGANISATION

Course Code	CB 3004(Same as CS/CI 3004)
Course Title	Computer System Organisation
Number of Credits	4 (L: 3, T: 1, P: 0)
Prerequisites	-
Course Category	PC

COURSE OBJECTIVES

To have a thorough understanding of the basic structure and operation of a digital computer, its architectures and computational designs.

COURSE OUTCOMES

Have a good understanding of functioning of computer system as such and its various sub components. Student will be able to understand computing requirement for a specific purpose, analyse performance bottlenecks of the computing device and choose appropriate computing device for a given use case.

COURSE CONTENTS

1. **Structure of Computers**
   1.1. Computer Functional units
   1.2. Von-Neumann architecture
   1.3. Bus structures
   1.4. Basic Operational Concepts
   1.5. Data representation (Fixed and Floating point)
   1.6. Error detecting codes.
   1.7. Register Transfer and Micro Operations
        1.7.1. Register transfer
        1.7.2. Bus and memory transfers
        1.7.3. Arithmetic micro-operations
        1.7.4. Logic micro-operations
        1.7.5. Shift micro-operations
        1.7.6. Arithmetic logic shift unit.

2. **Micro Programmed Control**
   2.1. Control memory
   2.2. Address sequencing
   2.3. Design of control unit
   2.4. Computer Arithmetic
        2.4.1. Addition and Subtraction
        2.4.2. Multiplication and Division algorithms
        2.4.3. Floating-point arithmetic operation
        2.4.4. Arithmetic Pipeline
        2.4.5. Instruction Pipeline
        2.4.6. RISC Pipeline
        2.4.7. Vector Processing
        2.4.8. Array Processors.

3. **Introduction to Microprocessor Architecture**
   3.1. Instruction Set Architecture design principles from programmer's perspective.
   3.2. One example microprocessor (Intel, ARM, etc).

4. **Assembly Language Programming**
   4.1. Simple programs
   4.2. Assembly language programs involving
        4.2.1. logical
        4.2.2. branch
        4.2.3. call instructions
        4.2.4. sorting
        4.2.5. evaluation of arithmetic expressions
        4.2.6. string manipulation
        4.2.7. assembler directives

4.2.8. procedures and macros

5.   Memory and Digital Interfacing
5.1.   addressing and address decoding
5.2.   Interfacing of:
5.2.1. RAM
5.2.2. ROM
5.2.3. EPROM

REFERENCES:
1. Computer System Architecture, M. Moris Mano, Pearson/PHI India.
2. Microprocessors Interface, Douglas V.Hall, Tata McGraw-Hill.
3. Computer Organization, Carl Hamacher, Zvonks Vranesic, Safea Zaky, McGraw-Hill
4. Advanced Microprocessors and Peripherals- Architecture, Programming and interfacing, A.K. Ray, K.M. Bhurchandi, Tata McGraw-Hill, New Delhi, India.
5. Computer Organization and Design: A Hardwar/Software Interface (MIPS Edition) by Patterson and Hennessy.

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INTRODUCTION TO CLOUD COMPUTING

Course Code	CB 3005
Course Title	Introduction to Cloud Computing
Number of Credits	4 (L: 4, T: 0, P: 0)
Prerequisites	-
Course Category	PC

COURSE OBJECTIVES

This course gives students an insight into the basics of cloud computing along with cloud standards, cloud reference framework, virtualization & cloud security. Cloud computing is one of the fastest growing domain from a while now. It will provide the students basic understanding of cloud computing.

COURSE OUTCOMES

On completion of this course, the students should be able to understand cloud computing and its various aspects. They will be able to describe virtualization, cloud security and other cloud computing aspects.

COURSE CONTENTS

1.   Cloud Computing: An Overview
    1.1   Introduction
    1.2   Cloud Computing
        1.2.1   Key Cloud Characteristics
        1.2.2   Cloud computing attributes
    1.3   Cloud Service Models
        1.3.1   Software as a Service
        1.3.2   Platform as a Service
        1.3.3   Infrastructure as a Service
        1.3.4   Cloud Support Services
            1.3.4.1 Data Storage as a Service (DSaaS)
            1.3.4.2 Analytics as a Service (AaaS)
            1.3.4.3 Desktop as a Service (DaaS)
            1.3.4.4 Security as a Service (SecaaS)
            1.3.4.5 Identity and Access Management as Service (IAMaaS)
            1.3.4.6 Monitoring as a Service (MaaS)
    1.4   Cloud Computing Deployment Models
    1.5   Benefits, Limitations, and Concerns associated with Cloud Computing
    1.6   Migrating to Clouds
    1.7   Cloud Prospects and Implications

2.   Cloud: Services & Standards
    2.1   Introduction
    2.2   Providers of Infrastructure as a Service
    2.3   Providers of Platform as a Service
    2.4   Providers of Software as a Service
    2.5   Providers of Data Storage as a Service
    2.6   Other Services
        2.6.1   IBM SmartCloud
        2.6.2   EMC IT
        2.6.3   Microsoft Windows Azure
        2.6.4   Salesforce Service Cloud: Knowledge as a Service
        2.6.5   Amazon Simple Queue Service (SQS)
    2.7   Cloud Standards
        2.7.1   Why Standards?
        2.7.2   What Sort of Standards?
        2.7.3   What Sort of Organizations?
        2.7.4   Cloud, Standards and Management

3.   Cloud Reference Frameworks
    3.1   Introduction
    3.2   Review of Common Cloud Reference Frameworks

REFERENCES

1. Encyclopedia of Cloud Computing by San Murugesan, Irena Bojanova, Wiley
2. Cloud Computing: A Practical Approach by Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, The McGraw Hill
3. Cloud Computing For Dummies, 2nd Edition by Daniel Kirsch, Judith Hurwitz
4. https://www.tutorialspoint.com/cloud_computing/index.htm

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COMPUTER PROGRAMMING LAB

Course Code	CB 3006(Same as CS/ IT/CI 3006)
Course Title	Computer Programming Lab
Number of Credits	2 (L: 0, T: 0, P: 4)
Prerequisites	-
Course Category	PC

COURSE OBJECTIVES

This Lab course is intended to practice what is taught in theory class of 'Computer Programming' and become proficient in computer programming. Computer programming is all about regular practice. Students should work on solved and unsolved problems listed in the text books, and the problems given by the teacher. Some of the topics that should necessary be covered in lab are listed below.

COURSE OUTCOMES

Student should be able to write code snippets, and then compile, debug and execute them.

COURSE CONTENTS

S. No.	Topics for Practice
1	Familiarization with programming environment (Editor, Compiler, etc.)
2	Programs using I/O statements and various operators
3	Programs using expression evaluation and precedence
4	Programs using decision making statements and branching statements
5	Programs using loop statements
6	Programs to demonstrate applications of n dimensional arrays
7	Programs to demonstrate use of string manipulation functions
8	Programs to demonstrate parameter passing mechanism
9	Programs to demonstrate recursion
10	Programs to demonstrate use of pointers
11	Programs to demonstrate command line arguments
12	Programs to demonstrate dynamic memory allocation
13	Programs to demonstrate file operations

The language of choice will be C. This is a skill course. More you practice, better it will be.

REFERENCES
1. Let Us C, Yashavant Kanetkar
2. Problem Solving and Programming in C, R.S. Salaria, Khanna Publishing House
3. C Programming Absolute Beginner's Guide, Dean Miller and GregPerry
4. The C Programming Language, Kernighan and Ritchie, Prentice Hall of India
5. Programming in ANSI C, E. Balagurusamy, Tata McGraw-Hill
6. C Programming & Data Structures, B. A. Fouruzan and R. F. Gilberg, CENGAGE Learning.

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INTRODUCTION TO CLOUD COMPUTING LAB

Course Code	CB 3007
Course Title	Introduction to Cloud Computing Lab
Number of Credits	2 (L: 0, T: 0, P: 4)
Prerequisites	-
Course Category	PC

COURSE OBJECTIVES

This Lab course is intended to get practical exposure of configuring virtual machine and working on virtual environment, learn the design and development process involved in creating a cloud-based application.

COURSE OUTCOMES

On completion of this course, the students will be able to configure various virtualization tools such as Virtual Box, VMware workstation. They will be able to develop web applications in cloud & simulate a cloud environment.

COURSE CONTENTS

S. No.	Topics for Practice
1	Working of Google Drive to make spread sheet and notes.
2	Install Virtualbox/VMware Workstation with different flavours of Linux or Windows OS.
3	Install a C compiler in the virtual machine created using virtual box and execute simple programs.
4	Install Google App Engine. Create hello world app.
5	Use GAE launcher to launch the web applications.
6	Install CloudSim in windows and Linux OS.
7	Simulate a cloud scenario using CloudSim.

This is a skill course. More student practice and try to find solution on their own, better it will be.

REFERENCES

1.   CS8711-Cloud Computing Lab Valliammai 2017R.pdf
2.   pdfcoffee.com_lab-manual-cloud-computingpdf-pdf-free.pdf
3.   Cloud Computing For Dummies, 2nd Edition by Daniel Kirsch, Judith Hurwitz
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DATA STRUCTURES LAB

Course Code	#CS 3008(Same as CS/IT/CI 3008)
Course Title	Data Structures Lab
Number of Credits	1 (L: 0, T: 0, P: 2)
Prerequisites	-
Course Category	PC

COURSE OBJECTIVES

This Lab course is intended to practice whatever is taught in theory class of 'Data Structures', 'Algorithms' and is an extension of previous course on 'Computer Programming'. Students should work on problems listed in the text books, and the problems given by the teacher. Some of the topics that should necessary be covered in lab are listed below. This Lab course requires a good coordination between theory course in Data Structures and Algorithms.

COURSE OUTCOMES

Student will be able to write programs for creating and doing different operations on various data structures. Student will be able to use/implement various algorithms learnt in the course on Algorithms. In summary student will have a good command over Data Structures and its applications in Algorithms.

COURSE CONTENTS

S. No.	Topics for Practice
1	Write a program using recursive and non-recursive functions to perform search operation in a given list of integers using linear search technique
2	Search operation in a given list of integers using binary search technique
3	Write a program to implement insertion sorting for a given random data
4	Write a program to implement bubble sorting for a given random data
5	Write a program to implement quick sorting for a given random data
6	Write a program to implement selection sorting for a given random data
7	Write a program to implement heap sorting for a given random data
8	Write a program to implement single linked list
9	Write a program to implement double linked list
10	Write a program to implement circular linked list
11	Write a program to Implement Stack operations using array and linked list
12	Write a program to Implement Queue operations using array and linked list.
13	Write a program to implement Breadth First Search (BFS)
14	Write a program to implement Depth First Search (DFS)
15	Write a program to implement a binary tree of integers

Use 'C' as programming language for the purpose. This is a skill course. More student practice and try to find solution on their own, better it will be.

REFERENCES
1. Data Structures, R.S. Salaria, Khanna Book Publishing
2. Data Structures Using C, Reema Thareja, Oxford University Press India.
3. Classic Data Structures, Samanta Debasis, Prentice Hall of India.
4. Fundamentals of Data Structure in C, Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan, University Press, India.
5. Data Structures: A Pseudo code approach with C, Richard F. Gilberg, Behrouz A. Forouzan, CENGAGE Learning, India.
6. Data Structures and Algorithms: Concepts, Techniques and Applications, G.A.V. Pai, McGraw- Hill Education, India.

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GOVERNMENT OF RAJASTHAN
BOARD OF TECHNICAL EDUCATION RAJASTHAN JODHPUR

SEMESTER SCHEME-2020-21

IV SEMESTER
(SESSION 2021-2022 & ONWARDS)

Cloud Computing & Big Data (IV Semester)   Prepared: 2021-22

OPERATING SYSTEMS

Course Code	CB 4001(Same as CS/IT 4001)
Course Title	Operating Systems
Number of Credits	3 (L: 3, T: 0, P: 0)
Pre-requisites	-
Course Category	PC

COURSE LEARNING OBJECTIVES

A general introduction to various ideas in implementation of operating systems, particularly UNIX. Introduce to various options available so as to develop capacity to compare, contrast, and evaluate the key trade-offs between different design choices.

COURSE OUTCOMES

Students should be able to demonstrate basic knowledge about Operating System, be able to apply OS concepts such as processes, memory and file systems to system design, able to configure OS in an efficient and secure manner.

UNIT 1:
- 1.1. Overview of Operating System
- 1.2. Basic concepts
- 1.3. UNIX/LINUX Architecture
- 1.4. Kernel
- 1.5. Services and systems calls
- 1.6. System programs.

UNIT 2:
- 2.1. Process management
  - 2.1.1. Process concepts
  - 2.1.2. Operations on processes
  - 2.1.3. IPC
- 2.2. Process scheduling
  - 2.2.1. FCFS
  - 2.2.2. SJF
  - 2.2.3. Priority
  - 2.2.4. Round Robin
- 2.3. Multi- threaded programming
- 2.4. Memory management
  - 2.4.1. Memory allocation
  - 2.4.2. Swapping
  - 2.4.3. Paging
  - 2.4.4. Segmentation
- 2.5. Virtual memory

UNIT 3:
- 3.1. File management
  - 3.1.1. Concept of a file
  - 3.1.2. Access methods
- 3.2. Directory structure
- 3.3. File system structure and implementation
  - 3.3.1. Directory implementation
  - 3.3.2. Free- space management
  - 3.3.3. Efficiency and performance
- 3.4. Different types of file systems

UNIT 4:
- 4.1. I/O system
- 4.2. Mass storage structure
  - 4.2.1. Overview
  - 4.2.2. Disk structure
  - 4.2.3. Disk attachment
- 4.3. Disk scheduling algorithms
  - 4.3.1. FCFS

4.3.2.   SSTF
4.3.3.   SCAN
4.3.4.   LOOK
4.4.   Swap space management
4.5.   Raid.

UNIT 5:
5.1.   OS Security
5.2.   Authentication
5.3.   Access Control
5.4.   Access Rights
5.5.   System Logs

REFERENCES
1. Operating System Concepts, Silberschatz and Galvin, Wiley India Limited
2. UNIX Concepts and Applications, Sumitabha Das, McGraw-Hill Education
3. Operating Systems, Internals and Design Principles, Stallings, Pearson Education, India
4. Operating System Concepts, Ekta Walia, Khanna Publishing House
5. Modern Operating Systems, Andrew S. Tanenbaum, Prentice Hall of India
6. Operating systems, Deitel & Deitel, Pearson Education, India

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Cloud Computing & Big Data (IV Semester)   Prepared: 2021-22

INTRODUCTION TO BIG DATA

Course Code	CB 4002
Course Title	Introduction to Big Data
Number of Credits	3 (L: 3, T: 0, P: 0)
Prerequisites	-
Course Category	PC

COURSE LEARNING OBJECTIVES

The basic purpose of this course is to understand the concepts of big data. Other objective is to understand the technology components of big data. The main objective is to learn the MapReduce and Hadoop fundamentals.

COURSE OUTCOMES

On completion of this course the learners will be able to go through the concepts of big data, the technology components of big data. Students will also learn two latest distributed computing technologies that are MapReduce and Hadoop.

COURSE CONTENTS

UNIT 1: GETTING STARTED WITH BIG DATA
- 1.1. Fundamentals of Big Data
- 1.2. Evolution of Data Management
- 1.3. Waves of Managing Data
- 1.4. Defining Big Data
- 1.5. Big Data Management Architecture
- 1.6. MapReduce, Hadoop, and Big Table
- 1.7. Big data analytics an introduction
- 1.8. Big data applications and Journey

UNIT 2: EXAMINING BIG DATA TYPES
- 2.1. Structured Data
- 2.2. Role of relational databases in big data
- 2.3. Unstructured Data
- 2.4. Role of a CMS in big data management
- 2.5. Integrating data types into a big data environment

UNIT 3: BIG DATA TECHNOLOGY COMPONENTS
- 3.1. Big data stack
- 3.2. Redundant physical infrastructure
- 3.3. Security infrastructure
- 3.4. Interfaces and feeds to and from applications
- 3.5. Operational databases
- 3.6. Organizing data services and tools
- 3.7. Analytical Data Warehouses

UNIT 4: MAP-REDUCE FUNDAMENTALS
- 4.1. The origins of MapReduce
- 4.2. The map function
- 4.3. The reduce function
- 4.4. Putting map and reduce together
- 4.5. Optimizing MapReduce tasks

UNIT 5: HADOOP FUNDAMENTALS
- 5.1 Hadoop and its importance
- 5.2 Hadoop Distributed File System
- 5.3 Digging into Hadoop MapReduce
- 5.4 Putting Hadoop to work
- 5.5 Hadoop Foundation and Ecosystem
- 5.6 Hadoop YARN
- 5.7 HBase
- 5.8 Hive
- 5.9 Interacting with the Hadoop Ecosystem
- 5.10 Sqoop

5.11   Zookeeper

REFERENCES
1. Big Data for dummies- Judith S. Hurwitz, Alan F. Nugent, Dr. Fern Halper and Marcia A. Kaufman
2. Data Science and Big Data Analytics -David Dietrich, Barry Heller, Beibei Yang

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COMPUTER NETWORKS

Course Code	CB 4003(Same as CS/IT/CI 4003)
Course Title	Computer Networks
Number of Credits	2 (L: 2, T: 0, P: 0)
Prerequisites	-
Course Category	PC

COURSE LEARNING OBJECTIVES

Understand functioning of computer networks and popular networking protocols

COURSE OUTCOMES

- Understanding of computer networks, issues, limitations, options available.
- Understanding of the care that needs to be taken while developing applications designed to work over computer networks
- Able to configure basic LAN and connect computers to it.

COURSE CONTENT

UNIT 1:
- 1.1.   Introduction to computer networks
- 1.2.   Network Models
- 1.3.   OSI Reference Model
- 1.4.   TCP/IP Model

UNIT 2:
- 2.1.   Transmission media
  - 2.1.1.   Principles
  - 2.1.2.   Issues and examples
- 2.2.   Wired media – coaxial, utp, stp, fiber optic cables
- 2.3.   Wireless media – hf, vhf, uhf, microwave, ku band
- 2.4.   Network topologies
- 2.5.   Data link layer
  - 2.5.1.   Design issues
  - 2.5.2.   Example protocols (ethernet, wlan, bluetooth)
  - 2.5.3.   Switching techniques

UNIT 3:
- 3.1.   Network layer
  - 3.1.1.   Design issues
  - 3.1.2.   Example protocols (ipv4)
- 3.2.   Routing
  - 3.2.1.   Principles/issues
  - 3.2.2.   Algorithms (distance-vector, link-state) and protocols (rip, ospf)

UNIT 4:
- 4.1.   Transport layer
  - 4.1.1.   Design issues
  - 4.1.2.   Example protocols (tcp)
- 4.2.   Application layer protocols (smtp, dns)

UNIT 5:
- 5.1.   Functioning of Network Devices
  - 5.1.1.   NIC, Hub, Switch, Router, WiFi Devices
- 5.2.   Network Management System and example protocol (SNMP)

REFERENCES

1. Computer Networks, 4th Edition (or later), Andrew S. Tanenbaum, PHI
2. TCP/IP Illustrated, Volume-1, W. Richard Stevens, Addision Wesley
3. Data and Computer Communications, William Stallings, PHI
4. An Engineering Approach to Computer Networking, S. Keshav, Addision Wesley/Pearson
5. An Integrated Approach to Computer Networks, Bhavneet Sidhu, Khanna Publishing House

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INTRODUCTION TO DBMS & MYSQL

Course Code	CB 4004
Course Title	Introduction to DBMS & MySQL
Number of Credits	3 (L: 3, T: 0, P: 0)
Prerequisites	-
Course Category	PC

COURSE LEARNING OBJECTIVES

It covers the development of database-driven applications using the capabilities provided by modern database management system software. The concepts include conceptual modeling, relational database design and database query languages.

COURSE OUTCOMES

After completing the course, the students will understand
- How to design a database, database-based applications
- How to use a DBMS
- The critical role of database system in designing several information system-based software or applications.
- How to execute queries in MySQL database to retrieve results efficiently.

COURSE CONTENT

UNIT 1: Introduction
- 1.1.   Database-System Applications
- 1.2.   Purpose of Database Systems
- 1.3.   View of Data
- 1.4.   Database Languages
- 1.5.   Database Design & Database Engine
- 1.6.   Database Users and Administrators
- 1.7.   History of Database Systems

UNIT 2 : Introduction to the Relational Model
- 2.1.   Structure of Relational Databases
- 2.2.   Database Schema
- 2.3.   Keys
- 2.4.   Schema Diagrams
- 2.5.   Relational Query Languages
- 2.6.   The Relational Algebra

UNIT 3: Database Design Using the E-R Model
- 3.1.   Overview of the Design Process
- 3.2.   The Entity-Relationship Model
- 3.3.   Complex Attributes
- 3.4.   Mapping Cardinalities
- 3.5.   Primary Key
- 3.6.   Removing Redundant Attributes in Entity Sets
- 3.7.   Reducing E-R Diagrams to Relational Schemas

UNIT 4: An introduction to MySQL
- 4.1.   An introduction to relational databases
- 4.2.   How to use MySQL Workbench
- 4.3.   How to retrieve data from a single table
- 4.4.   How to retrieve data from two or more tables
- 4.5.   How to insert, update, and delete data
- 4.6.   How to code summary queries and code subqueries

REFERENCES
1. Database System Concepts, Abraham Silberschatz, H. F. Korth, S. Sudarshan, McGraw- Hill, New Delhi
2. Joel Murach, MYSQL, 3rd Edition, Mike Murach & Associates, Inc.
3. Fundamentals of Database Systems, Elmasri & Navathe, Pearson Education
4. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, TataMcGraw-Hill.
5. Introduction to Database Systems, C.J.Date, Pearson Education
6. Introduction to SQL, Rick F.Vander Lans, Pearson Education

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WEB TECHNOLOGIES

Course Code	CB 4005 (Same as CS/CI 4005)
Course Title	Web Technologies
Number of Credits	2 (L: 2, T: 0, P: 0)
Prerequisites	-
Course Category	PC

COURSE LEARNING OBJECTIVES

To provide basic skills on tools, languages and technologies related to website development. Learnings from this course may be used in the Mini Project and summer internship.

COURSE OUTCOMES

Student will be able to develop/build a functional website with full features.

COURSE CONTENTS

UNIT 1: INTRODUCTION TO WWW
    1.1.   Protocols and programs
          1.1.1.   Secure connections,
          1.1.2.   Application and development tools
    1.2.   The web browser
    1.3.   What is server
    1.4.   Setting up UNIX and LINUX web servers
    1.5.   Logging users
    1.6.   Dynamic IP Web Design
          1.6.1.   Web site design principles
          1.6.2.   Planning the site and navigation

UNIT 2: WEB SYSTEMS ARCHITECTURE
    2.1.   Architecture of Web based systems
          2.1.1.   Client/server (2-tier) architecture
          2.1.2.   3-Tier architecture
    2.2.   Building blocks of fast and scalable data access Concepts
          2.2.1.   Caches-Proxies- Indexes-Load Balancers- Queues
    2.3.   Web Application architecture (WAA)

UNIT 3: JAVASCRIPT
    3.1.   Client-side scripting
    3.2.   What is JavaScript
    3.3.   Simple JavaScript
    3.4.   Variables
    3.5.   Functions, conditions
    3.6.   Loops and repetition

UNIT 4: ADVANCE SCRIPTING
    4.1.   JavaScript and objects
          4.1.1.   JavaScript own objects
          4.1.2.   DOM and web browser environments, forms and validations
    4.2.   DHTML
          4.2.1.   Combining HTML, CSS and JavaScript
    4.3.   Ajax
    4.4.   Introduction to XML
    4.5.   Introduction to Web Services

UNIT 5: PHP
5.
    5.1.   Server-side scripting
          5.1.1.   Arrays
          5.1.2.   Function and forms
          5.1.3.   Advance php
    5.2.   Databases
          5.2.1.   Basic command with php examples
          5.2.2.   Connection to server, creating database
          5.2.3.   Selecting a database

        5.2.4.   Listing database
        5.2.5.   Listing table- names creating a table
        5.2.6.   Inserting data
        5.2.7.   Altering tables, queries, deleting database, deleting data and tables
    5.3.   Php myadmin and database bugs

REFERENCES

1. "Web Technologies--A Computer Science Perspective", Jeffrey C. Jackson,
2. "Internet & World Wide Web How To Program", Deitel, Deitel, Goldberg, Pearson Education
3. "Web programming- Building Internet Application", Chris Bales
4. "Web Applications: Concepts and Real World Design", Knuckles

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SYSTEM ADMINISTRATION USING LINUX

Course Code	CB 40061
Course Title	System Administration Using Linux
Number of Credits	3 (L: 3, T: 0, P: 0)
Pre-requisites	-
Course Category	PE

COURSE LEARNING OBJECTIVES

A general introduction to various ideas in implementation of operating systems, particularly Linux. Introduce to various options available so as to develop capacity to compare, contrast, and evaluate the key trade-offs between different design choices.

COURSE OUTCOMES

Students should be able to demonstrate basic knowledge about Linux Operating System, be able to apply OS concepts such as processes, memory and file systems to system design, able to configure OS in an efficient and secure manner.

UNIT 1: Introduction
- 1.1 Essential duties of the system administrator
  - 1.1.1 Account provisioning
  - 1.1.2 Adding and removing hardware
  - 1.1.3 Performing backups
  - 1.1.4 Installing and upgrading software
  - 1.1.5 Monitoring the system
  - 1.1.6 Troubleshooting
  - 1.1.7 Maintaining local documentation
  - 1.1.8 Vigilantly monitoring security
- 1.2 Process Management
  - 1.2.1 Introduction to process
  - 1.2.2 Process priorities
  - 1.2.3 Background Jobs

UNIT 2: Disk Management
- 0.1 disk partitions
- 0.2 file system
- 0.3 mounting
- 0.4 troubleshooting tools
- 0.5 introductions to uuid's
- 0.6 introduction to raid
- 0.7 logical volume management

UNIT 3: Boot Management
- 1.1 bootloader
- 1.2 init and runlevels

UNIT 4: System Management
- 2.1 scheduling
- 2.2 logging
- 2.3 memory management
- 2.4 resource monitoring
- 2.5 package management

UNIT 5: Network Management
- 3.1 general networking
- 3.2 interface configuration
- 3.3 network sniffing
- 3.4 ssh client and server

REFERENCES
1. Unix And Linux System Administration Handbook (Forth Edition) by: Evi Nemeth, Garth Snyder, Trent R. Hein, Ben Whaley Prentice Hall
2. Linux System Administration by: Paul Cobbaut (http://linux-training.be)

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INTERNET OF THINGS

Course Codex	CB 40062
Course Title	Internet of things
Number of Credits	3 (L: 3, T: 0, P: 0)
Prerequisites	-
Course Category	PE

COURSE LEARNING OBJECTIVES

Internet of Things (IoT) is presently an important technology with wide ranging interest from Government, academia and industry. IoT cuts across different application domain verticals ranging from civilian to defense sectors which includes agriculture, space, health care, manufacturing, construction, water, mining, etc. Today it is possible to build different IoT solutions such as shopping system, infrastructure management in both urban and rural areas, remote health monitoring and emergency notification systems, and transportation systems. Therefore, it is very important to learn the fundamentals of this emerging technology.

COURSE OUTCOMES

Students will have good understanding of various aspect of IoT, know some tools and have basic implementation skills.

COURSE CONTENTS

UNIT 1:
      1.1   Introduction to IoT
      1.2   Sensing
      1.3   Actuation

UNIT 2:
      2.1   Basics of IoT Networking
      2.2   Communication Protocols
      2.3   Sensor networks

UNIT 3:
      3.1   Introduction to Arduino programming
      3.2   Integration of Sensors/Actuators to Arduino

UNIT 4:
      4.1   Implementation of IoT with Raspberry Pi
      4.2   Data Handling Analytics

UNIT 5:
      5.1   Case Studies:
           5.1.1 Agriculture
           5.1.2 Healthcare
           5.1.3 Activity Monitoring

REFERENCES
1. https://nptel.ac.in/noc/individual_course.php?id=noc17-cs22
2. "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press)
3. Internet of Things by Dr. Jeeva Jose, Khanna Publishing House (Edition 2017)
4. "Internet of Things: A Hands-on Approach", by Arshdeep Bahga and Vijay Madisetti (Universities Press)
5. Internet of Things: Architecture and Design Principles, Raj Kamal, McGraw Hill

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Cloud Computing & Big Data (IV Semester)   Prepared: 2021-22

INTRODUCTION TO BIG DATA LAB

Course Code	CB 4007
Course Title	Introduction to Big Data Lab
Number of Credits	2 (L: 0, T: 0, P: 4)
Prerequisites	-
Course Category	PC

COURSE LEARNING OBJECTIVES

The basic purpose of this lab course is to understand the concepts of distributed data programming through MapReduce. The main objective is to learn and implement basic to advance programs in MapReduce environment.

COURSE OUTCOMES

On completion of this course the learners will be able to go through the programming concepts of MapReduce. Students will also Understanding installation of Linux environment for running MapReduce programs and perform various programs using MapReduce.

COURSE CONTENTS

S. No.	Topics for Practice
1	Understanding and installing Linux environment for running MapReduce programs.
2	Write a MapReduce program to calculate the bigram (2-gram) of all time in the dataset.
3	Write a MapReduce program to find top-N words in a text file.
4	Write a MapReduce program for finding the most common two word phrase from the input
5	Write a pig program for finding the most common word from the news.
6	Write a reduce program for computing counts of status/error codes.
7	Write a map program for computing counts of status/error codes with maximum count.
8	Write a reduce program for computing counts of status/error codes with maximum count.

This is a skill course. More student practice and try to find solution on their own, better it will be.

REFERENCES

1. Big Data Science and Analytics – A Hands-on Approach, Arshdeep Bahga, Vijay Madisetti
2. Data Science and Big Data Analytics -David Dietrich, Barry Heller, Beibei Yang

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Cloud Computing & Big Data (IV Semester)   Prepared: 2021-22

INTRODUCTION TO DBMS & MYSQL LAB

Course Code	CB 4008
Course Title	Introduction to DBMS & MYSQL Lab
Number of Credits	1 (L: 0, T: 0, P: 2)
Prerequisites	-
Course Category	PC

COURSE LEARNING OBJECTIVES

This Lab course is intended to practice whatever is taught in theory class of 'Introduction to DBMS & MySQL'. A few sample case studies are listed with some suggested activities. More case studies may be added to this list. You need to develop these case studies, apply all relevant concepts learnt in theory class as the course progress, identify activities/operations that may be performed on the database. It will be a good idea to also use concepts learnt in the course on Software Engineering.

COURSE OUTCOMES

After completing the course, the students will understand
- How to design a database, database-based applications
- How to use a DBMS
- The critical role of database system in designing several information system-based software systems or applications.
- How to execute queries in MySQL database to retrieve results efficiently.

COURSE CONTENTS

S. No.	Topics for Practice
1	Case Study-1: Employee database – 'Create' employee table, 'Select' and display an employee matching a given condition, 'Delete' duplicate records, delete rows using triggers, insert and update records, find net salary, etc.
2	Construct an E-R diagram for a car insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents. Each insurance policy covers one or more cars and has one or more premium payments associated with it. Each payment is for a particular period of time, and has an associated due date, and the date when the payment was received.
3	How to use MySQL Workbench to run SQL statements
4	How to code the SELECT, WHERE, ORDER BY& LIMIT clause
5	How to work with inner joins, outer joins & unions.
6	How to create test tables, insert new rows, update or delete existing rows.
7	How to group and summarize data
8	How to code subqueries in the WHERE, HAVING, SELECT & FROM clause
9	How to use the ALL, ANY and SOME keywords.

This is a skill course. More student practice and try to find solution on their own, better it will be.

REFERENCES
1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, McGraw- Hill, New Delhi, India.
2. Joel Murach, MYSQL, 3rd Edition, Mike Murach & Associates, Inc.
3. Raghurama Krishnan, Johannes Gehrke, Database Management Systems, Tata McGraw-Hill, New Delhi, India.
4. Introduction to Database Systems, C.J. Date, Pearson Education
5. Introduction to SQL, Rick F.Vander Lans, Pearson Education

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NETWORK & SYSTEM ADMINISTRATION LAB

Course Code	CB 4009
Course Title	Network & System Administration Lab
Number of Credits	2 (L: 0, T: 0, P: 2)
Pre-requisites	-
Course Category	PC

COURSE LEARNING OBJECTIVES

A general introduction to various ideas in implementation of operating systems, particularly Linux. Introduce to various options available so as to develop capacity to compare, contrast, and evaluate the key trade-offs between different design choices.

COURSE OUTCOMES

Students should be able to demonstrate basic knowledge about Operating System, be able to apply OS concepts such as processes, memory and file systems to system design, able to configure OS in an efficient and secure manner.

COURSE CONTENTS

S. No.	Topics for Practice
1	Boot Linux system from command prompt.
2	How to send a task in background.
3	How to terminate a selected task.
4	How to make partitions of Had Disk using Linux.
5	How to mound External Hard disk and printer on Linux System.
6	How to change file system in Linux Operating system.
7	How to install Linux with Window operating System.
8	How to schedule a task for automating running on given time and date.
9	How to access remote machine using ssh client.
10	Boot Linux system from command prompt.

This is a skill course. More student practice and try to find solution on their own, better it will be.

REFERENCES

1. Unix And Linux System Administration Handbook (Forth Edition) by: Evi Nemeth, Garth Snyder, Trent R. Hein, Ben Whaley Prentice Hall

2. Linux System Administration by: Paul Cobbaut (http://linux-training.be)

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WEB TECHNOLOGIES LAB

Course Code	#CB 4010 (Same as CS/CI 4010)
Course Title	Web Technologies Lab
Number of Credits	1 (L: 0, T: 0, P: 2)
Prerequisites	-
Course Category	PC

COURSE LEARNING OBJECTIVES

This Lab course is intended to practice whatever is taught in theory class of 'Web Technologies'. Some of the things that should necessary be covered in lab are listed below:

COURSE OUTCOMES

Student will be able to program web applications using and will be able to do the following:
- Use LAMP Stack for web applications
- Use Tomcat Server for Servlets and JSPs
- Write simple applications with Technologies like HTML, JavaScript, AJAX, PHP, Servlets and JSPs
- Connect to Database and get results
- Parse XML files using Java (DOM and SAX parsers)

Student will be able to develop/build a functional website with full features.

COURSE CONTENTS

S. No.	Topics for Practice
1	Coding Server Client Programs
2	Developing Web Application using HTML, JavaScript
3	Developing Advanced Web Application Programs using CSS
4	Practicing PHP: Basics
5	Practicing PHP: Web Application Development
6	Practicing PHP: MySQL - tiered Applications
7	Developing a fully functional Web Service Application using all the technologies learned in this course.

This is a skill course. More student practice and try to find solution on their own, better it will be.

REFERENCES
1. "Web Technologies--A Computer Science Perspective", Jeffrey C. Jackson,
2. "Internet & World Wide Web How To Program", Deitel, Deitel, Goldberg, Pearson Education
3. "Web programming- Building Internet Application", Chris Bales
4. "Web Applications: Concepts and Real World Design", Knuckles

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ESSENCE OF INDIAN KNOWLEDGE AND TRADITION

Course Code	+CB 4222 (Same in All Branches of Engg.)
Course Title	Essence of Indian Knowledge and Tradition
Number of Credits	0 (L:2, T:0, P:0)
Prerequisites	-
Course Category	AU

COURSE CONTENTS

Basic Structure of Indian Knowledge System:

(i)   वेद,

(ii)   उऩवेद (आयुवेद,धनुवेद,गन्धवेद,स्थाऩत्यआदद)

(iii)   वेदथाथांग (शिक्था, कलऩ, ननरुत, व्थाकरण, ज्योनतषछथांद),

(iv)   उऩथाइग (धर्मशथास्र, ऱोथाथांसथा, नुरथाण, तकशरथास्र)

• Modern Science and Indian Knowledge System
• Yoga and Holistic Health care
• Case Studies.

REFERENCES /SUGGESTED LEARNING RESOURCES

1. V. Sivarama Krishna, "Cultural Heritage of India- Course Material", Bhartiya Vidya Bhavan, Mumbai, fifth Edition, 2014.
2. Swami Jitatmanand, "Modern Physics and Vedant", Bhartiya Vidya Bhavan.
3. Fritz of Capra, "The wave of Life".
4. Fritz of Capra, "Tao of Physics".
5. V N Jha, "Tarka sangraha of Annam Bhatta, International" Cinmay Foundation, Velliarnad, Amakuam.
6. R N Jha, "Science of Consciousness Psychotheraphy and Yoga Practices" Vidya nidhi Prakasham, Delhi, 2016.

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GOVERNMENT OF RAJASTHAN
BOARD OF TECHNICAL EDUCATION RAJASTHAN JODHPUR

SEMESTER SCHEME-2020-21

V SEMESTER
(SESSION 2021-2022 & ONWARDS)

Cloud computing and BIG Data (V Semester)   Prepared: 2021-22

ADVANCE CLOUD COMPUTING

Course Code	CB 5001
Course Title	Advance Cloud Computing
Number of Credits	3 (L: 3, T: 0, P: 0)
Prerequisites	CB 3005 Introduction to Cloud Computing
Course Category	PC

COURSE OBJECTIVES

The objective of this course is to prepare the student with the advance topics of cloud computing. A sound grasp of cloud computing is essential for diploma students of cloud computing. This course gives insight of mobile cloud computing, open-source cloud, cloud testing & migration to cloud.

COURSE OUTCOMES

After learning the course, the students should be able to answer questions like-
- How to migrate to clouds?
- What is mobile cloud computing?
- How cloud testing done?
- What is cloud gaming, cloud fault tolerance?

COURSE CONTENTS

UNIT 1: Mobile Cloud Computing
1.1 Introduction
1.2 Mobile Cloud Computing
    1.2.1 Motivation
    1.2.2 Definition
    1.2.3 Building Blocks
    1.2.4 Mobile Cloud Computing versus Cloud Computing
1.3 Mobile Cloud Computing Architectures
    1.3.1 Mobile Distant-Immobile-Cloud Computing (MDICC)
    1.3.2 Mobile Proximate-Immobile-Cloud Computing (MPICC)
    1.3.3 Mobile Proximate-Mobile-Cloud Computing (MPMCC)
    1.3.4 Hybrid Mobile Cloud Computing (HMCC)
1.4 Outstanding Challenges
    1.4.1 Lightweight Techniques
    1.4.2 Portability
    1.4.3 Interoperability
    1.4.4 Seamless Connectivity
    1.4.5 Live VM Migration
1.5 The Concept of Community Clouds

UNIT 2: Open-Source Cloud & Cloud Standards
2.1 Introduction
2.2 Criteria for Evaluating Open-Source IaaS Cloud Solutions
    2.2.1 Comparison of Open-Source IaaS Cloud Solutions
2.3 Criteria for Evaluating Open-Source PaaS Cloud Software Solutions
    2.3.1 Comparison of Open-Source PaaS Cloud Software Solutions
2.4 Criteria for Evaluating Open-Source SaaS Cloud Software Solutions
    2.4.1 Comparison of Open-Source SaaS Cloud Solutions
2.5 Open-Source Cloud Infrastructure Automation Tools
    2.5.1 Hyperic
    2.5.2 Chef
    2.5.3 Puppet
    2.5.4 Zenoss
2.6 Cloud Standard
2.7 Why Standards?
2.8 What Sort of Standards?
    2.8.1 Open Standards
2.9 What Sort of Organizations?
2.10 Individual Standards

REFERENCES

1. Encyclopedia of Cloud Computing by San Murugesan, Irena Bojanova, Wiley
2. Cloud Computing: A Practical Approach by Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, The McGraw Hill
3. Cloud Computing For Dummies, 2nd Edition by Daniel Kirsch, Judith Hurwitz
4. https://www.tutorialspoint.com/cloud_computing/index.htm

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BIG DATA ANALYTICS

Course Code	CB 5002
Course Title	Big Data Analytics
Number of Credits	3 (L: 3, T: 0, P: 0)
Prerequisites	CB 4002 Introduction to Big Data
Course Category	PC

COURSE LEARNING OBJECTIVES

The basic purpose of this course is to understand the concepts of big data analytics and advance analytics. Students will also learn various methods of big data analytics and tools for text analytics using big data.

COURSE OUTCOMES

On completion of this course the learners will be able to go through the concepts of basic and advanced big data analytics, data analytics life cycle, various methods for big data analytics and tools for text analytics.

COURSE CONTENTS

UNIT 1: INTRODUCTION TO BIG DATA ANALYTICS
  1.1.   Big Data Overview
  1.2.   State of the practice in analytics
  1.3.   Key Roles for the New Big Data Ecosystem
  1.4.   Examples of Big Data Analytics

UNIT 2: DATA ANALYTICS LIFECYCLE
  2.1.   Overview
  2.2.   Phase 1: Discovery
  2.3.   Phase 2: Data Preparation
  2.4.   Phase 3: Model Planning
  2.5.   Phase 4: Model Building
  2.6.   Phase 5: Communicate Results
  2.7.   Phase 6: Operationalize

UNIT 3: DATA ANALYTICS METHODS
  3.1.   Basic analytics
  3.2.   Advanced analytics
  3.3.   Operationalized analytics
  3.4.   Monetizing analytics
  3.5.   Big Data Analytics Examples
  3.6.   Big Data Analytics Solutions

UNIT 4: ADVANCE ANALYTICAL METHODS
  4.1   Overview of Clustering
  4.2   Overview of Association Rules
  4.3   Overview of Regression
  4.4   Overview of Time Series Analysis
  4.5   Overview of Text Analysis

UNIT 5: TEXT ANALYTICS AND BIG DATA
  5.1   Different types of unstructured data
  5.2   Defining text analytics
  5.3   Unstructured analytics use cases
  5.4   Putting unstructured data together with structured data
  5.5   Text analytics tools for big data

REFERENCES
1. Big Data for dummies- Judith S. Hurwitz, Alan F. Nugent, Dr. Fern Halper and Marcia A. Kaufman
2. Data Science and Big Data Analytics -David Dietrich, Barry Heller, Beibei Yang

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ECONOMIC POLICIES IN INDIA

Course Code	CB 51001(Same in All Branches of Engg.)
Course Title	Economic Policies in India
Number of Credits	3 (L:3, T:0, P:0)
Prerequisites	-
Course Category	OE

COURSE LEARNING OBJECTIVES

The objective of this course is to familiarize the students of different streams with the basic concepts, structure, problems and issues concerning Indian economy.

CO1	Understand Indian economics policy, planning strategies
CO2	It will enable to students to comprehend theoretical and empirical development across countries and region for policy purposes
CO3	Development Economics as a discipline encompasses different approach es to the problems of unemployment, poverty,income generation, industrialization from different perspectives
CO4	Able to identify the problems and capable to decide the application for future development
CO5	Analyze economic issues and find solutions to complex economic problems and take correct economic judgment

COURSE CONTENTS

1. **BASIC FEATURES AND PROBLEMS OF INDIAN ECONOMY**
    1.1.   Economic History of India
    1.2.   Nature of Indian Economy
    1.3.   Demographic features and Human Development Index
    1.4.   Problems of Poverty, Unemploy-ment, Inflation, income inequality, Blackmoney in India

2. **SECTORAL COMPOSITION OF INDIAN ECONOM**
    2.1.   Issues in Agriculture sector in India
    2.2.   land reforms
    2.3.   Green Revolution
    2.4.   agriculture policies of India

3. **INDUSTRIAL DEVELOPMENT**
    3.1.   Small scale and cottage industries
    3.2.   Industrial Policy
    3.3.   Public sector in India
    3.4.   Service sector in India

4. **ECONOMIC POLICIES**
    4.1.   Economic Planning in India
    4.2.   Planning commission v/s NITI Aayog
    4.3.   Five Year Plans
    4.4.   Monetary policy in India
    4.5.   Fiscal Policy in India
    4.6.   Centre state Finance Relations
    4.7.   Finance commission in India
    4.8.   LPG policy in India

5. **EXTERNAL SECTOR IN INDIA**
    5.1.   India's foreign trade value composition and direction
    5.2.   India Balance of payment since 1991
    5.3.   FDI in India
    5.4.   Impact of Globalization on Indian Economy
    5.5.   WTO and India

REFERENCES

1. Dutt Rudder and K.P.M Sunderam (2017). Indian Economy .S Chand & Co.Ltd. New Delhi.
2. Mishra S. K & V. K Puri (2017). Indian Economy and Its Development Experience. Himalaya Publishing House.
3. Singh, Ramesh, (2016): Indian Economy, Tata-McGraw Hill Publications, New Delhi.
4. Dhingra, I.C., (2017): March of the Indian Economy, Heed Publications Pvt. Ltd.
5. Karam Singh Gill, (1978): Evolution of the Indian Economy, NCERT, NewDelhi
6. Kaushik Basu (2007): The Oxford Companion to Economics of India ,Oxford University Press.

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ENGINEERING ECONOMICS & ACCOUNTANCY

Course Code	CB 51002 (Same in All Branches of Engg.)
Course Title	Engineering Economics & Accountancy
Number of Credits	3 (L:3, T:0, P:0)
Prerequisites	-
Course Category	OE

COURSE OBJECTIVES

- To acquire knowledge of basic economics to facilitate the process of economic decision making.
- To acquire knowledge on basic financial management aspects.
- To develop the basic skills to analyze financial statements.

COURSE OUTCOMES

At the end of the course, the student will be able to:

CO1	Understand the macro-economic environment of the business and its impact on enterprise
CO2	Understand cost elements of the product and its effect on decision making
CO3	Prepare accounting records and summarize and interpret the accounting data for managerial decisions
CO4	Understand accounting systems and analyze financial statements using ratio analysis
CO5	Understand the concepts of financial management and investment

COURSE CONTENTS

1. INTRODUCTION
- 1.1. Managerial Economics
- 1.2. Relationship with other disciplines
- 1.3. Firms: Types, objectives and goals
- 1.4. Managerial decisions
- 1.5. Decision analysis

2. DEMAND & SUPPLY ANALYSIS
- 2.1. Demand
  - 2.1.1. Types of demand
  - 2.1.2. Determinants of demand
  - 2.1.3. Demand function
  - 2.1.4. Demand elasticity
  - 2.1.5. Demand forecasting
- 2.2. Supply
  - 2.2.1. Determinants of supply
  - 2.2.2. Supply function
  - 2.2.3. Supply elasticity

3. PRODUCTION AND COST ANALYSIS
- 3.1. Production function
- 3.2. Returns to scale
- 3.3. Production optimization
- 3.4. Least cost input; Iso quants
- 3.5. Managerial uses of production function
- 3.6. Cost Concepts
  - 3.6.1. Cost function
  - 3.6.2. Types of Cost
  - 3.6.3. Determinants of cost
  - 3.6.4. Short run and long run cost curves
  - 3.6.5. Cost Output Decision
  - 3.6.6. Estimation of Cost

4. PRICING
- 4.1. Determinants of Price
- 4.2. Pricing under different objectives and different market structures

4.3. Price discrimination
4.4. Pricing methods in practice
4.5. Role of Government in pricing control

5. FINANCIAL ACCOUNTING (ELEMENTARY TREATMENT)

5.1. Balance sheet and related concepts
5.2. Profit & Loss Statement and related concepts
5.3. Financial Ratio Analysis
5.4. Cash flow analysis
5.5. Funds flow analysis
5.6. Comparative financial statements
5.7. Analysis & Interpretation of financial statements
5.8. Investments
5.9. Risks and return evaluation of investment decision
5.10. Average rate of return
5.11. Payback Period
5.12. Net Present Value
5.13. Internal rate of return

REFERENCES

1. McGuigan, Moyer and Harris, 'Managerial Economics; Applications, Strategy and Tactics', Thomson South Western, 10th Edition, 2005.
2. Prasanna Chandra. 'Fundamentals of Financial Management', Tata McGraw Hill Publishing Ltd., 4th edition,2005.
3. Samuelson. Paul A and Nordhaus W. D., 'Economics', Tata McGraw Hill Publishing Company Limited, New Delhi, 2004.
4. Paresh Shah, 'Basic Financial Accounting for Management', Oxford University Press, New Delhi, 2007.
5. Salvatore Dominick, 'Managerial Economics in a global economy' Thomson South Western, 4th Edition, 2001.

SCRIPTING LANGUAGE (PYTHON)

Course Code	CB 50031
Course Title	Scripting Languages (Python)
Number of Credits	4 (L: 4, T: 0, P:0)
Prerequisites	CB3001 Computer Programming, CB3006 Computer Programming Lab
Course Category	PE

COURSE OBJECTIVES
To learn how to work with a scripting language.

COURSE OUTCOMES
At the end of the course student will be able to build program with a scripting language and will be able to learn any other scripting language on their own.

COURSE CONTENTS

UNIT 1: Introduction, Variables and Data Types
- 1.1 History
- 1.2 Features
- 1.3 Setting up path
- 1.4 Installation and Working with Python/Perl
- 1.5 Basic Syntax
- 1.6 Understanding Python variables
- 1.7 Numeric data types
- 1.8 Using string data type and string operations
- 1.9 Basic Operators
- 1.10 Understanding coding blocks
- 1.11 Defining list and list slicing
- 1.12 Other Data Types (Tuples, List, Dictionary -Python, Arrays, Associative Arrays)

UNIT 2: Control Structures
- 2.1 Conditional blocks using if
- 2.2 else and elif
- 2.3 For loops and iterations
- 2.4 while loops
- 2.5 Loop manipulation using continue, break and pass
- 2.6 Programming using conditional and loops block

UNIT 3: Functions, Modules and Packages
- 3.1 Organizing codes using functions
- 3.2 Organizing projects into modules
- 3.3 Importing own module as well as external modules
- 3.4 Understanding Packages

UNIT 4: File I/O, Text Processing, Regular Expressions
- 4.1 Understanding read functions
- 4.2 Understanding write functions
- 4.3 Programming using file operations
- 4.4 Powerful pattern matching and searching
- 4.5 Power of pattern searching using regex

UNIT 5: Frameworks
- 5.1 Overview of Django
- 5.2 Django Design Philosophy
- 5.3 Creating a simple Django Project
- 5.4 Django App life cycle

REFERENCES
1. Taming Python by Programming, Jeeva Jose, Khanna Publishing House
2. Starting Out with Python, Tony Gaddis, Pearson
3. Core Python Programming, Wesley J. Chun, Prentice Hall
4. Python Programming: Using Problem Solving Approach, Reema Thareja, Oxford University

5. Introduction to Computation and Programming Using Python. John V. Guttag, MIT Press.
6. Beginning Python using Python 2.6 and Python 3, James Payne, Wrox publishing
7. Practical Programming: An Introduction to Computer Science using Python3, Paul Gries, The Pragmatic Bookshelf

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SEMESTER SCHEME-2020-21

CYBER FORENSICS

Course Code	CB 50032
Course Title	Cyber Forensics
Number of Credits	4 (L: 4, T: 0, P: 0)
Prerequisites	-
Course Category	PE

COURSE LEARNING OBJECTIVES

To cover the concepts of advanced cyber forensics like operating system forensic, network forensic and mobile forensic. It enables the students to gain in-depth knowledge in the field of Advanced Cyber forensics.

COURSE OUTCOMES

After Learning the Course, the Students Should be able to
- Understand and Analyze the Forensics in PC and in Network
- Analyze the Forensics after the Attack
- Report and Document the Attack
- learn investigation tools and techniques, analysis of data to identify evidence, Technical Aspects & Legal Aspects

COURSE CONTENT

UNIT 1: Introduction to Cyber Forensics
　　1.1　　What is Cyber Forensics?
　　1.2　　Forensics Investigation Process
　　1.3　　Digital Evidence
　　1.4　　Brief about Cybercrimes
　　1.5　　Case studies
　　1.6　　Challenges in Cybercrimes

UNIT 2: Windows Forensics
　　2.1.　Digital Evidence in Windows
　　2.2.　Volatile Evidence Artifacts
　　2.3.　Non-volatile Artifacts
　　2.4.　File System
　　2.5.　Time line Analysis

UNIT 3: Linux Forensics
　　3.1.　Popular Linux Distributions
　　3.2.　File System
　　3.3.　Forensic Process for Linux Systems & Artifacts
　　3.4.　Linux Distributions Used for Forensic Analysis
　　3.5.　Case studies

UNIT 4: Anti-forensics Practices
　　4.1　Data Wiping and Shredding
　　4.2　Trail Obfuscation
　　4.3　Data hiding & Steganography
　　4.4　Anti-Forensics Detection Techniques
　　4.5　Case studies

UNIT 5: Network Forensics
　　5.1　The OSI Model
　　5.2　Forensic Footprint
　　5.3　Seizure of Networking Devices
　　5.4　Network Forensic Artifacts

UNIT 6: Mobile Forensics
　　6.1　Acquisition Protocol
　　6.2　Rooting & Debug Bridging in android
　　6.3　Manual Extraction

6.4 Physical Acquisition
6.5 Chip-Off and Micro-read

UNIT 7: Malware Analysis
7.1 Static Analysis
7.2 Dynamic Analysis
7.3 Tools
7.4 Challenges

REFERENCES

1. Practical Cyber Forensics An Incident-Based Approach to Forensic Investigations, Niranjan Reddy, APRESS

2. CYBER FORENSICS, A Field Manual for Collecting, Examining, and Preserving Evidence of Computer Crimes, 2nd Edition, Albert J. Marcella, Jr. Doug Menendez, Auerbach Publications.

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CLOUD COMPUTING TOOLS

Course Code	CB 50041
Course Title	Cloud Computing Tools
Number of Credits	3 (L: 3, T: 0, P: 0)
Prerequisites	CB 3005, CB3007
Course Category	PE

COURSE LEARNING OBJECTIVES

This course gives students an insight into the basics of cloud computing along with virtualization. It will provide the students understanding about AWS, network setup using VPC, Hosting website, Microsoft AZURE.

COURSE OUTCOMES

After completing the course, the students will understand
- Basics of cloud and its components
- AWS and its features
- Network setup using VPC
- Hosting website with database
- Case study of Microsoft AZURE and GCP

COURSE CONTENT

As a part of the lab, project work is included.

UNIT 1: Achieving agility with EC2
1.1.   What is Cloud & Its Components
1.2.   Introduction to AWS features-IAAS
1.3.   Cryptography & SSH Login with key pair (Public / Private)
1.4.   Recognize AWS Global Infrastructure

UNIT 2 : Provisioning resources & store data in cloud
2.1.   Basics of Linux commands
2.2.   Amazon Simple Storage services (S3) on Cloud
2.3.   Amazon Elastic Block Store: Volume & Snapshots
2.4.   Amazon Cloud Watch service for EC2 instance(s)

UNIT 3: Network Setup in AWS using VPC [Virtual Private Cloud]
3.1.   Create own network with Subnets mask and Gateway
3.2.   Bridging EC2 instances to your internal network with a VPN
3.3.   Launching EC2 with our VPC
3.4.   EC2 Instance Management tool for monitoring: CloudWatch

UNIT 4: Hosting website and test with database
4.1.   Prepare machines for configure LAMP [Linux, Apache, MySQL, Php] for hosting website on EC2 for Database you may use RDS
4.2.   Tune the Apache and MySQL for heavy load on website

UNIT 5: Other Cloud Computing Tools
4.3.   Microsoft AZURE
4.4.   Google Cloud Platform (GCP)

REFERENCES
1. Amazon Web Services in Action, 2nd Edition
2. Learning Amazon Web Services (AWS): A Hands-On Guide to the Fundamentals of AWS Cloud
3. Amazon Web Services for Dummies
4. Cloud Computing Principle and Paradigms. By Rajkumar Buyya and James Broberg.
5. Cloud Computing a Hands-on Approach. By Arshdeep Bahga and Vijay K Madiseti.
6. AWS Certified Advanced Networking Official Study Guide: Specialty Exam 1st Edition

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Cloud computing and BIG Data (V Semester)   Prepared: 2021-22

BIG DATA & CLOUD COMPUTING: SECURITY & PRIVACY

Course Code	CB 50042
Course Title	Big Data & Cloud Computing: Security & Privacy
Number of Credits	3 (L: 3, T: 0, P: 0)
Pre-requisites	CB 3005 Introduction to Cloud Computing, CB 4002 Introduction to Big Data
Course Category	PE

COURSE LEARNING OBJECTIVES

The basic purpose of this course is to understand the concepts of security and privacy of big data and cloud computing. Students will also learn Infrastructure security, privacy attack, privacy technologies and different encryption schemes.

COURSE OUTCOMES

On completion of this course the learners will be able to go through the concepts of security and privacy of big data and cloud computing. Also understand Hadoop and cloud security, privacy-preserving analysis for big data using cryptographic tools.

UNIT 1:
- 1.1.   Infrastructure Security
  - 1.1.1   The Network Level
  - 1.1.2   The Host Level
  - 1.1.3   The Application Level
- 1.2.   Aspects of Data Security
- 1.3.   Data Security Mitigation
- 1.4.   Provider Data and Its Security

UNIT 2:
- 2.1 Security management
  - 2.1.1 Security Management Standards
  - 2.1.2 Security Management in the Cloud
- 2.2   Availability Management
  - 2.2.1   SaaS
  - 2.2.2   PaaS
  - 2.2.3   IaaS
- 2.3   Access Control
- 2.4   Security Vulnerability, Patch and Configuration Management
- 2.5   Hadoop Security
- 2.6   Cloud Security
- 2.7   Monitoring and Auditing
- 2.8   Key Management
- 2.9   Anonymization

UNIT 3:
- 3.1   What is Privacy?
- 3.2   What is The Data Life Cycle?
- 3.3   What are the key Privacy Concerns in the Cloud?
- 3.4   Who is Responsible for Protecting Privacy?
- 3.5   Changes to Privacy risk Management and Compliance in Relation to Cloud Computing
- 3.6   Legal and Regulatory Implications

UNIT 4:
- 4.1   Privacy Attacks
  - 4.1.1   Tabular Data Attack
  - 4.1.2   Graph Data Attack
  - 4.1.3   Location Privacy Attack
  - 4.1.4   Attacks for Other Applications
- 4.2   Privacy Technologies
  - 4.2.1   Encryption
  - 4.2.2   Anonymization
  - 4.2.3   Differential Privacy
  - 4.2.4   Other Technologies

4.3   Privacy Metrics
- 4.3.1   Uncertainty
- 4.3.2   Error/Accuracy
- 4.3.3   Indistinguishability

UNIT 5:

5.1   Privacy-preserving data Analysis
- 5.1.1   Security Model privacy-preserving data analysis

5.2   Encryption Schemes with special properties
- 5.2.1   Deterministic encryption and keyword search
- 5.2.2   Order Preserving encryption and range query
- 5.2.3   Scalar-product-preserving encryption and nearest neighbor query
- 5.2.4   Searchable symmetric encryption

5.3   Schemes based on secure computation
- 5.3.1   Secure computation
- 5.3.2   Scalability of secure computation
- 5.3.3   Secure computation on top of ORAM

REFERENCES

1. Cloud Security & Privacy, Tim Mather, Subra Kumarswamy, Shahed Latif, Wiley India Limited
2. Security and Privacy for Big Data, Cloud Computing and Applications, Wei Ren, Lizhe Wang, Kim-Kwang, Raymond Choo, Fatos Xhafa

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SCRIPTING LANGUAGE (Python) LAB

Course Code	CB 50051 (Same as CI 50051)
Course Title	Scripting Language (Python) Lab
Number of Credits	2 (L: 0, T: 0, P: 4)
Prerequisites	CB 50031 Scripting Language (Python)
Course Category	PE

COURSE OBJECTIVES

This Lab course is intended to practice whatever is taught in theory class of 'Scripting Languages' and become proficient in scripting. Computer programming is all about regular practice. Students should work on solved and unsolved problems listed in the text books, and the problems given by the teacher. Some of the topics that should necessary be covered in lab are listed below.

COURSE OUTCOMES

At the end of the course student will be able to build program with a scripting language and will be able to learn any other scripting language on their own.

COURSE CONTENTS

S. No.	Topics for Practice
1	Practice basic coding syntax
2	Write and execute scripts based on data types
3	Write and execute Python scripts with conditionals and loops
4	Write and execute Scripts based on Functions and Modules
5	File Processing scripts
6	Write and execute Regular Expressions
7	Write and execute SQL Queries

This is a skill course. More student practice and try to find solution on their own, better it will be.

REFERENCES
1. Taming Python by Programming, Jeeva Jose, Khanna Publishing House
2. Starting Out with Python, Tony Gaddis, Pearson
3. Core Python Programming, Wesley J. Chun, Prentice Hall
4. Python Programming: Using Problem Solving Approach, Reema Thareja, Oxford University Press
5. Introduction to Computation and Programming Using Python. John V. Guttag, MIT Press.
6. Beginning Python using Python 2.6 and Python 3, James Payne, Wrox publishing
7. Practical Programming: An Introduction to Computer Science using Python3, Paul Gries, The Pragmatic Bookshelf

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CYBER FORENSICS LAB

Course Code	CB 50052 (Same as CI 50052)
Course Title	Cyber Forensics LAB
Number of Credits	2 (L: 0, T: 0, P: 4)
Prerequisites	CB 50032 Cyber Forensics
Course Category	PE

COURSE LEARNING OBJECTIVES

To correctly define and cite appropriate instances for the application of Cyber forensics Correctly collect and analyze Cyber forensic evidence. Identify the essential and up-to-date concepts, algorithms, protocols, tools, and methodology of Cyber Forensics.

COURSE OUTCOMES

At the end of the course the student will be able to implement windows forensic tools and Linux forensic tools like FTK image tool, Autopsy tool, Sleuth Kit. Student will also be able to implement some Anti forensic tools and mobile forensic tools.

COURSE CONTENT

Windows forensics tools	1.	Create evidence image using FTK Imager tool
	2.	Using Autopsy Tool to analyze the evidence image and generate report
	3.	Recover deleted files from a Windows system using Recuva recovery tool
	4.	Use Regshot tool to take two Registry snapshots and then compare them
Linux forensics tools	5.	Using linux fdisk command for Partitions Listing
	6.	Create a memory dump image of Linux system using LiME tool
	7.	Raw Image Analysis with 'The Sleuth Kit' tool
Anti-forensics tools	8.	Encrypt some files on your system using VeraCrypt utility
	9.	Hide some data of your choice into a picture using SilentEye utility
	10.	Use Stegdetect tool (Linux) to analyze an image for steganographic content
Mobile Forensics	11.	Image Extraction of an Android Device
	12.	Android Malware Analysis

REFERENCES

1   Case studies of book "Practical Cyber Forensics An Incident-Based Approach to Forensic Investigations" by Niranjan Reddy, APRESS
2   CYBER FORENSICS, A Field Manual for Collecting, Examining, and Preserving Evidence of Computer Crimes, 2nd Edition, Albert J. Marcella, Jr. Doug Menendez, Auerbach Publications.

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CLOUD COMPUTING TOOLS LAB

Course Code	CB 50061
Course Title	Cloud Computing Tools Lab
Number of Credits	2 (L: 0, T: 0, P: 4)
Prerequisites	CB 50041 Cloud Computing Tools
Course Category	PE

COURSE LEARNING OBJECTIVES

This Lab course is intended to practice whatever is taught in theory class of 'CLOUD COMPUTING TOOLS'. Student will able to create AWS instances, cloud watch, EBS Volume, ACW service and other instances available in AWS.

COURSE OUTCOMES

At the end of the course student will be able to implement AWS account and create roles and responsibility of users/admin using IAM. Student will able to create instances of AWS, Cloud watch, EBS volume etc. Student will be able to create own network and can configure file server on EC2.

COURSE CONTENTS

S. No.	Topics for Practice
1	Create AWS account & Navigate to the AWS Management Console
2	Create roles for user / admin using IAM (Identity Access Management)
3	Create instances in cloud & access using keys in EC2
4	Create AWS Instance from scratch and access using Putty / Linux CLI mode
5	Create a Instances from with AWS features like: Cloud Watch, EBS Volume
6	How to use Amazon Simple Storage services (S3)
7	How to use Amazon Cloud Watch service for EC2 instance(s)
8	Create own network with Subnets mask and Gateway
9	Configure File Server on EC2
10	Hosting website and test with database

This is a skill course. More student practice and try to find solution on their own, better it will be.

REFERENCES
1. Amazon Web Services in Action, 2nd Edition
2. Learning Amazon Web Services (AWS): A Hands-On Guide to the Fundamentals of AWS Cloud
3. Amazon Web Services For Dummies
4. Cloud Computing Principle and Paradigms. By Rajkumar Buyya and James Broberg.
5. Cloud Computing a Hands-on Approach. By Arshdeep Bahga and Vijay K Madiseti.
6. AWS Certified Advanced Networking Official Study Guide: Specialty Exam 1st Edition

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BIG DATA & CLOUD COMPUTING: SECURITY & PRIVACY LAB

Course Code	CB 50062
Course Title	Big Data & Cloud Computing: Security & Privacy Lab
Number of Credits	2 (L: 0, T: 0, P: 4)
Prerequisites	CB 50042 Big Data & Cloud Computing: Security & Privacy
Course Category	PE

COURSE LEARNING OBJECTIVES

This Lab course is intended to understand the concepts of security and privacy of big data and cloud computing. The main objective is to learn and implement basic privacy, security and encryption programs.

COURSE OUTCOMES

Get the skill to provide privacy and security services to real systems. Get the knowledge to solve security issues in day-to-day life. Also learn the working principle of privacy, security and encryption.

COURSE CONTENTS

S. No.	Topics for Practice
1	Steps for cloud service customers to evaluate and manage the security and privacy of their use of cloud services.
2	Case Study of any PaaS.
3	Implement differential privacy
4	Construct system to search, filter for encrypted data
5	Implement Deterministic encryption and keyword search
6	Implement Searchable symmetric encryption
7	Implement Homomorphic Encryption

This is a skill course. More student practice and try to find solution on their own, better it will be.

REFERENCES
1   Security for Cloud Computing Ten Steps to ensure Success Version 3.0
2   Big Data Security and Privacy Handbook.
3   Security and Privacy for Big Data, Cloud Computing and Applications, Edited by: Wei Ren, Lizhe Wang, Kim Kwang Raymond Choo and Fatos Xhafa

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GOVERNMENT OF RAJASTHAN
BOARD OF TECHNICAL EDUCATION RAJASTHAN JODHPUR

SEMESTER SCHEME-2020-21

VI SEMESTER
(SESSION 2021-2022 & ONWARDS)

ENTREPRENEURSHIP AND START-UPS

Course Code	CB 6111 (Same in All Branches of Engg.)
Course Title	Entrepreneurship and Start-ups
Number of Credits	4 (L:3, T:1, P:0)
Prerequisites (Course code)	-
Course Category	HS

COURSE LEARNING OBJECTIVES

1. Acquiring Entrepreneurial spirit and resourcefulness.
2. Familiarization with various uses of human resource for earning dignified means of living.
3. Understanding the concept and process of entrepreneurship-its contribution and role in the growth and development of individual and the nation.
4. Acquiring entrepreneurial quality, competency, and motivation.
5. Learning the process and skills of creation and management of entrepreneurial venture.

LEARNING OUTCOME

Upon completion of the course, these students will be able to demonstrate knowledge of the following topics:
1. Understanding the dynamic role of entrepreneurship and small businesses
2. Organizing and Managing a Small Business
3. Financial Planning and Control
4. Forms of Ownership for Small Business
5. Strategic Marketing Planning
6. New Productor Service Development
7. Business Plan Creation

COURSE CONTENTS

1. **INTRODUCTION TO ENTREPRENEURSHIP AND START–UPS**
    1.1. Definitions, Traits of an entrepreneur, Intrapreneurship, Motivation
    1.2. Types of Business Structures,
    1.3. Similarities / differences between entrepreneurs and managers.

2. **BUSINESS IDEAS AND THEIR IMPLEMENTATION**
    2.1. Discovering ideas and visualizing the business
    2.2. Activity map
    2.3. Business Plan

3. **IDEA TO START-UP**
    3.1. Market Analysis– Identifying the target market,
    3.2. Competition evaluation and Strategy Development,
    3.3. Marketing and accounting,
    3.4. Risk analysis

4. **MANAGEMENT**
    4.1. Company's Organization Structure,
    4.2. Recruitment and management of talent.
    4.3. Financial organization and management

5. **FINANCING AND PROTECTION OF IDEAS**
    5.1. Financing methods available for start-ups in India
    5.2. Communication of Ideas to potential investors– Investor Pitch
    5.3. Patenting and Licenses

6. **EXIT STRATEGIES FOR ENTREPRENEURS, BANKRUPTCY, AND SUCCESSION AND HARVESTING STRATEGY**

SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1.	The Startup Owner's Manual: The Step by-Step Guide for Building a Great Company	Steve Blank and Bob Dorf	K & S Ranch ISBN–978-0984999392
2.	The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses	Eric Ries	Penguin UK ISBN–978-0670921607
3.	Demand: Creating What People Love Before They Know They Want It	Adrian J. Slywotzky with Karl Weber	Headline Book Publishing ISBN–978-0755388974
4.	The Innovator's Dilemma: The Revolutionary Book That Will Change the Way You Do Business	Clayton M. Chris Tensen	Harvard business ISBN:978-142219602

SUGGESTED SOFTWARE/LEARNING WEBSITES
1.   https://www.fundable.com/learn/resources/guides/startup
2.   https://corporatefinanceinstitute.com/resources/knowledge/finance/corporatehstructure/
3.   https://www.finder.com/small-business-finance-tips
4.   https://www.profitbooks.net/funding-options-to-raise-startup-capital-for-your-business/

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PROJECT MANAGEMENT

Course Code	CB 62001(Same in All Branches of Engg.)
Course Title	Project Management
Number of Credits	3 (L:3,T:0,P:0)
Prerequisites	-
Course Category	OE

COURSE LEARNING OBJECTIVES
- To develop the idea of project plan, from defining and confirming the project goals and objectives, identifying tasks and how goals will be achieved.
- To develop an understanding of key project management skills and strategies.

COURSE OUTCOMES

At the end of the course, the student will be able to:

CO1	Understand the importance of projects and its phases.
CO2	Analyze projects from marketing, operational and financial perspectives.
CO3	Evaluate projects based on discount and non-discount methods.
CO4	Develop network diagrams for planning and execution of a given project.
CO5	Apply crashing procedures for time and cost optimization.

COURSE CONTENTS

1. CONCEPT OF A PROJECT
- 1.1. Classification of projects
- 1.2. Importance of project management
- 1.3. The project Life cycle
- 1.4. Establishing project priorities (scope-cost-time)
- 1.5. Project priority matrix
- 1.6. Work break down structure

2. CAPITAL BUDGETING PROCESS
- 2.1. Planning -Analysis-Selection-Financing-Implementation-Review.
- 2.2. Generation and screening of project ideas
- 2.3. Market and demand analysis
- 2.4. Demand forecasting techniques.
- 2.5. Market planning and marketing research process
- 2.6. Technical analysis

3. FINANCIAL ESTIMATES AND PROJECTIONS
- 3.1. Cost of projects
- 3.2. Means of financing
- 3.3. Estimates of sales and production-cost of production
- 3.4. Working capital requirement and its financing
- 3.5. Profitability project, cash flow statement and balance sheet.
- 3.6. Breakeven analysis

4. BASIC TECHNIQUES IN CAPITAL BUDGETING
- 4.1. Non discounting and discounting methods
- 4.2. pay-back period
- 4.3. Accounting rate of return
- 4.4. Net present value
- 4.5. Benefit cost ratio
- 4.6. Internal rate of return
- 4.7. Project risk
- 4.8. Social cost benefit analysis and economic rate of return.
- 4.9. Non-financial justification of projects

5. PROJECT ADMINISTRATION
- 5.1. Progress payments,
- 5.2. Expenditure planning,
- 5.3. Project scheduling and network planning

5.4.   Use of Critical Path Method (CPM),
5.5.   Schedule of payments and physical progress
5.6.   time-cost trade off
5.7.   Concepts and uses of PERT
5.8.   Cost as a function of time
5.9.   Project Evaluation and Review Techniques
5.10.   Cost mechanisms
5.11.   Determination of least cost duration.
5.12.   Post project evaluation
5.13.   Introduction to various Project management software.

REFERENCES
1. Project planning, analysis, selection, implementation and review – Prasanna Chandra–Tata McGraw Hill
2. Project Management– the Managerial Process– Clifford F. Gray & Erik W. Larson- McGraw Hill
3. Project management- David I Cleland- McGraw Hill International Edition, 1999
4. Project Management– Gopala Krishnan– Mc Millan India Ltd.
5. Project Management- Harry – Maylor– Pearson Publication

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RENEWABLE ENERGY TECHNOLOGIES

Course Code	CB 62002 (Same in All Branches of Engg.)
Course Title	Renewable Energy Technologies
Number of Credits	3 (L:3, T:0, P:0)
Prerequisites	-
Course Category	OE

COURSE LEARNING OBJECTIVES

- To understand present and future scenario of world energy use.
- To understand fundamentals of solar energy systems.
- To understand basics of wind energy.
- To understand bio energy and its usage in different ways.
- To identify different available non-conventional energy sources.

COURSE OUTCOMES

At the end of the course, the student will be able to:

CO1	Understand present and future energy scenario of the world.
CO2	Understand various methods of solar energy harvesting.
CO3	Identify various wind energy systems.
CO4	Evaluate appropriate methods for Bio energy generations from various Bio wastes.
CO5	Identify suitable energy sources for a location.

COURSE CONTENTS

1. **INTRODUCTION**
    1.1. World Energy Use
    1.2. Reserves of Energy Resources
    1.3. Environmental Aspects OF Energy Utilisation
    1.4. Renewable Energy Scenario in India and around the World
    1.5. Potentials; Achievements/ Applications
    1.6. Economics of renewable energy systems

2. **SOLAR ENERGY**
    2.1. Solar Radiation
    2.2. Measurements of Solar Radiation
    2.3. Flat Plate and Concentrating Collectors
    2.4. Solar direct Thermal Applications
    2.5. Solar thermal Power Generation
    2.6. Fundamentals of Solar Photo Voltaic Conversion
    2.7. Solar Cells
    2.8. Solar PV Power Generation
    2.9. Solar PV Applications

3. **WIND ENERGY**
    3.1. Wind Data and Energy Estimation
    3.2. Types of Wind Energy Systems
    3.3. Performance; Site Selection
    3.4. Details of Wind Turbine Generator
    3.5. Safety and Environmental Aspects

4. **BIO-ENERGY**
    4.1. Bio mass direct combustion
    4.2. Bio mass gasifiers
    4.3. Bio gas plants
    4.4. Digesters
    4.5. Ethanol production
    4.6. Bio diesel
    4.7. Cogeneration
    4.8. Bio mass Applications

5. OTHER RENEWABLE ENERGY SOURCES

     5.1.   Tidal energy
     5.2.   Wave Energy
     5.3.   Open and Closed OTEC Cycles
     5.4.   Small Hydro Geothermal Energy
     5.5.   Hydrogen and Storage
     5.6.   Fuel Cell Systems
     5.7.   Hybrid Systems

REFERENCES

1. Non-Conventional Energy Sources, Rai. G. D., Khanna Publishers, New Delhi, 2011.
2. Renewable Energy Sources, Twidell, J.W. & Weir, A., EFN Spon Ltd., UK, 2006.
3. Solar Energy, Sukhatme. S. P., Tata Mc Graw Hill Publishing Company Ltd., New Delhi, 1997.
4. Renewable Energy, Power for a Sustainable Future, Godfrey Boyle, Oxford University Press, U.K., 1996.
5. Fundamental of Renewable Energy Sources, G N Tiwari and M K Ghoshal, Narosa, New Delhi, 2007.
6. Renewable Energy and Environment A Policy Analysis for India, NH Ravindranath, U K Rao, B Natarajan, P Monga, Tata McGraw Hill.
7. Energy and The Environment, R A Ristinen and J J Kraushaar, second edition, John Willey & Sons, New York, 2006.
8. Renewable Energy Resources, J W T widell and A D Weir, ELBS, 2006.

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PRODUCT DESIGN

Course Code	CB 63001(Same in All Branches of Engg.)
Course Title	Product Design
Number of Credits	3 (L:3, T:0, P:0)
Prerequisites	-
Course Category	OE

COURSE LEARNING OBJECTIVES

• To acquire the basic concepts of product design and development process
• To understand the engineering and scientific process in executing a design from concept to finished product
• To study the key reasons for design or redesign.

COURSE OUTCOMES

At the end of the course, the student will be able to:

CO1	Understand the basic concepts of product design and development process.
CO2	Illustrate the methods to define the customer needs.
CO3	Describe an engineering design and development process.
CO4	Understand the intuitive and advanced methods used to develop and evaluate a concept.
CO5	Apply modelling and embodiment principles in product design and development process.

COURSE CONTENTS

1. **DEFINITION OF A PRODUCT**
   1.1. Types of products
   1.2. Levels of product
   1.3. Product-market mix
   1.4. New product development (NPD) process
   1.5. Idea generation methods
   1.6. Creativity
      1.6.1. Creative attitude
      1.6.2. Creative design process
   1.7. Morpho logical analysis
   1.8. Analysis of inter-connected decision areas
   1.9. Brain storming

2. **PRODUCT LIFECYCLE**
   2.1. The challenges of Product development
   2.2. Product analysis
   2.3. Product characteristics
   2.4. Economic considerations
   2.5. Production and Marketing aspects
   2.6. Characteristics of successful Product development
   2.7. Phases of a generic product development process
   2.8. Customer need identification
   2.9. Product development practices and industry-product strategies

3. **PRODUCT DESIGN**
   3.1. Design by evolution
   3.2. Design by innovation
   3.3. Design by imitation
   3.4. Factors affecting product design
   3.5. Standards of performance and environmental factors
   3.6. Decision making and iteration
   3.7. Morphology of design (different phases)
   3.8. Role of aesthetics in design

4. **INTRODUCTION TO OPTIMIZATION IN DESIGN**
   4.1. Economic factors in design
   4.2. Design for safety and reliability

4.3.   Role of computers in design
4.4.   Modeling and Simulation
4.5.   The role of models in engineering design
4.6.   Mathematical modeling
4.7.   Similitude and scale models
4.8.   Concurrent design
4.9.   Six sigma and design for six sigma
4.10.   Introduction to optimization in design
4.11.   Economic factors and financial feasibility in design
4.12.   Design for manufacturing
4.13.   Rapid Proto typing (RP)
4.14.   Application of RP in product design
4.15.   Product Development versus Design

5. **DESIGN OF SIMPLE PRODUCTS DEALING WITH VARIOUS ASPECTS OF PRODUCT DEVELOPMENT**
5.1.   Design Starting from need till the manufacture of the product

REFERENCES
1. Product Design and Development, Karl T. Ulrichand Steven D. Eppinger, Tata McGraw–Hill edition.
2. Engineering Design– George E. Dieter.
3. An Introduction to Engineering Design methods Vijay Gupta.
4. Merie Crawford: New Product management, McGraw-Hill Irwin.
5. Chitale A K and Gupta R C, "Product Design and Manufacturing", Prentice Hall of India, 2005.
6. Kevin Otto and Kristin Wood, Product Design, Techniques in Reverse Engineering and New Product Development, Pears on education.

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DISASTER MANAGEMENT

Course Code	CB 63002(Same in All Branches of Engg.)
Course Title	Disaster Management
Number of Credits	3 (L: 3, T: 0, P :0)
Prerequisites	-
Course Category	OE

COURSE LEARNING OBJECTIVES

Following are the objectives of this course:
• To learn about various types of natural and man-made disasters.
• To know pre and post-disaster management for some of the disasters.
• To know about various information and organizations in disaster management in India.
• To get exposed to technological tools and their role in disaster management.

COURSE OUTCOMES

1.1. After competing this course, student will be:
1.2. Acquainted with basic information on various types of disasters
1.3. Knowing the precautions and awareness regarding various disasters
1.4. Decide first action to be taken under various disasters
1.5. Familiarized with organization in India which are dealing with disasters
1.6. Able to select IT tools to help in disaster management

COURSE CONTENTS

1. **UNDERSTANDING DISASTER**
    1.1. Understanding the Concepts and definitions of Disaster
    1.2. Hazard
    1.3. Vulnerability
    1.4. Risk
    1.5. Capacity–Disaster and Development
    1.6. Disaster management

2. **TYPES, TRENDS, CAUSES, CONSEQUENCES AND CONTROL OF DISASTERS**
    2.1. Geological Disasters (earth quakes, land-slides, tsunami, mining);
    2.2. Hydro-Meteorological Disasters (floods, cyclones, lightning, thunder-storms, hailstorms, avalanches, droughts, cold and heat waves)
    2.3. Biological Disasters (epidemics, pest attacks, forest fire)
    2.4. Technological Disasters (chemical, industrial, radiological, nuclear)
    2.5. Manmade Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters)
    2.6. Global Disaster Trends
    2.7. Emerging Risks of Disasters
    2.8. Climate Change and Urban Disasters

3. **DISASTER MANAGEMENT CYCLE AND FRAME WORK**
    3.1. Disaster Management Cycle
    3.2. Paradigm Shift in Disaster Management
    3.3. Pre-Disaster
    3.4. Risk Assessment and Analysis
    3.5. Risk Mapping
    3.6. Zonation and Microzonation
    3.7. Prevention and Mitigation of Disasters
    3.8. Early Warning System
        3.8.1. Preparedness
        3.8.2. Capacity Development
        3.8.3. Awareness
    3.9. During Disaster
        3.9.1. Evacuation
        3.9.2. Disaster Communication
        3.9.3. Search and Rescue
        3.9.4. Emergency Operation Centre

          3.9.5.   Incident Comm and System
          3.9.6.   Relief and Rehabilitation
    3.10.   Post-disaster
          3.10.1. Damage and Needs Assessment,
          3.10.2. Restoration of Critical Infra structure
          3.10.3. Early Recovery Reconstruction and Redevelopment
          3.10.4. IDNDR, Yokohama Strategy, Hyogo Frame-work of Action

4.   DISASTER MANAGEMENT IN INDIA
    4.1.   Disaster Profile of India
    4.2.   Mega Disasters of India and Lessons Learnt
    4.3.   Disaster Management Act 2005
    4.4.   Institutional and Financial Mechanism
    4.5.   National Policy on Disaster Management
    4.6.   National Guidelines and Plans on Disaster Management
    4.7.   Role of Government (local, state and national)
    4.8.   Non-Government and Inter Governmental Agencies

5.   APPLICATIONS OF SCIENCE AND TECHNOLOGY FOR DISASTER MANAGEMENT
    5.1.   Geo informatics in Disaster Management (RS, GIS, GPS and RS)
    5.2.   Disaster Communication System (Early Warning and Its Dissemination)
    5.3.   Land Use Planning and Development Regulations
    5.4.   Disaster Safe Designs and Constructions
    5.5.   Structural and Non-Structural Mitigation of Disasters
    5.6.   S & T Institutions for Disaster Management in India

REFERENCES
1. Publications of National Disaster Management Authority (NDMA) on Various Templates and Guide lines for Disaster Management
2. Bhandani, R. K., An over view on natural & man-made disasters and their reduction, CSIR, New Delhi
3. Srivastava, H. N., and Gupta G. D., Management of Natural Disasters in developing countries, Daya Publishers, Delhi
4. Alexander, David, Natural Disasters, Kluwer Academic London
5. Ghosh, G.K., Disaster Management, APH Publishing Corporation
6. Murthy, D. B. N., Disaster Management: Text & Case Studies, Deep & Deep Pvt. Ltd.

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INDIAN CONSTITUTION

Course Code	CB 6333(Same in All Branches of Engg.)
Course Title	Indian Constitution
Number of Credits	0 (L:2, T:0; P:0)
Prerequisites (Coursecode)	-
Course Category	AU

COURSE CONTENT

1. **THE CONSTITUTION**
   - 1.1. Introduction
   - 1.2. The History of the Making of the Indian Constitution
   - 1.3. Preamble and the Basic Structure, and its interpretation
   - 1.4. Fundamental Rights and Duties and their interpretation
   - 1.5. State Policy Principles

2. **UNION GOVERNMENT**
   - 2.1. Structure of the Indian Union
   - 2.2. President– Role and Power
   - 2.3. Prime Minister and Council of Ministers
   - 2.4. Lok Sabha and Rajya Sabha

3. **STATE GOVERNMENT**
   - 3.1. Governor– Role and Power
   - 3.2. Chief Minister and Council of Ministers
   - 3.3. State Secretariat

4. **LOCAL ADMINISTRATION**
   - 4.1. District Administration
   - 4.2. Municipal Corporation
   - 4.3. Zila Panchayat

5. **ELECTION COMMISSION**
   - 5.1. Role and Functioning
   - 5.2. Chief Election Commissioner
   - 5.3. State Election Commission

SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1.	Ethics and Politics of the Indian Constitution	Rajeev Bhargava	Oxford University Press, New Delhi, 2008
2.	The Constitution of India	B.L. Fadia	Sahitya Bhawan; New edition (2017)
3.	Introduction to the Constitution of India	D D Basu	Lexis Nexis; Twenty-Third 2018 edition

SUGGESTED SOFTWARE / LEARNING WEBSITES
1. https://www.constitution.org/cons/india/const.html
2. http://www.legislative.gov.in/constitution-of-india
3. https://www.sci.gov.in/constitution
4. https://www.toppr.com/guides/civics/the-indian-constitution/the-constitution-of-india/

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