GOVERNMENT OF RAJASTHAN
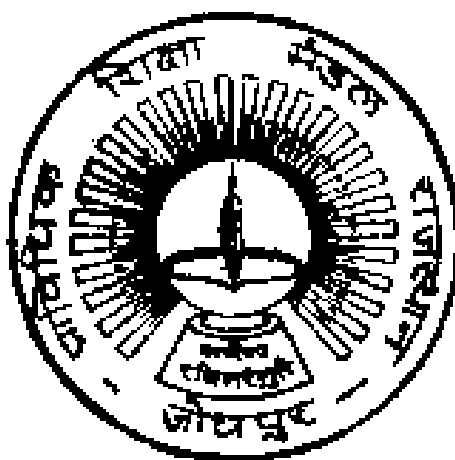## BOARD OF TECHNICAL EDUCATION RAJASTHAN JODHPUR

SEMESTER SCHEME-2020-21

(SESSION 2021-2022 & ONWARDS)

TEACHING AND EXAMINATION SCHEME AND SYLLABUS

INFORMATION TECHNOLOGY

(IT)

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Curriculum Development Cell
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-2020-21)
FOR DIPLOMA **III SEMESTER (INFORMATION TECHNOLOGY)(IT)**
SESSION 2021-2022 & 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	*IT 3001	Computer Programming	4	--	--	4	60	3	--	--	20	20	--	100	4
PC	IT 3002	ICT Resources	4	--	--	4	60	3	--	--	20	20	--	100	4
PC	*IT 3003	Data Structures	2	--	--	2	60	3	--	--	20	20	--	100	2
PC	IT 3004	Computer Architecture	3	1	--	4	60	3	--	--	20	20	--	100	4
PC	$IT 3005	Algorithms	3	1	--	4	60	3	--	--	20	20	--	100	4
PC	*IT 3006	Computer Programming Lab	--	--	4	4	--	--	40	3	--	--	60	100	2
PC	IT 3007	ICT Resources Lab	--	--	4	4	--	--	40	3	--	--	60	100	2
PC	*IT 3008	Data Structures Lab	--	--	2	2	--	--	40	3	--	--	60	100	1
SI	IT 3009	Summer Internship – I (4 weeks after II Sem.)	--	--	--	--	--	--	100	--	--	--	--	100	2
VS	+IT 3333	Anandam (Joy of Giving)	--	--	1	1	--	--	--	--	--	--	100	100	2
		Students Centered Activities	0	0	3	3	--	--	--	--	--	--	--	--	--
		Total	**16**	**2**	**14**	**32**	**300**	**--**	**220**	**--**	**100**	**100**	**280**	**1000**	**27**
												Grand Total:		**1000**	**27**

1.	L	: Lecture		5.	PR	: Marks for End Semester Exam for Practical
2.	T	: Tutorial		6.	CT	: Marks for class tests (Internal Assessment)
3.	P	: Practical		7.	TU/Assi	: Marks for tutorials/Assignment (Internal Assessment)
4.	TH	: Marks for End Semester Exam for Theory		8.	PR(S)	: Marks for practical and viva (Internal Assessment)

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

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

3. $IT 3005   is Same as CS 3005

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 (INFORMATION TECHNOLOGY)(IT)**
(SEMESTER SCHEME-2020-21)
SESSION 2021-2022 & 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	$IT 4001	Operating Systems	3	--	--	3	60	3	--	--	20	20	--	100	3
PC	**IT 4002	Introduction to DBMS	3	--	--	3	60	3	--	--	20	20	--	100	3
PC	*IT 4003	Computer Networks	2	--	--	2	60	3	--	--	20	20	--	100	2
PC	***IT 4004	SSAD/Software Engineering	3	--	--	3	60	3	--	--	20	20	--	100	3
PC	IT 4005	C++ Programming	2	--	--	2	60	3	--	--	20	20	--	100	2
PE	IT 4006	**Programme Elective-I** ***IT 40061- Information Security ^^IT 40062- Cyber Laws	3	1	--	4	60	3	---	---	20	20	--	100	4
PC	**IT 4007	Operating Systems Lab	--	--	2	2	--	--	40	3	--	--	60	100	1
PC	*IT 4008	Introduction to DBMS Lab	--	--	2	2	--	--	40	3	--	--	60	100	1
PC	**IT 4009	Computer Networks Lab	--	--	2	2	--	--	40	3	--	--	60	100	1
PC	IT 4010	C++ Programming Lab	--	--	2	2	--	--	40	3	--	--	60	100	1
PR	IT 4011	Minor Project	--	-	4	4	--	--	40	--	--	--	60	100	2
AU	+IT 4222	Essence of Indian Knowledge and Tradition	2	--	--	2	--	--	--	--	--	--	--	--	--
VS	+IT 4444	Anandam (Joy of Giving)	--	--	1	1	--	--	--	--	--	--	100	100	2
		Students Centered Activities	0	0	3	3	--	--	--	--	--	--	--	--	--
		Total	**18**	**1**	**16**	**35**	**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. +IT 4222 and +IT 4444 are same in all branches of Engineering

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

3. **IT 4002 , **IT 4007, **IT4008 and **IT 4009 are same as CI/CS 4002 , CI/CS 4007,CI/CS 4008 and CI/CS 4009 respectively

4. **IT 4003 is same as CB/CI/CS 4003

5. ***IT4004 and***IT 40061 are same as CS 4004 and CS 40061 respectively

6. ^^IT 40062 is same as CI 40062

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

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 (INFORMATION TECHNOLOGY)(IT)**
(SEMESTER SCHEME-2020-21)
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	*IT 5001	Introduction to e-Governance	2	1	--	3	60	3	--	--	20	20	--	100	3
PC	**IT 5002	Internet of Things	2	1	--	3	60	3	--	--	20	20	--	100	3
OE	+IT 5100	**Open Elective-I** +**IT 51001-** Economic Policies in India +**IT 51002-** Engineering Economics & Accountancy	3	--	--	3	60	3	--	--	20	20	--	100	3
PE	IT 5003	**Programme Elective – II** ****IT50031-** Data Sciences: Data Warehousing and Data Mining **IT50032-** Programming in Java	3	--	--	3	60	3	--	--	20	20	--	100	3
PE	IT 5004	**Programme Elective – III** ***IT50041-** Advance Computer Networks **IT50042-** Cloud Computing	3	--	--	3	60	3	--	--	20	20	--	100	3
PE	IT 5005	**Programme Elective – II Lab** ***IT50051-** Data Sciences: Data Warehousing and Data Mining Lab **IT 50052--** Programming in JavaLab	--	--	2	2	--	--	40	3	--	--	60	100	1
SI	IT 5006	Summer Internship – II(6 weeks after IV Sem)	--	--	--	--	--	--	100	--	--	--	--	100	3
PR	IT 5007	Major Project	--	--	2	2	--	--	--	--	--	--	--	--	--
VS	+IT 5555	Anandam (Joy of Giving)	--	--	1	1	--	--	--	--	--	--	100	100	2
		Students Centered Activities	0	0	3	3	--	--	--	--	--	--	--	--	--
		Total	**13**	**2**	**8**	**23**	**300**		**140**		**100**	**100**	**160**	**800**	**21**

Grand Total: **800** | **21**

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. +IT 51001, +IT 51002 and +IT 5555 are same in all branches of Engineering

2. *IT 5001, * IT 50041 and *IT 50051 are sma as CS 5001, CS 50041 and CS 50051 respectively

3. **IT 5002 and **IT50031 are sane as CS/CI 5002 and CS/CI50031 respectively

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

GOVERNMENT OF RAJASTHAN
BOARD OF TECHNICAL EDUCATION RAJASTHAN, JODHPUR
TEACHING AND EXAMINATION SCHEME
(SEMESTER SCHEME-2020-21)
FOR DIPLOMA **VI SEMESTER (INFORMATION TECHNOLOGY)(IT)**
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)		
HS	+IT 6111	Entrepreneurship and Start-ups	3	1	--	4	60	3	--	--	20	20	--	100	4
OE	+IT 6200	**Open Elective-II** +IT 62001- Project Management +IT 62002- Renewable Energy Technologies	3	--	--	3	60	3	--	--	20	20	--	100	3
OE	+IT 6300	**Open Elective-III** +IT 63001- Product Design +IT 63002- Disaster Management	3	--	--	3	60	3	--	--	20	20	--	100	3
AU	+IT 6333	Indian Constitution	2	--	--	2	--	--	--	--	--	--	--	--	--
PE	IT 6001	**Programme Elective IV** **IT60011-**.Dot Net Technology *IT60012- Software Testing	3	--	--	3	60	3	--	--	20	20	--	100	3
PE	IT 6002	**Programme Elective IV-Lab** **IT 60021-Dot** Net Technology *IT 60022- Software Testing Lab	--	--	2	2	--	--	40	--	--	--	60	100	1
PR	IT 6003	Major Project	--	--	6	6	--	--	40	--	--	--	60	100	4
SE	IT 6004	Seminar	1	--	--	1	--	--	--	--	--	--	100	100	1
VS	+IT 6666	Anandam (Joy of Giving)	--	--	1	1	--	--	--	--	--	--	100	100	2
		Students Centered Activities	0	0	3	3	--	--	--	--	--	--	--	--	--
		Total	15	1	12	28	240	--	80	--	80	80	320	800	21
												Grand Total:		800	21

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· +IT 6111, +IT 62001, +IT62002, +IT 63001, +IT63002, +IT 6333 and +IT 6666 are same in all branches of Engineering

2. *IT 60012, and *IT 60022 are same as CS 60012 and CS 60022respectively

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	:	IT 3001(Same as CB/CI/CS 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: i) Formulating a solution for a given problem as a well-defined sequence of actions, and ii) 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

REFERENCE BOOKS:
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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ICT RESOURCES

Course Code	:	IT 3002
Course Title	:	ICT Resources
Number of Credits	:	4 (L: 4; T: 0; P: 0)
Prerequisites	:	-
Course Category	:	PC

COURSE OBJECTIVES

The objective of this course is to introduce the concept of PC hardware and its utilities. Students are able to understand network concepts and networking administration in detailed. The ICT applications are very popular these days specially is E-governance, computer-based learning & EMIS.

COURSE OUTCOMES

Student should be able to install windows operating system. The focus of the course as mentioned above should be on example-based learning. The student must be familiar with working on tools such as compression utilities, file recovery and antivirus. Students must be able to use networking, networking devices and network administration to achieve desired communication.

COURSE CONTENTS

1. **PC Assembly & Operation**
    1.1.   Assembly & Disassembly of PC & its various parts
    1.2.   Booting and BIOS Setup
    1.3.   CMOS Setup & meaning of its various setting
2. **Configuration of PC**
    2.1.   Installation of Windows OS
    2.2.   Installation of S/W packages such as MS office etc.
    2.3.   Operation of printers & installation of printer driver
    2.4.   Backup & Restore operation
3. **Utilities**
    3.1.   Concept of Compression
    3.2.   Compression Utilities: winzip, pkzip, winrar
    3.3.   Defragmenting hard disk using defrag
    3.4.   Scandisk for checking disk spaces
    3.5.   Lost files & recovery
    3.6.   Formatting Hard disk
    3.7.   Antivirus packages
    3.8.   CD Writing Software, Nero etc.
4. **Networking Concepts**
    4.1.   Introduction
    4.2.   LAN, WAN, MAN
    4.3.   Network Topologies
    4.4.   Transmission media & method of communication
    4.5.   Cabling: Straight through cross over
    4.6.   Study of components: switches, bridges, routers, WI FI routers etc.
    4.7.   Communication Protocol, TCP/IP
    4.8.   IP Addressing
    4.9.   MAC Address
    4.10.   Sub netting
5. **Network Administration**
    5.1.   Installing & Configuring the Network Windows operating system
    5.2.   Creation of user& groups
    5.3.   File Sharing
    5.4.   Resource sharing

REFERENCE BOOKS:
1. Upgrading & Repairing PC's Scott & Muella, Techmedia, New Delhi
2. Computer Installation and Servicing D. Balasubramanian, TMH
3. Basic of Network NIIT, Prentice, Hall of India
4. Network Protocols & Slandered NIIT, Prentice, Hall of India

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DATA STRUCTURES

Course Code	:	IT 3003(Same as CB/CI/CS 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

REFERENCE BOOKS:
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 ofIndia.
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 ARCHITECTURE

Course Code	:	IT 3004
Course Title	:	Computer Architecture
Number of Credits	:	4 (L: 3, T: 1, P: 0)
Prerequisites	:	-
Course Category	:	PC

COURSE OBJECTIVES

To have a thorough understanding of the basic digital electronics, 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, analyze performance bottlenecks of the computing device and choose appropriate computing device for a given use case.

COURSE CONTENTS

1. **Data Representation**
    1.1. Data Types
        1.1.1. Number System
        1.1.2. Octal and Hexadecimal Numbers
        1.1.3. Decimal Representation
        1.1.4. Alphanumeric Representation
    1.2. Complements
        1.2.1. (r-1)'s complement
        1.2.2. (r's) complement
        1.2.3. Subtraction of unsigned numbers
    1.3. Fixed Point Representation
        1.3.1. Integer Representation
        1.3.2. Arithmetic Addition
        1.3.3. Arithmetic Subtraction
        1.3.4. Overflow
        1.3.5. Decimal Fixed-Point Representation
    1.4. Floating Point Representation
    1.5. Other Binary Codes
        1.5.1. Gray Code
        1.5.2. Other Decimal Codes
            1.5.2.1. Self-Complementing
            1.5.2.2. weighted code
            1.5.2.3. excess-3 code
        1.5.3. Other Alphanumeric Codes
            1.5.3.1. EBCDIC
    1.6. Error Detection Codes
2. **Register Transfer Microoperations**
    2.1. Register Transfer Language
    2.2. Register Transfer
    2.3. Bus and Memory Transfer
    2.4. Arithmetic Microoperations
    2.5. Logic Microoperations
    2.6. Shift Microoperations
    2.7. Arithmetic Logic Shift Unit
3. **Basic Computer Organization and Design**
    3.1. Instruction Codes
    3.2. Computer Registers
    3.3. Computer Instructions
    3.4. Timing and Control
    3.5. Instruction Cycle
    3.6. Memory Reference Instructions
    3.7. Input-Output and Interrupt

      3.8.   Design of Basic Computer
      3.9.   Design of Accumulator Logic

4. Programming the Basic Computer
      4.1.   Machine Language
      4.2.   Assembly Language
      4.3.   Assembler
      4.4.   Program Loops
      4.5.   Subroutines
      4.6.   Input-Output Programming

5. Microprogrammed Control
      5.1.   Control Memory
      5.2.   Address Sequencing
      5.3.   Microprograms
      5.4.   Design of Control Unit

6. Central Processing Unit
      6.1.   General Register Organization
      6.2.   Stack Organization
      6.3.   Instruction Formats
      6.4.   Addressing Modes
      6.5.   Data Transfer and Manipulation
      6.6.   Program Control
      6.7.   Reduced Instruction set Computer (RISC)

REFERENCE BOOKS:

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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ALGORITHMS

Course Code	:	IT 3005(Same as CS 3005)
Course Title	:	Algorithms
Number of Credits	:	4(L: 3, T: 1, P: 0)
Prerequisites	:	-
Course Category	:	PC

COURSE OBJECTIVES

The objective of this course is to prepare the student with the algorithmic foundations of computing. A sound grasp of algorithms is essential for any computer science engineer. Almost all programming involves algorithms at some level.

COURSE OUTCOMES

The student should be able to design basic algorithms for sorting and searching. The student should be able to understand the basic notions of time and space complexity of algorithms. The student should be able to implement sorting, searching, tree and graph algorithms in a modern computer programming language.

COURSE CONTENTS

1. **Fundamentals**
    1.1.   Programming Models
    1.2.   Data Abstraction
            1.2.1.   Sets
            1.2.2.   Multisets
            1.2.3.   Stacks
            1.2.4.   Queues
    1.3.   Asymptotic and worst-case analysis of algorithms.
2. **Sorting**
    2.1.   The sorting problem
    2.2.   Bubble sort
    2.3.   Selection sort
    2.4.   Insertion sort
    2.5.   Merge sort
    2.6.   Quicksort.
3. **Searching**
    3.1.   Symbol Tables
    3.2.   Binary Search Trees
    3.3.   Balanced Search Trees
    3.4.   Hash Tables.
4. **Graphs**
    4.1.   Definition of a directed and undirected graph
            4.1.1.   Paths
            4.1.2.   Cycles
            4.1.3.   Spanning trees
    4.2.   Directed Acyclic Graphs
    4.3.   Topological Sorting
    4.4.   Minimum Spanning Tree algorithms
            4.4.1.   Shortest Path algorithms: Dijkstra's algorithm
            4.4.2.   Flow-based algorithms.
5. **Strings**
    5.1.   String Sort
    5.2.   Tries
    5.3.   Substring Search
    5.4.   Regular Expressions
    5.5.   Elementary Data compression.

REFERENCE BOOKS:
1.   Algorithms, Sedgewick and Wayne, Pearson
2.   Introduction to Algorithms, Cormen, Leiserson, Rivest and Stein. MIT Press
3.   Introduction to Theory of Computation, Sipser Michael, Cengage Learnng.
4.   Design & Analysis of Algorithms, Gajendra Sharma, Khanna Publishing House

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COMPUTER PROGRAMMING LAB

Course Code	:	IT 3006(Same as CB/CI/CS 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.

REFERENCE BOOKS:
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.

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ICT RESOURCES LAB

Course Code	:	IT 3007
Course Title	:	ICT Resources 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 'Introduction to ICT Resources' and become proficient. Using ICT Resources proficiently is all about regular practice. Students should work on windows operating system, and use the stated tools.

COURSE OUTCOMES

Student should be able to install Windows OS, and use basic tools and perform networking.

COURSE CONTENTS

S. No.	Topics for Practice
1	Installation of Windows OS
2	Study of Window registry
3	Backup & Restore procedure of Windows.
4	Use of Compression Utilities.
5	Use of CD Writing Software
6	To prepare straight & Cross over cable using standard color coding.
7	Install NIC, assigning of IP address to the system
8	To Create simple LAN with two PC using single cross over cable to connect the workstation.

REFERENCE BOOKS:
1. Upgrading & Repairing PC's Scott & Muella, Techmedia, New Delhi
2. Computer Installation and Servicing D. Balasubramanian, TMH
3. Basic of Network NIIT, Prentice, Hall of India
4. Network Protocols & Slandered NIIT, Prentice, Hall of India

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DATA STRUCTURES LAB

Course Code	:	IT 3008(Same as CB/CI/CS 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.

REFERENCE BOOKS:

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)

OPERATING SYSTEMS

Course Code	:	IT 4001 (Same as CB/CS 4001)
Course Title	:	Operating Systems
Number of Credits	:	3 (L: 3, T: 0, P :0)
Pre-requisites	:	IT 3003 Data Structure
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 CONTENT:

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

REFERENCE BOOKS:
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

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.

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INTRODUCTION TO DBMS

Course Code	:	IT 4002(Same as CI/CS 4002)
Course Title	:	Introduction to DBMS
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
(i)   How to design a database, database-based applications
(ii) How to use a DBMS
(iii) The critical role of database system in designing several information system-based software systems or applications.

COURSE CONTENT:

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

UNIT 1:
      1.1.   Introduction
      1.2.   Components of DBMS
      1.3.   Advantage of DBMS
      1.4.   Database System v/s File System
      1.5.   Database System Concepts and Architecture
      1.6.   Application Architecture of DBMS
      1.7.   Overall Dabatase Structure

UNIT 2 :
      2.1.   Data Modeling using the Entity-Relationship Model
      2.2.   Notations of ER Diagram
      2.3.   Mapping Constraints
      2.4.   Keys
      2.5.   The Enhanced Entity-Relationship (EER) model

UNIT 3:
      3.1.   The Relational Data Model and Relational Database Constraints
      3.2.   Codd's Rule of DBMS
      3.3.   ER/EER to Relational Model map- ping
      3.4.   Relational Algebra
      3.5.   Relational Calculus

UNIT 4:
      4.1.   SQL-99
           4.1.1.   Schema definition,
           4.1.2.   Constraints
           4.1.3.   Queries and Views
      4.2.   Security
      4.3.   Introduction to SQL programming Techniques

UNIT 5:
      5.1.   Functional dependencies and normalization for relational databases
           5.1.1.   Normalization Concepts
           5.1.2.   Normal Forms (1NF, 2NF, 3NF, BCNF)
      5.2.   Relational database design algorithms and further dependencies.

      5.2.1.   Multi-Valued Dependancy and 4NF
      5.2.2.   Join Dependancy and 5NF

REFERENCE BOOKS:

1. Fundamentals of Database Systems, Elmasri & Navathe, Pearson Education
2. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, TataMcGraw-Hill.
3. Database System Concepts, Abraham Silberschatz, Henry F. Korth, S. Sudarshan, 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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COMPUTER NETWORKS

Course Code	:	IT 4003(Same as CB/CI/CS 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:

1. Understanding of computer networks, issues, limitations, options available.
2. Understanding of the care that needs to be taken while developing applications designed to work over computer networks
3. 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).

REFERENCE BOOKS:

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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SSAD/SOFTWARE ENGINEERING

Course Code	:	IT 4004(Same as CS 4004)
Course Title	:	SSAD/Software Engineering
Number of Credits	:	3 (L: 3, T: 0, P: 0)
Prerequisites	:	-
Course Category	:	PC

COURSE LEARNING OBJECTIVES:
1. Inculcate essential technology and software engineering knowledge and skills essential to build a reasonably complex usable and maintainable software iteratively.
2. Emphasize on structured approach to handle software development.
3. Enhance communication skills.

COURSE OUTCOMES:
The proposed course is expected to provide an introduction to software engineering concepts and techniques to undergraduate students, thus enabling them to work in a small team to deliver a soft- ware system. The course content and project will introduce various software technologies, process and project management skills that are needed for the delivery of software in a team setting

COURSE CONTENTS:

As per the course design, concepts learned as part of this course will/should be used in the Minor Project (Proj.202). These two courses should go hand in hand to be effective.

UNIT 1:
- 1.1.   Introduction to Software Engineering
- 1.2.   Lifecycle
- 1.3.   Process Models
- 1.4.   Traditional v/s Agile processes

UNIT 2:
- 2.1.   Development Activities
  - 2.1.1.   Requirements Gathering and Analysis
- 2.2.   Design Concepts
  - 2.2.1.   Software architecture and Architectural styles
  - 2.2.2.   Basic UI design
- 2.3.   Effective Coding and Debugging techniques

UNIT 3:
- 3.1.   Software Testing Basics,
  - 3.1.1.   Unit, Integration, System and Acceptance Testing
- 3.2.   Introduction to various testing techniques (e.g. Stress testing)
- 3.3.   Writing and executing test cases
- 3.4.   Quality Assurance

UNIT 4:
- 4.1.   Project Management
  - 4.1.1.   Project management concepts,
  - 4.1.2.   Configuration and Release Management
  - 4.1.3.   Version Control and its tools (Git)
- 4.2.   Release Planning
- 4.3.   Change Management
- 4.4.   Software Maintenance

REFERENCE BOOKS:

1. Software Engineering – A Practitioner's Approach, 7th Edition, Roger Pressman.
2. Software engineering, Ian Sommerville, Pearson Education
3. An Integrated Approach to Software Engineering, Pankaj Jalote, Springer Verlag
4. Software Engineering, Nasib Singh Gill, Khanna Book Publishing Co. India.
5. Software Engineering, K. K. Agarval, Yogesh Singh, New Age International Publishers

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C++ PROGRAMMING

Course Code	:	IT 4005
Course Title	:	C++ Programming
Number of Credits	:	2(L: 2, T: 0, P: 0)
Prerequisites	:	IT 3001
Course Category	:	PC

COURSE LEARNING OBJECTIVES:

To provide adequate knowledge about object-oriented programming concept. Today much application software is developed using object-oriented technology. It helps in reusability of the code, sharing of various resources. The user works in real world environment. This paper gives knowledge of object-oriented technology. C++ cover the practical implementation of OOPs. Various features like inheritance, encapsulation etc. are covered.

COURSE OUTCOMES:

After undergoing the subject, students will be able to:
- Explain the concepts of OOPS
- Explain and execute the language construct concepts.
- Debug and compile the program written in C++.
- Explain and implement class program.
- Explain and implement overloading.
- Describe and implement inheritance concepts.

COURSE CONTENT:

1. An Overview of Object Oriented Programming :
    1.1   The need of object oriented programming
    1.2   Characteristics of OOPs: Objects, Classes, Inheritance, Reusability, New data types, Polymorphism and overloading
    1.3   Benefits of OOPs

2. Object Oriented Programming Using C++ :
    2.1   An overview of C++ Programming
    2.2   Data Types, Operators, Manipulators
    2.3   "cin" and "cout" usages
    2.4   Statements : Comments, Assignments, if, switch and loops
    2.5   Functions and its default arguments
    2.6   Inline functions

3. Objects and Classes :
    3.1   Class and its members
    3.2   Access Specifier : public, private, protected
    3.3   Static data member and static functions
    3.4   Array of objects
    3.5   Constructors and Destructors
    3.6   Friend function
    3.7   Copy constructor

4. Overloading of Functions and Operators :
    4.1   Function overloading
    4.2   Defining operators over loading
    4.3   Rules of overloading operators
    4.4   Overloading unary operators
    4.5   Overloading binary operators
    4.6   Operator overloading using friend functions

5. Inheritance and Polymorphism :
    5.1   Inheritance: Using public, private and protected access specifiers
    5.2   Types of inheritance

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    5.3   Virtual base classes
    5.4   Virtual and pure virtual functions
    5.5   Abstract classes

6. Managing Console I/O and File I/O :
    6.1   C++ streams and stream classes
    6.2   Unformatted I/O operations
    6.3   Formatted console I/O operations
    6.4   Classes for file stream operations
    6.5   Opening and closing a file
    6.6   File modes and file pointers

REFERENCE BOOKS:

1. Programming in C++   E. Balaguruswamy, TMH
2. Oriented Programming TURBO C++   Robert Lafore, Galgotia Pub.
3. The Complete Reference C++   Herbert Schildt, TMH
4. The C++ Programming Language   B. Stroustrup, Addison wesley/Pearson
5. Let us C++   Y. Kanetkar, BPB
6. Object Oriented Programming and C++   R.Rajaram, New Age

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INFORMATION SECURITY

Course Code	:	IT 40061 (Same as CS 40061)
Course Title	:	Information Security
Number of Credits	:	4 (L: 3, T: 1, P: 0)
Prerequisites	:	--
Course Category	:	PE

COURSE LEARNING OBJECTIVES:

To learn how to evaluate and enhance information security of IT infrastructure and organisations

COURSE OUTCOMES:

Understanding of security needs and issues of IT infrastructure. Have basic skills on security audit of networks, operating systems and application software.

COURSE CONTENTS:

UNIT 1:
- 1.1. Introduction to Information Security
- 1.2. Various aspects of information security (PAIN)
- 1.3. Security Features of Operating Systems
  - 1.3.1. Authentication
  - 1.3.2. Logs
  - 1.3.3. Audit Features
  - 1.3.4. File System Protection,
  - 1.3.5. User Privileges
  - 1.3.6. RAID options
  - 1.3.7. Anti-Virus Software, etc.

UNIT 2:
- 2.1. Understanding security weaknesses in popular networking protocols
  - 2.1.1. IP
  - 2.1.2. TCP
  - 2.1.3. UDP
  - 2.1.4. RIP
  - 2.1.5. OSPF
  - 2.1.6. HTTP
  - 2.1.7. SMTP etc.
- 2.2. Security weaknesses in common networking devices
  - 2.2.1. Hub
  - 2.2.2. Switch
  - 2.2.3. Router
  - 2.2.4. Wifi
- 2.3. Security solutions to mitigate security risk of
  - 2.3.1. Networking protocols (ipsec, HTTPS, etc)
  - 2.3.2. Devices (VLAN, VPN, Ingress Filtering, etc)

UNIT 3:
- 3.1. Basics of Cryptography
- 3.2. PKI
- 3.3. Security considerations while developing softwares

UNIT 4:
- 4.1. Network Security Products
- 4.2. Firewall
- 4.3. IDS/IPS
- 4.4. VPN Concentrator
- 4.5. Content Screening Gateways, etc.

UNIT 5:

    5.1.   Introduction to Security Standards
    5.2.   ISO 27001
    5.3.   Indian IT Act
    5.4.   IPR Laws
    5.5.   Security Audit procedures
    5.6.   Developing Security Policies
    5.7.   Disaster Recovery, Business Continuity Planning

REFERENCE BOOKS:

1.   Information Security and Cyber Laws, Sarika Gupta, Khanna Publishing House
2.   RFCs of protocols listed in content (https://www.ietf.org)
3.   Various Acts, Laws and Standards (IT Act, ISO27001 Standard, IPR and Copyright Laws, etc.)
4.   Security Guideline documents of Operating Systems (OS Manual, Man Pages, etc)
5.   https://www.cert-in.org.in/
6.   https://www.sans.org/

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CYBER LAWS

Course Code	:	IT 40062 (Same as CI 40062)
Course Title	:	Cyber Laws
Number of Credits	:	4(L: 3, T: 1, P: 0)
Prerequisites	:	-----
Course Category	:	PE

COURSE LEARNING OBJECTIVES:
To provide an understanding of the basic structure of cyber laws and their impact on every day living in the cyber society. The essential ingredients of a website for the bank. It tells how ISP and cyber café management should work. In view of the social purpose behind the course it is meant to inculcate the knowledge about "Cyber Crimes" and inter alias build some awareness about behavioral aspects that lead to negative behavior in the society.

COURSE OUTCOMES:
Student will have general idea about the cyber contracts, cyber-crimes, cyber privacy, cyber laws and will be able to explore further. To provide an understanding of the basic structure of cyber laws and their impact on every day living in the cyber society. To aware students of the nature of the cyber space, how internet functions, what are the nature of properties created on the internet, how to use digital signatures. Dealing with virus and other cyber-crimes. How banks function in the E-era.

COURSE CONTENT:

UNIT 1:
  1.1   Information Technology and Legal Response : Introduction
  1.2   We, Cyberspace and Our Lives
  1.3   The Nature of the Net
  1.4   Features of the Net
  1.5   Geographical Indeterminacy

UNIT 2:
  2.1   Cyber crimes: Introduction
  2.2   Cyber Crime – A perspective
  2.3   The Problem: Current Forms of Computer Crime
        2.3.1   Infringements of Privacy
        2.3.2   Economic offences
        2.3.3   Computer Hacking
        2.3.4   Software Piracy and other forms of Product Piracy
        2.3.5   Computer Sabotage and Computer Extortion
        2.3.6   Computer Fraud
        2.3.7   Illegal and harmful contents

UNIT 3:
  3.1   Cyber contracts: Introduction
  3.2   Essentials of a contract
        3.2.1   Intention to be bound
        3.2.2   Offer and Acceptance
        3.2.3   Concept of offer
        3.2.4   Offer by and to whom
        3.2.5   Statements which are not offers
  3.3   Termination of offer
  3.4   Quality of acceptance
  3.5   Consideration
  3.6   Capacity of the parties
  3.7   Consent
  3.8   Unlawful agreements
  3.9   Persons bound by contract
  3.10 Performance and frustration
  3.11 Subsequent Events and Frustration

3.12   Remedies for Breach of Contract
       3.12.1   Damages
       3.12.2   Specific Performance
       3.12.3   Injunctions

UNIT 4:
4.1   Cyber Privacy: Introduction
4.2   Policy approaches to privacy concerns
       3.12.4   Market approach
       3.12.5   Human rights approach
       3.12.6   Contract approach
4.3   Platform for Privacy Preferences Project (P3P)

UNIT 5:
5.1   Cyber Intellectual Property Rights: Introduction
5.2   Concept of Intellectual Property Rights
5.3   The Impact of Electronic Commerce on Intellectual Property
       5.3.1   The Protection Of Copyright And Related Rights In The Digital Environment
       5.3.2   Overview of the Issues
       5.3.3   Technological protection measures
       5.3.4   Future Work in the protection of Copyright and related rights

UNIT 6:
6.1   Information Technology Act, 2000 (I.T. Act, 2000): Including all the amendments till date
6.2   Transmission of electronic documents
6.3   Evidentiary presumptions of a secured electronic document
6.4   Certifying Authority (CA)
6.5   Controller of Certifying Authorities.
6.6   Suspension of Certifying Authority
6.7   Digital Signature

REFERENCE BOOKS:
   1   Cyber Law for Every Netijen in India Na. Vijayashankar
   2   Cyber Law Simplified Vivek Sood, TMH

OPERATING SYSTEMS LAB

Course Code	:	IT 4007(Same as CI/CS 4007)
Course Title	:	Operating Systems Lab
Number of Credits	:	1 (L: 0, T: 0, P: 2)
Prerequisites	:	IT 3003 Data Structures
Course Category	:	PC

COURSE LEARNING OBJECTIVES:

This Lab course is intended to practice and do experiment on concepts taught in theory class of 'Operating Systems' and gain insight into functioning of the Operating Systems.

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, and become an advance user of operating system.

COURSE CONTENTS:

S.No.	Topics for Practice
1	Revision practice of various commands like man, cp, mv, ln, rm, unlink, mkdir, rmdir.
2	Implement two way process communication using pipes
3	Implement message queue form of IPC
4	Implement shared memory and semaphore form of IPC
5	Simulate the CPU scheduling algorithms - Round Robin, SJF, FCFS, priority
6	Simulate Bankers algorithm for Deadlock Avoidance and Prevention
7	Simulate all FIFO Page Replacement Algorithm using C program
8	Simulate all LRU Page Replacement Algorithms using C program
9	Simulate Paging Technique of Memory Management
10	Practice various commands/utilities such as catnl, uniq, tee, pg, comm, cmp, diff, tr, tar, cpio, mount, umount, find, umask, ulimit, sort, grep, egrep,fgrep cut, paste, join, du, df , ps, who, etc and many more.

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

REFERENCE BOOKS:

1. Operating System Concepts, Silberschatz, Abraham and Galvin, Peter, Wiley India Limited
2. UNIX Concepts and Applications, Sumitabha Das, McGraw-Hill Education
3. Operating System Concepts, Ekta Walia, Khanna Publishing House

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INTRODUCTION TO DBMS LAB

Course Code	:	IT 4008(Same as CI/CS 4008)
Course Title	:	Introduction to DBMS Lab
Number of Credits	:	1 (L: 0, T: 0, P: 2)
Prerequisites	:	IT 3006 Computer Programming Lab
Course Category	:	PC

COURSE LEARNING OBJECTIVES:

This Lab course is intended to practice whatever is taught in theory class of 'Introduction to DBMS'. 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/SSAD.

COURSE OUTCOMES:

After completing the course, the students will understand
(i)   How to design a database, database-based applications
(ii) How to use a DBMS
(iii) The critical role of database system in designing several information system-based software systems or applications.

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	Case Study-2: Visitor Management database
3	Case Study-3: Students Academic database
4	Case Study-4: Inventory Management System database
5	Case study-5: Bank Operations database
6	Case Study-6: Bus Operator (Roadways) – Do related activities such as prepare E-R Model, Relational Model, do Normalization, Create Tables, Insert data, Delete Data, Query database, create stored procedures, etc.

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

REFERENCE BOOKS:
1. Elmasri & Navathe, Fundamentals of Database Systems, Pearson Education
2. Raghurama Krishnan, Johannes Gehrke, Database Management Systems, Tata McGraw-Hill, New Delhi, India.
3. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, 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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COMPUTER NETWORKS LAB

Course Code	:	IT 4009(Same as CI/CS 4009)
Course Title	:	Computer Networks 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 'Computer Networks'. Some of the things that should necessary be covered in lab are listed below:

COURSE OUTCOMES:
1. Understanding of computer networks, issues, limitations, options available.
2. Able to configure basic small LAN and connect computers to it.

COURSE CONTENTS:

S.No.	Topics for Practice
1	Showing various types of networking cables and connectors, identifying them clearly
2	Looking at specifications of cables and connectors of various companies on Internet, find out differences.
3	Making patch cords using different types of cables and connectors - crimping, splicing, etc
4	Demonstration of different type of cable testers, using them for testing patch cords pre- pared by the students in Lab and standard cables prepared by professionals
5	Configuring computing devices (PC, Laptop, Mobile, etc) for network, exploring different options and their impact – IP address, gateway, DNS, security options, etc
6	Showing various networking devices – NICs, Hub, Switch, Router, WiFi access point, etc.
7	Looking at specifications of various networking devices various companies on Internet, find out differences.
8	Setting up a small wired LAN in the Lab
9	Setting up a small wireless LAN in the Lab

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

REFERENCE BOOKS:
1. Cisco press books on CCNA
2. User manual of networking devices available in the lab
3. Wiki pages on networking devices

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C++ PROGRAMMING LAB

Course Code	:	IT 4010
Course Title	:	C++ Programming Lab
Number of Credits	:	1(L: 0, T: 0, P: 2)
Prerequisites	:	IT 3006
Course Category	:	PC

COURSE LEARNING OBJECTIVES:

To provide adequate knowledge about object oriented programming concept. Today much application software is developed using object-oriented technology. It helps in reusability of the code, sharing of various resources. The user works in real world environment. This paper give knowledge of object oriented technology. C++ cover the practical implementation of OOPs. Various features like inheritance, encapsulation etc. are covered.

COURSE OUTCOMES:
After undergoing the subject, students will be able to:
- Explain the concepts of OOPS
- Explain and execute the language construct concepts.
- Debug and compile the program written in C++.
- Explain and implement class program.
- Explain and implement overloading.
- Describe and implement inheritance concepts.

COURSE CONTENT:

S.No.	Topics for Practice
1	Practice for Classes and Object Creation
2	Practice for constructors and destructors creation
3	Practice for static and friend functions for a class.
4	Practice for Function overloading
5	Practice for Operator overloading
6	Practice for Copy constructor
7	Practice for inheritance
8	Practice for virtual function
9	Practice for exception handling template
10	Practice for read( ) and write( )

REFERENCE BOOKS:

1. Programming in C++   E. Balaguruswamy, TMH
2. Oriented Programming TURBO C++   Robert Lafore, Galgotia Pub.
3. The Complete Reference C++   Herbert Schildt, TMH
4. The C++ Programming Language   B. Stroustrup, Addison wesley/Pearson
5. Let us C++   Y. Kanetkar, BPB
6. Object Oriented Programming and C++   R.Rajaram, New Age

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ESSENCE OF INDIAN KNOWLEDGE AND TRADITION

Course Code	IT 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	None
Course Category	AU

COURSE CONTENTS:

Basic Structure of Indian Knowledge System:

     (i)वेद,

     (ii)उपवेद (आयुर्वेद,धनुर्वेद,गन्धर्वेद,स्थापत्यआदद)

     (iii)वेदथांग (शिक्षा, कलप, ननरुत, व्याकरण, ज्योनतषछथांद),

     (iv)उपथाइग (धर्मशथास्र, ौीर्थाथांसथा, 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)

INTRODUCTION TO E-GOVERNANCE

Course Code	:	IT 5001(Same as CS 50001)
Course Title	:	Introduction to e-Governance
Number of Credits	:	3(L: 2, T: 1, P: 0)
Prerequisites	:	-----
Course Category	:	PC

COURSE LEARNING OBJECTIVES:

To cover the concepts of e-Governance and to understand how technologies and business models shape the contours of government for improving citizen services and bringing in transparency.
COURSE OUTCOMES:

Through exposure to introductory ideas and practices followed in a selected number of e-Governance initiatives in India, the course will help students to understand and appreciate the essence of e-Governance.
COURSE CONTENT:

UNIT 1:
   1.1   Exposure to emerging trends in ICT for development
   1.2   Understanding of design and implementation of
         1.2.1   e-Government projects,
         1.2.2   e-governance lifecycle.

UNIT 2:
   2.1   Need for Government Process Re-engineering (GPR)
            National e-Governance Plan(NeGP) for India
   2.2   SMART Governments & Thumb Rules

UNIT 3:
   3.1   Architecture and models of e-Governance, including Public Private Partnership (PPP)
   3.2   Need for Innovation and Change Management in e-Governance
   3.3   Critical Success Factors
   3.4   Major issue including corruption, resistance for change, e-Security and Cyber laws

UNIT 4:
   4.1   Focusing on Indian initiatives and their impact on citizens;
   4.2   Sharing of case studies to highlight best practices in managing e-Governance projects in Indian context.
   4.3   Visits to local e-governance sites (CSC, eSeva, Post Office, Passport Seva Kendra, etc) as part of Tutorials.

UNIT 5:
   5.1   Mini Projects by students in groups – primarily evaluation of various e-governance projects

REFERENCE BOOKS:
   1.   Managing Transformation –Objectives to Outcomes. J Satyanarayana, Prentice Hall India
   2.   The State, IT and Development. Kenneth Kenniston, RK Bagga and Rohit Raj Mathur, Sage Publications India Pvt Ltd.
   3.   e-Government -The Science of the Possible. J Satyanarayana, Prentice Hall, India
   4.   http://www.csi-sigegov.org/publications.php
   5.   https://negd.gov.in
   6.   https://www.nisg.org/case-studies-on-e-governance-in-india

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INTERNET OF THINGS

Course Code	:	IT 5002(Same as CI/CS 50002)
Course Title	:	Internet of Things
Number of Credits	:	3(L: 2, T: 1, P: 0)
Prerequisites	:	-----
Course Category	:	PC

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 defence 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: Agriculture, Healthcare, Activity Monitoring

REFERENCE BOOKS:
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 ArshdeepBahga and Vijay Madisetti (Universities Press)
5. *Internet of Things: Architecture and Design Principles, Raj Kamal,* McGraw Hill
6. Research papers

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ECONOMIC POLICIES IN INDIA

Course Code	IT 51001 (Same in All Branches of Engg.)
Course Title	Economic Policies in India
Number of Credits	3 (L:3,T:0,P:0)
Prerequisites	NIL
CourseCategory	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 estotheproblemsofunemployment,poverty,incomegeneration,industrializationfromdifferentperspec-tives
CO4	Abletoidentifytheproblemsandcapabletodecidetheapplicationforfuturedevelopment
CO5	Analyzeeconomicissuesandfindsolutionstocomplexeconomicproblemsandtakecor-recteconomicjudgment

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 ECONOMY:
- 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.

REFERENCE BOOKS:

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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SEMESTER SCHEME 2020-2021

ENGINEERING ECONOMICS & ACCOUNTANCY

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

REFERENCE BOOKS:
1.Mc Guigan, 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, NewDelhi, 2007.
5.Salvatore Dominick, 'Managerial Economics in a global economy'. Thomson SouthWestern, 4th Edition, 2001.

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DATA SCIENCES: DATA WAREHOUSING AND DATA MINING

Course Code	:	IT 50031(Same as CI/CS 50031)
Course Title	:	Data Sciences: Data Warehousing and Data Mining
Number of Credits	:	3(L: 3, T: 0, P: 0)
Prerequisites	:	-----
Course Category	:	PE

COURSE LEARNING OBJECTIVES:

Introduce students to the domain of Data Warehousing and Data Mining
COURSE OUTCOMES:
Student will have general idea about Data Warehousing and Data Mining techniques, will be able to explore further and effectively use related tools**.**

COURSE CONTENTS:
UNIT 1:INTRODUCTION
- 1.1.   Motivation,
- 1.2.   Importance,
- 1.3.   Definitions,
- 1.4.   Kind of Data,
- 1.5.   Data Mining Functionalities,
- 1.6.   Kinds of Patterns,
- 1.7.   Classification of Data Mining Systems,
- 1.8.   Data Mining Task Primitives,
- 1.9.   Integration of A Data Mining System with A Database or Data Warehouse System,
- 1.10.   Major Issues in Data Mining,
- 1.11.   Types of Data Sets and Attribute Values,
- 1.12.   Basic Statistical Descriptions of
  - 1.12.1.   Data,
  - 1.12.2.   Data Visualization,
  - 1.12.3.   Measuring Data Similarity.
- 1.13.   PREPROCESSING:
  - 1.13.1.   Data Quality,
  - 1.13.2.   Major Tasks in Data Preprocessing,
  - 1.13.3.   Data Reduction,
  - 1.13.4.   Data Transformation and Data Discretization,
  - 1.13.5.   Data Cleaning and Data Integration.

UNIT 2:DATA WAREHOUSING AND ON-LINE ANALYTICAL PROCESSING
- 2.1.   Data Warehouse basic concepts,
- 2.2.   Data Warehouse Modeling - Data Cube and OLAP,
- 2.3.   Data Warehouse Design and Usage,
- 2.4.   Data Warehouse Implementation,
- 2.5.   Data Generalization by Attribute-Oriented Induction,
- 2.6.   Data Cube Computation.

UNIT 3:PATTERNS, ASSOCIATIONS AND CORRELATIONS
- 3.1.   Mining Frequent Patterns,
- 3.2.   Associations and Correlations:
  - 3.2.1.   Basic Concepts,
  - 3.2.2.   Efficient and Scalable Frequent Item set Mining Methods,
  - 3.2.3.   Pattern Evaluation Methods,
  - 3.2.4.   Applications of frequent pattern and associations.
- 3.3.   Frequent Patterns and Association Mining:
  - 3.3.1.   A Road Map,
  - 3.3.2.   Mining Various Kinds of Association Rules,
  - 3.3.3.   Constraint-Based Frequent Pattern Mining,
  - 3.3.4.   Extended Applications of FrequentPatterns
UNIT 4:CLASSIFICATION
- 4.1.   Basic Concepts,
- 4.2.   Decision Tree Induction,

4.3.   Bayesian Classification Methods,
4.4.   Rule-Based Classification,
4.5.   Model Evaluation and Selection,
4.6.   Techniques to Improve Classification Accuracy:
     4.6.1.   Ensemble Methods,
     4.6.2.   Handling Different Kinds of Cases in Classification,
     4.6.3.   Classification by Neural Networks,
     4.6.4.   Support Vector Machines,
     4.6.5.   Pattern-Based Classification,
     4.6.6.   Lazy Learners (or Learning from Your Neighbors).

UNIT 5:CLUSTER ANALYSIS

5.1.   Basic Concepts of Cluster Analysis,
5.2.   Clustering Structures,
5.3.   Major Clustering Approaches,
     5.3.1.   Partitioning Methods,
     5.3.2.   Hierarchical Methods,
     5.3.3.   Density-Based Methods,
     5.3.4.   Model-Based Clustering,
5.4.   Why outlier analysis,
5.5.   Identifying and handling of outliers,
5.6.   Outlier Detection Techniques.
5.7.   WEB MINING:
     5.7.1.   Basic concepts of web mining,
     5.7.2.   different types of web mining,
     5.7.3.   PAGE RANK Algorithm,
     5.7.4.   HITS Algorithm

REFERENCE BOOKS:
1. Jiawei Han, Micheline Kamber, Jian Pei, Data Mining: Concepts and Techniques, Elsevier
2. Margaret H Dunham, Data Mining Introductory and Advanced Topics, Pearson Education
3. Amitesh Sinha, Data Warehousing, Thomson Learning, India.
4. Xingdong Wu, Vipin Kumar, the Top Ten Algorithms in Data Mining, CRC Press, UK.

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PROGRAMMING IN JAVA

Course Code	:	IT 50032
Course Title	:	Programming in JAVA
Number of Credits	:	3(L: 3, T: 0, P: 0)
Prerequisites	:	IT 4005
Course Category	:	PE

COURSE LEARNING OBJECTIVES:

To provide adequate knowledge about object oriented programming concept. Java is an OOP language with a built-in application programming interface (API) that can handle graphics and user interfaces and that can be used to create applications or applets. Because of its rich set of API's, its platform independence, Java can also be thought of as a platform in itself. This course introduces the structure, syntax, and programming paradigm of the Java language and platform.

COURSE OUTCOMES:

Students will be able to write programs and then run those programs on multiple operating systems. One can learn the Java syntax that are most likely to encounter professionally and Java programming idioms used to build robust, maintainable Java application

COURSE CONTENT:

UNIT 1:
- 1.1   Introduction to Java : Basic concepts of Object Oriented Programming Objects and Classes, Encapsulation, Inheritance, Polymorphism
- 1.2   Benefits and Applications of OOP
- 1.3   Java features
- 1.4   Source file, Java Token, Java statements
- 1.5   Compiling and running Java programs

UNIT 2:
- 2.1   Language Basics: Primitive Data Types, Constants, Variables, Integer, Floating, Character, Boolean Type, Declaration and Scope of variables
- 2.2   Arrays, Type Casting, Strings : 1 D Array, 2 D Array, Sting Arrays, String Methods, String Buffer Class
- 2.3   Operators and Expressions: Assignment, Arithmetic, and Unary Operators ,Logical, Relational, and Conditional Operators Arithmetic expressions, Precedence of Arithmetic Expressions, Operator Precedence and Associativity
- 2.4   Control Statements: Selection, Iteration, break, continue

UNIT 3:
- 3.1   Classes: Declaring Classes, Member Variables, Defining Methods
- 3.2   Objects: Creating and Using Objects
- 3.3   Constructors: Providing Constructors for Classes, Passing Information to a Method or a Constructor
- 3.4   Method Overloading Static Members, Final Variable, Methods and Classes
- 3.5   Garbage Collection: finalize Method Modifiers: Access Modifiers, Other Modifiers

UNIT 4:
- 4.1   Inheritance: Extending a Class, Defining a class, Super keyword
- 4.2   Multilevel Inheritance
- 4.3   Method Overriding, Abstract and final Classes
- 4.4   Visibility Control

UNIT 5:
- 5.1   Interfaces: Defining, Extending and Implementing
- 5.2   Packages: Introduction, Defining and creating
- 5.3   Access Protection

UNIT 6:
- 6.1   Exception Handling:
    Exceptions: Introductions, Exceptions types
- 6.2   Syntax of Exception Handling, Using try and catch, throw, throws, and finally

6.3　Multithreaded Programming: Creating a Thread - Introduction, Implementing and Extending Threads

6.4 Life Cycle of a Thread

REFERENCE BOOKS:

1. Programming with Java. E Balagurusamy , TMH.
2. Let Us Java. Yashvant Kanetkar, BPB Publications.
3. The Complete Reference Java 2. Herbert Schildt, TMH.
4. Thinking in Java. Bruce Eckel.

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ADVANCE COMPUTER NETWORKS

Course Code	:	IT 50041(Same as CS 50041)
Course Title	:	Advance Computer Networks
Number of Credits	:	3 (L: 3, T: 0, P: 0)
Prerequisites	:	-----
Course Category	:	PE

COURSE LEARNING OBJECTIVES:

Introduce Advance Networking Concepts, Theories and Tools

COURSE OUTCOMES:

1.Understanding core concepts/theories/algorithms of computer networks

2.Some hands-on capability on various network devices and tools

3 Capability to design and implement a computer network

COURSE CONTENT:

UNIT 1:
- 1.1. Review of Networking Basics;
- 1.2. Advance Topics in IPv4 –
  - 1.2.1. Subnetting,
  - 1.2.2. Multicasting,
  - 1.2.3. Multicast Routing Protocols (IGMP, PIM, DVMRP);
- 1.3. Advance Topics in TCP –
  - 1.3.1. flow management,
  - 1.3.2. congestion avoidance,
  - 1.3.3. protocol spoofing;
- 1.4. IPv6

UNIT 2:
- 2.1. Telecom Networks,
- 2.2. Switching Techniques;
- 2.3. Introduction to
  - 2.3.1. Frame Relay,
  - 2.3.2. ATM,
  - 2.3.3. MPLS;
- 2.4. VSAT Communication –
  - 2.4.1. Star and Mesh architectures,
  - 2.4.2. bandwidth reservation;
- 2.5. Wireless Networks –
  - 2.5.1. WiFi,
  - 2.5.2. WiMax,
- 2.6. Cellular Phone Technologies –
  - 2.6.1. GSM,
  - 2.6.2. CDMA,
  - 2.6.3. 3G,
  - 2.6.4. 4G

UNIT 3:
- 3.1. Network Redundancy,
- 3.2. Load Balancers,
- 3.3. Caching,
- 3.4. Storage Networks;
- 3.5. QoS;
- 3.6. Network Monitoring –
  - 3.6.1. SNMP,
  - 3.6.2. RMON;

UNIT 4: ADVANCE SCRIPTING
    4.1.   Introduction to Network Security –
           4.1.1.   VLAN,
           4.1.2.   VPN,
           4.1.3.   Firewall,
           4.1.4.   IPS,
           4.1.5.   Proxy Servers

UNIT 5: PHP
    5.1.   Network Simulation,
    5.2.   Network design case studies and exercises,
    5.3.   IP Addressing schema,
    5.4.   Protocol Analysers (Wireshark, etc)

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REFERENCE BOOKS:
1. RFCs and Standards Documents (www.ietf.org and other standard body websites)
2. Communication Networking – An Analytical Approach, Anurag-Manjunath-Joy
3. TCP/IP Illustrated (Vol.1,2), Stevens
4. Data Networks, Bertsekas-Gallager
5. An Engineering Approach to Computer Networking, S. Keshav

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CLOUD COMPUTING

Course Code	:	IT 50042
Course Title	:	Cloud Computing
Number of Credits	:	3(L: 3, T: 0, P: 0)
Prerequisites	:	-----
Course Category	:	PE

COURSE LEARNING OBJECTIVES:

This course offers a good understanding of cloud computing concepts and challenges faced in implementation of cloud computing.

COURSE OUTCOMES:

After undergoing the subject, a student would be able to:

- Explain core concepts of cloud computing paradigm.
- Explain various Service Models
- Explain various Deployment Models.
- Describe SLA management in Cloud Computing
- Explain and apply the concept of virtualization.

COURSE CONTENT:

1. Introduction
- 1.1 Evolution of Cloud Computing
- 1.2 Cloud Computing Overview
- 1.3 Characteristics
- 1.4 Applications
- 1.5 Benefits
- 1.6 Challenges

2. Service and Deployment Models
- 2.1 Cloud Computing Service Models:
  - 2.1.1 Infrastructure as a Service
  - 2.1.2 Platform as a Service
  - 2.1.3 Software as a Service
- 2.2 Cloud Computing Deployment Models:
  - 2.2.1 Private Cloud; Public Cloud
  - 2.2.2 Community Cloud
  - 2.2.3 Hybrid Cloud
  - 2.2.4 Major Cloud Service providers

3. Service Level Agreement (SLA) Management
- 3.1 Overview of SLA
- 3.2 Types of SLA
- 3.3 SLA Life Cycle
- 3.4 SLA Management Process

4. Virtualization
- 4.1 Overview of Virtualization
- 4.2 Types of Virtualization
- 4.3 Benefits of Virtualization
- 4.4 Hypervisors

5. Cloud Security
- 5.1 Infrastructure Security
- 5.2 Data Security & Privacy Issues
- 5.3 Legal Issues in Cloud Computing

REFERENCE BOOKS:

1. Rajkumar Buyya, James Broberg, Andrzej Goscinski (Editors): Cloud Computing: Principles and Paradigms, Wiley, 2011
2. Kumar Saurabh, Cloud Computing, Wiley, 2012.
3. Barrie Sosinsky: Cloud Computing Bible, Wiley, 2011.
4. Judith Hurwitz, Robin Bloor, Marcia Kaufman,Fern Halper: Cloud Computing for Dummies, Wiley, 2010.

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DATA SCIENCES: DATA WAREHOUSING AND DATA MINING LAB

Course Code	:	IT 50051(Same as CS 50051)
Course Title	:	Data Sciences: Data Warehousing and Data Mining Lab
Number of Credits	:	1(L: 0, T: 0, P: 2)
Prerequisites	:	-----
Course Category	:	PE

COURSE LEARNING OBJECTIVES:

Introduce students to the practical domain of Data Warehousing and Data Mining.

COURSE CONTENT:

S.No.	Topics for Practice
1	Study and explore WEKA environment.
2	Create .arff file using WEKA.
3	Demonstration of pre-processing of .arff file.
4	Demonstrateperforming association rule mining on data sets.
5	Demonstrate performing classification on data sets.
6	Demonstrate performing clustering on data sets.
7	Demonstrate performing Regression on data sets.
8	Demonstration of association rule mining.
9	Perform classification using Bayesianclassification algorithm.
10	Perform the cluster analysis by k-means method.

REFERENCE BOOKS:
5. Jiawei Han, MichelineKamber, Jian Pei, Data Mining: Concepts and Techniques, Elsevier
6. Margaret H Dunham, Data Mining Introductory and Advanced Topics, Pearson Education
7. AmiteshSinha, Data Warehousing, Thomson Learning, India.
8. Xingdong Wu, Vipin Kumar, the Top Ten Algorithms in Data Mining, CRC Press, UK.

COURSE OUTCOMES:
Student will have general idea about Data Warehousing and Data Mining tool (WEKA), will be able to explore further and effectively use related tools.

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PROGRAMMING IN JAVA LAB

Course Code	:	IT 50052
Course Title	:	Programming in Java lab
Number of Credits	:	1(L: 0, T: 0, P: 2)
Prerequisites	:	IT 4010
Course Category	:	PE

COURSE LEARNING OBJECTIVES:

To introduce students to the domain of Java language Programming

COURSE OUTCOMES:

Student will have general idea about Java language Programming

COURSE CONTENT:

S.No.	Topics for Practice
1	Practice for compiling and running simple Java Programs
2	Practice for using java basics
3	Practice for creating simple class and its objects
4	Practice for creating methods and constructors.
5	Practice for static classes and methods
6	Practice for extending class
7	Practice for creating and using Abstract Class
8	Practice for creating and using of Interfaces and Packages
9	Practice for creating and using Exception Handling
10	Practice for creating and using Threads

REFERENCE BOOKS:
1. Programming with Java. E Balagurusamy , TMH.
2. Let Us Java. Yashvant Kanetkar, BPB Publications.
3. The Complete Reference Java 2. Herbert Schildt, TMH.
4. Thinking in Java. Bruce Eckel.

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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	IT 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)	None
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 student 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

SUGGESTEDSOFTWARE/LEARNINGWEBSITES:
a. https://www.fundable.com/learn/resources/guides/startup
b. https://corporatefinanceinstitute.com/resources/knowledge/finance/corporatehstructure/
c .https://www.finder.com/small-business-finance-tips
d. https://www.profitbooks.net/funding-options-to-raise-startup-capital-for-your-business/

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PROJECT MANAGEMENT

CourseCode	IT 62001(Same in All Branches of Engg.)
CourseTitle	Project Management
NumberofCredits	3(L:3,T:0,P:0)
Prerequisites	NIL
CourseCategory	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 andeconomic 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 softwares.

REFERENCE BOOKS

1.Project planning, analysis, selection, implementation and review –Prasannachandra–Tata McGraw Hill
2.Project Management – the Managerial Process– Clifford F. Gray & Erik W. Larson-McGrawHill
3.Project management- David I Cleland- Mcgraw Hill International Edition, 1999
4.Project Management– Gopala krishnan– Mcmillan India Ltd.
5.Project Management- Harry – Maylor – Peason Publication

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RENEWABLE ENERGY TECHNOLOGIES

CourseCode	IT 62002 (Same in All Branches of Engg.)
CourseTitle	Renewable Energy Technologies
NumberofCredits	3 (L:3,T:0,P:0)
Prerequisites	NIL
CourseCategory	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.

REFERENCE BOOKS
1. Non-Conventional Energy Sources, Rai. G. D., Khanna Publishers, New Delhi, 2011.
2. Renewable Energy Sources, Twidell, J.W. & Weir, A., EFN SponLtd.,UK,2 006.
3. Solar Energy, Sukhatme. S. P., Tata Mc Graw Hill Publishing CompanyLtd. ,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	IT 63001(Same in All Branches of Engg.)
Course Title	Product Design
Number of Credits	3 (L:3,T:0,P:0)
Prerequisites	NIL
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 product;
   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

REFERENCE BOOKS
1.Product Design and Development, Karl T.Ulrichand Steven D.Eppinger, TataMc Graw–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	IT 63002(Same in All Branches of Engg.)
Course Title	Disaster Management
Number of Credits	3 (L: 3, T: 0 ,P :0)
Prerequisites	NIL
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. Familiarised 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 Stretegy, 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

CourseCode	IT 6333(Same in All Branches of Engg.)
CourseTitle	Indian Constitution
NumberofCredits	0 (L:2,T:0;P:0)
Prerequisites(Coursecode)	None
CourseCategory	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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DOT NET TECHNOLOGY

Course Code	:	IT 60011
Course Title	:	Dot Net Technology
Number of Credits	:	3(L: 3, T: 0, P: 0)
Prerequisites	:	IT 4005
Course Category	:	PE

COURSE LEARNING OBJECTIVES:
Dot NET has evolved as an important framework in the recent times for developing windows, web and enterprise applications.
The objective of the subject is to introduce .NET technology which provides a multi-language environment to develop windows based software. The main focus is on .NET framework, development environment as VB.NET, ASP.NET.

COURSE OUTCOMES:
Student will have general idea about Dot NET technology, will be able to explore further, effectively use related tools and have basic implementation skills.
COURSE CONTENT:

UNIT 1:
    1.1   Introduction to .NET Framework and Development Environment
    1.2   Comparison between .NET and Java
    1.3   Architecture and Advantages of .NET framework
    1.4   Namespaces
    1.5   Object Oriented Features
    1.6   Visual Studio.NET Integrated Development
    1.7   Elements of IDE
    1.8   Writing a Simple Application using .NET

UNIT 2:
    2.1   Introduction to and Features of VB.NET
    2.2   Similarities and Differences between Visual Basic and VB.NET
    2.3   Data types supported in VB.NET
    2.4   Variables, Scope of Variables
    2.5   Access Control: Public, Private, Protected, Friend, Protected Friend
    2.6   Various Operators: Arithmetic, Comparison, Assignment, Logical Operators, Concatenation Operators, Operator Precedence

UNIT 3:
    3.1   Programming Concepts of VB.NET: Control Structures: Decision Making Statements, Looping Statements, Other Statements
    3.2   Arrays: Static, Dynamic Arrays, Array Functions
    3.3   Procedures and Functions
    3.4   Parameter Passing: Pass-by-Value, Pass-by-Reference, Optional and Named Arguments
    3.5   Predefined Functions: MsgBox( ), InputBox( ), and other functions

UNIT 4:
    4.1   Introduction to Object Oriented Features of VB.NET: Class, Objects, Overloading, Overriding, Structure
    4.2   Structure: Similarities and Differences with Class
    4.3   Overloading the Methods
    4.4   Shared Members
    4.5   Inheritance
    4.6   Abstract Base Class
    4.7   Interfaces: Differences between Interface and Class

UNIT 5:
    5.1   Introduction to Windows FORMS and Controls

    5.2   Windows Forms: Properties and Methods, Events, MDI Forms
    5.3   Properties and Methods Controls: Label, TextBox, LinkLabel, Button, Radio Button, CheckBox, ListBox, ComboBox, Timer control, Scroll bars, Menu
    5.4   Exception Handling

UNIT 6:

    6.1   Database Connectivity using ADO._NET: Evolution and Features of ADO.NET
    6.2   ADO.NET Object Model
    6.3   Life Cycle of a Thread
    6.4   Overview of Data Provider, Provider Objects: Connection, Command, Data Adapter, Data Reader
    6.5   Overview of DataSet, Types of DataSets
    6.6   Data Object Model and Data Object Model
    6.7   Using Command Objects
    6.8   Data Binding : Simple Binding, Complex Binding
    6.9   Introduction to ASP.NET
    6.10   Differences and Similarities between ASP and ASP.NET
    6.11   Characteristics of ASP.NET
    6.12   Architecture of ASP.NET

REFERENCE BOOKS:

1 Essentials of .NET Programming, C. Komalavalli, Sanjib K Sahu, Ane Books Pvt. Ltd., New Delhi.
2 Visual Basic.NET, Shirish Chavan, Pearson Education, New Delhi.
3 Introduction to Visual Basic.NET, NIIT (PHI).
4 ASP.NET and VB.NET Web Programming, Matt J. Crouch , Pearson Education, New Delhi.
5 Programming VB.NET, Cornell, Gary, IDG.

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SOFTWARE TESTING

Course Code	:	IT 60012(Same as CS 60012)
Course Title	:	Software Testing
Number of Credits	:	3 (L: 3, T: 0, P: 0)
Prerequisites	:	CS 404
Course Category	:	PE

COURSE LEARNING OBJECTIVES:
Essential software testing knowledge and skills, required to reasonably test a system under
Development in a systematic manner.
COURSE OUTCOMES:
Student will develop skills to understand the system, choose suitable testing methods, strategies, tools and technology,
execute and report the test. Student will also be able to understand need and usage of test automation and gain expertise
in at least 1 test automation tool
COURSE CONTENTS:
As per the course design, concepts learned in this course will/should be used in the major project (Proj.202).

UNIT 1: Basics
    1.1   Introduction to Software Quality basics
        1.1.1   Verification and validation
        1.1.2   quality perspectives
    1.2   Testing terminology
    1.3   Software Testing Life Cycle (STLC)
    1.4   "V" model of Testing,
    1.5   QA process, cost of testing, types of tests

UNIT 2: Writing Test Cases
    2.1   Writing test cases
    2.2   Functional Testing, non-functional testing, (Performance testing), UI testing.
    2.3   Preparing test data, Writing Unit test, Integration test and User Acceptance Tests
    2.4   Preparing test scenarios from Software requirements

UNIT 3: Test Execution and Management
    3.1   Test execution
    3.2   Test Oracles
    3.3   Test planning, test strategy including when to stop testing
    3.4   test-coverage- Traceability matrix, JIRA, Bugzilla and other bug tracking tools.
    3.5   Test data mining
    3.6   Test reporting.

UNIT 4: Test Automation
    4.1   Why automation
    4.2   when not to automate
    4.3   writing simple automated test cases,
    4.4   learn and practice any one automated testing framework like Selenium

UNIT 5: Other quality Assurance
    5.1   Quality and Defect management - Code reviews,
    5.2   Quality tools
    5.3   Change management
    5.4   Version control
SUGGESTED LAB WORK:
       Writing and executing test cases of different types for a sample system, may be for the minor project done
earlier; using Bugzilla to report cases; writing performance test cases for different types of test (load, stress,
benchmarking, etc.); Writing automated test for UI, writing-executing test scripts for a sample system.
REFERENCE BOOKS/RESOURCES:
   1.   Software Engineering – A Practitioner's Approach, 7th Edition, Roger Pressman.
   2.   Bugzilla (https://www.bugzilla.org/)
   3.   JIRA (https://www.atlassian.com/software/jira)
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DOT NET TECHNOLOGY LAB

Course Code	:	IT 60021
Course Title	:	Dot Net Technology Lab
Number of Credits	:	1(L: 0, T: 0, P: 2)
Prerequisites	:	-----
Course Category	:	PE

COURSE LEARNING OBJECTIVES:

To introduce students to the domain of Dot Net Programming.

COURSE OUTCOMES:

Student will have general idea about Dot Net Programming.

COURSE CONTENT:

S.No.	Topics for Practice
1	Practice programs on VB.NET using variables and operators.
2	Practice programs on VB.NET using conditional and control structures.
3	Practice programs on VB.NET using Arrays.
4	Practice programs on VB.NET using Inheritance property.
5	Practice programs on VB.NET using Forms.
6	Practice programs on VB.NET using Controls.
7	Practice programs on Database connectivity using ADO.NET.
8	Practice programs on Data Access through ASP.NET
9	Practice programs on ASP.NET using web controls.
10	Practice programs on ASP.NET using Event-handling.
11	Practice programs on ASP.NET using Cookies.

REFERENCE BOOKS:

1 Essentials of .NET Programming, C. Komalavalli, Sanjib K Sahu, Ane Books Pvt. Ltd., New Delhi.
2 Visual Basic.NET, Shirish Chavan, Pearson Education, New Delhi.
3 Introduction to Visual Basic.NET, NIIT (PHI).
4 ASP.NET and VB.NET Web Programming, Matt J. Crouch , Pearson Education, New Delhi.
5 Programming VB.NET, Cornell, Gary, IDG.

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SOFTWARE TESTING LAB.

Course Code	:	IT 60022 (Same as CS 60022)
Course Title	:	Software Testing Lab
Number of Credits	:	1(L: -, T: 0, P: 2) Lab
Prerequisites	:	CS 404
Course Category	:	PE

COURSE LEARNING OBJECTIVES:
Essential software testing knowledge and skills, required to reasonably test a system under
Development in a systematic manner.

COURSE OUTCOMES:
Student will develop skills to understand the system, choose suitable testing methods, strategies, tools and technology,
execute and report the test. Student will also be able to understand need and usage of test automation and gain expertise
in at least 1 test automation tool

COURSE CONTENTS:

1. Test cases of different types for a sample system, may be for the minor project done earlier; using
Bugzilla to report cases
2. Writing performance test cases for different types of test (load, stress, benchmarking, etc.)
3. Writing automated test for UI
4. Writing-executing test scripts for a sample system.

REFERENCE BOOKS/RESOURCES:
4. Software Engineering – A Practitioner's Approach, 7th Edition, Roger Pressman.
5. Bugzilla (https://www.bugzilla.org/)
6. JIRA (https://www.atlassian.com/software/jira)

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