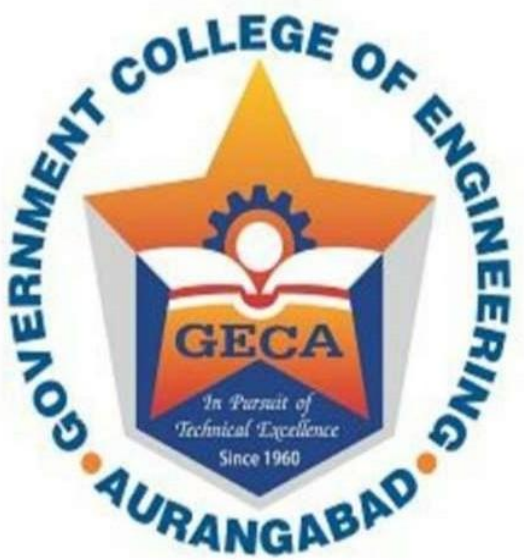

GOVERNMENT COLLEGE OF ENGINEERING AURANGABAD

(An Autonomous Institute of Govt. of Maharashtra)
Station Road, Osmanpura, Aurangabad- 431005 (M.S.)
(0240) 2366101, 2366111, Fax: (0240) 2332835

Department of Information Technology
NEP

Second Year IT Curriculum Structure & Detailed Syllabus (UG Program)

(Effective from: A.Y. 2023-2024)

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Program Specific Outcomes (PSOs)

After successful completion of the program graduates would:

PSO I Apply core IT Knowledge to identify, formulate and solve emerging engineering problems.

PSO II Design, develop and deploy quality software products by applying knowledge of modern IT concepts and tools.

PSO III Apply the skills of IT professionals to develop novel solutions in societal and environmental contexts

Program Educational Objective(s)

After graduation and few years of graduation, the (Information Technology) graduates would

PEO I Interpret, design and analyze data for effective problem solving

PEO II Pursue advanced studies to adapt to current trends

PEO III Attain professional careers and provide services in societal and environmental context for sustainable development

PEO IV Work successfully with effective communication skills, professionalism, team work and ethical attitude

Program Outcome(s)

The program enables students to achieve by the time of graduation:

PO1 **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2 **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6 **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Mapping of PEOs and POs

	Programme Educational Objective(s)	**Program Outcome(s)**
PEO I	Interpret, design and analyze data for effective problem solving	1,2,3
PEO II	Pursue advanced studies to adapt to current trends	3,4,5,6,7,9
PEO III	Attain professional careers and provide services in societal and environmental context for sustainable development	4,5,6,7,8,9,10,11,12
PEO IV	Work successfully with effective communication skills, professionalism, team work and ethical attitude	6,8,10,11,12

GENERAL COURSE STRUCTURE & THEME

A. Definition of Credit:

1 Hr. Lecture (L) per week	1 Credit
1 Hr. Tutorial (T) per week	1 Credit
1 Hr. Practical (P) per week	0.5 Credit
2 Hours Practical (P) per week	1 Credit

B. ***Tentative Credit Distribution and*** **Second Year to Final Year curriculum structure for the completion of B.Tech. in Information Technology degree with one Minor/Honors/Research:**

Structure of B. Tech.in Information Technology with multidisciplinary minor:

Course Types/ Semester	I	II	III	IV	V	VI	VII	VIII	Total
Basic Science Course	8	8		--	--	--	--	--	16
Engineering Science Course	7	7		--	--	--	--	--	14
Programme Core Course (PCC)	--	2	15	11	11	11	--	--	50
Programme Elective Course (PEC)	--	--	--	--	8	6	6	-	20
Multidisciplinary Minor (MD M)		-	4	3	4	3			14
Open Elective (OE) Other than a particular program	--	--	3	3	2	--	--		8
Vocational and Skill Enhancement Course (VSEC)	2	2		2		2	--	--	8
Ability Enhancement Course (AEC -01, AEC-02)		2	--	2	--	--	--	--	4
Entrepreneurship/Economics/ Management Courses	--		2	2				--	4
Indian Knowledge System (IKS)	2			--	--	--	--	--	2
Value Education Course (VEC)	--	--	2	2	--	--	--	--	4
Research Methodology	--	--	--	--	--	--		2	2
Comm. Engg. Project (CEP)/Field Project (FP)	--	--	2	--	--	--		--	2
Project	--	--	--	--	--	2	4	--	6
Internship/ OJT	--	---			--	--		12	12
Co-curricular Courses (CC)	2	2		--	--	--	--	-	4
Total Credits / Semester with MDM	**21**	**23**	**28**	**25**	**25**	**24**	**10**	**14**	**170**
Total Credits / Semester with Double MDM	**21**	**23**	**32**	**28**	**28**	**29**	**13**	**10**	**184**
Honors Credits/ Semester					4	4	4	6	18
Total Credits / Semester with MDM +Honors	**21**	**23**	**28**	**25**	**29**	**28**	**14**	**20**	**188**
Research Credits/ Semester							**9**	**9**	**18**
Total Credits / Semester with MDM+Research	**21**	**23**	**28**	**25**	**25**	**24**	**19**	**23**	**188**

Students can opt for any of the following as per the rules and regulations given by institute:

1. **B.Tech with one Multidisciplinary Minor = Total 170 Credits**
2. **B.Tech with one Multidisciplinary Minor and Honor in A.I.M.L. =Total 188 Credits**
3. **B. Tech with one Multidisciplinary Minor and Honor by Research=Total 188 Credits**
4. **B. Tech with two Multidisciplinary Minors=Total 184 Credits**

Dr. Smita Chavan
Head, IT

Dr. Anil Karwankar
Dean, Academics

Approved Updated Curriculum in XXXth Academic Council Meeting
Dated: 5th July 2025

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Government College of Engineering, Aurangabad

(An Autonomous Institute)

Teaching and Evaluation Scheme from year 2023-2024

B. **Tech. Program in Information Technology with Semester– III and IV**

SEMESTER- III

Sr. No	Category	Course Code	Course Title	Hours per week			Credits	Continuous Evaluation in terms of Marks				Total
				L	T	P		ISE I	ISEI I	ISE III	ESE	
1	PCC	ITPCC2001	Discrete Mathematical Structures	3	0	0	3	15	15	10	60	100
2	PCC	ITPCC2002	Data Structures	3	0	0	3	15	15	10	60	100
3	PCC	ITPCC2003	Object Oriented Programming	3	0	0	3	15	15	10	60	100
4	PCC	ITPCC2004	Computer Networks	3	0	0	3	15	15	10	60	100
5	PCC	ITPCC2005	Lab Data Structures	0	0	2	1	-	-	25	25	50
6	PCC	ITPCC2006	Lab Object Oriented Programming	0	0	2	1	-	-	25	25	50
7	PCC	ITPCC2007	Lab Computer Networks	0	0	2	1	-	-	25	25	50
8	MDM	ITMDM5001/ ITMDM6001	Data Structures and Algorithm	3	0	0	3	15	15	10	60	100
9	MDM	ITMDM5002/ ITMDM6002	Lab Data Structures and Algorithm	0	0	2	1	-	-	25	-	25
10	OE	ITOEC0010	Data Structures and Algorithm	3	0	0	3	15	15	10	60	100
11	VEC	INVEC0010	Universal Human Values -II Understanding Harmony	2	0	0	2	10	10	0	30	50
12	HSSM	ITEEM0010	Professional Ethics and Cyber Laws	2	0	0	2	10	10	0	30	50
13	EXL	ITEXL2001	Community based Project	0	0	4	2	-	-	50	-	50
Total				**22**	**0**	**12**	**28**	**110**	**110**	**210**	**495**	**925**

SEMESTER- IV

Sr. No	Category	Course Code	Course Title	Hours per week			Credits	Continuous Evaluation in terms of Marks				Total
				L	T	P		ISE I	ISEI I	ISEII I	ESE	
1	PCC	ITPCC2010	Statistics, random variables and Linear Algebra	3	0	0	3	15	15	10	60	100
2	PCC	ITPCC2011	Database Management System	3	0	0	3	15	15	10	60	100
3	PCC	ITPCC2012	Operating Systems	3	0	0	3	15	15	10	60	100
4	PCC	ITPCC2013	Lab Database Management System	0	0	2	1	-	-	25	25	50
5	PCC	ITPCC2014	Lab Operating Systems	0	0	2	1	-	-	25	25	50
6	MDM	ITMDM5003 ITMDM6003	Introduction to Database Management Systems	3	0	0	3	15	15	10	60	100
7	OE	ITOEC1020	Introduction to Database Management Systems	3	0	0	3	15	15	10	60	100
8	VSEC-3	ITVSE2001	Lab Computer Programming I(Python Programming)	0	0	2	1	-	-	25	-	25
9	VSEC-3	ITVSE2002	Lab Computer Programming II (FSD - I)	0	0	2	1	-	-	25	-	25
9	AEC02	EEAEC2010	Technical Communication	2	0	0	2	10	10	0	30	50
10	HSSM	ITEEM1020	Business Intelligence	2	0	0	2	10	10	0	30	50
11	VEC	CEVEC0010	Environmental Science	2	0	0	2	10	10	0		50
				21	**0**	**8**	**25**	**105**	**105**	**150**	**440**	**800**

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

ITPCC2001: Discrete Mathematical Structures		
Teaching Scheme	**Examination Scheme**	
Lectures: 03 hrs/ week	**ISE I**	**15 Marks**
Tutorial: -	**ISE II**	**15 Marks**
Credits: 03	**ISE III**	**10 Marks**
	End Semester Examination	**60 Marks**

Prerequisites: - None

Course description:
This course covers fundamental concepts in discrete mathematics with applications to computer science and information technology. Topics include sets, functions, relations, logical connectives, analysis techniques based on counting methods and recurrence relations, trees and graphs and algebraic systems.

Course Outcomes: After completing the course, students will able to:

CO1 Explain the fundamental concepts of sets, logical connectives, relations, functions and algebraic systems
CO2 Solve mathematical problems using mathematical reasoning methods
CO3 Demonstrate discrete problems using sequences, combinatorics and counting techniques
CO4 Apply information theory and non linear data structures for finding effective solutions to a variety of problems.

Detailed Syllabus:

Unit 1 Sets, Combinations of sets, Finite and Infinite sets, Uncountably infinite sets, Mathematical Induction, Principle of inclusion and exclusion, Multisets, Propositions, Logical Connectives, Conditionals and Biconditionals, Logical equivalences, Euclidean Algorithm

Unit 2 Permutations and Combinations: rule of sum and product, Permutations, Combinations, Algorithms for generation of Permutations and Combinations.

Unit 3 Discrete Probability, Conditional Probability, Bayes' Theorem, Information theory and Mutual Information

Unit 4 Relations, Properties of Binary Relations, Closure of relations, Warshall's algorithm, Equivalence relations and partitions, Partial ordering relations and lattices, Chains and Anti chains, Functions, Recursive functions, Pigeon hole principle., Recurrence relation, Linear Recurrence Relations with constant Coefficients, Homogeneous Solutions, Total solutions, solutions by the method of generating functions

Unit 5 Algebraic Systems: Algebraic Systems, Groups, Semi Groups, Monoids, Subgroups, Permutation Groups, Codes and Group codes, Isomorphism and Automorphisms, Homomorphism and Normal Subgroups, Rings, Integral domain and Fields.

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Text and Reference Books

1. 1.C. L. Liu, D. P.Mohapatra, "Elements of Discrete Mathematics", 3rd Edition, Tata McGraw Hill, 2008, ISBN 978-0-07-066913-0
2. R. Johnsonbaugh, "Discrete Mathematics", 5th Edition, Pearson Education, 2001, ISBN 81-7808-279-9
3. G. Shanker Rao, "Discrete Mathematics and Structure", 1st Edition, New Age International publisher, 2003, ISBN 81-224-1424-9
4. B. Kolman, R. Busby and S. Ross, "Discrete Mathematical Structures", 4th Edition, Pearson Education, 2002, ISBN 81-7808-556-9
5. J. Tremblay, R. Manohar, "Discrete Mathematical Structures with application to Computer Science", McGraw-Hill, 2002, ISBN 0-07-065142-6
6. Kenneth H. Rosen: Discrete Mathematics and Its Applications, 5th Edition, Tata McGraw-Hill, 2003, ISBN 0-07-053047-5

Web Resources

1. Introduction to Discrete Mathematics for Computer Science Specialization, offered by University Of California San Diego HSE University, Platform – Coursera
2. Discrete Mathematics, by Prof. Sudarshan Iyengar, Prof. Prabuchandran K.J, IIT Ropar, IIT Dharwad https://nptel.ac.in/courses/106/106/106106183/
3. Discrete Mathematics – IIITB, by Prof. Ashish Choudhury, IIIT Bangalore, https://nptel.ac.in/courses/106/108/106108227/
4. Discrete Structures, Prof. Dipanwita Roychowdhury, IIT Kharagpur. https://Nptel.Ac.In/Courses/106/105/106105192/

Mapping of Course outcomes with Program Outcomes and Program Specific Outcomes

Course outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	1	1									3	1	
CO2		3			2							1	3	1	
CO3	3	2	1	1									3	1	
CO4	3	2	1	1								1	3	1	

3 – High 2 – Medium 1 - Low

Assessment:

ISE I: Class Test-I of Maximum Marks-15
ISE II: Class Test-II of Maximum Marks-15
ISE III: Teacher's Assessment of Maximum Marks-10
Teachers Assessment of 10 marks is based on one of the / or combination of few of following

1) Surprise test
2) Assignment
3) Quizzes
4) Any other activity suggested by course coordinator

ESE: End Semester Examination of Maximum Marks-60

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	End Semester Examination
K1	Remember	5	5	2	10
K2	Understand	7	7	3	20

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

K3	Apply	3	3	5	20
K4	Analyze	-	-	-	10
K5	Evaluate	-	-	-	-
K6	Create	-	-	-	-
Total Marks 100		15	15	10	60

Assessment table:

Assessment Tool	K2	K3	K3	K3
	CO1	CO2	CO3	CO4
ISE I(15 Marks)	6	5	2	2
ISEII (15 Marks)	2	3	5	5
ISEIII (10 Marks)	2	2	3	3
ESE Assessment (60 Marks)	10	20	20	10
Total Marks 100	20	30	30	20

ITPCC2002 : Data Structure		
Teaching Scheme	**Examination Scheme**	
Lectures: 03 hrs/ week	**ISE I**	**15 Marks**
Tutorial: 0	**ISE II**	**15 Marks**
Credits:03	**ISE III**	**10 Marks**
	End Semester Examination	**60 Marks**

Course Description: This course covers some of the general-purpose data structures and algorithms, and software development. It is aimed at helping you understand the reasons for choosing structures or algorithms. This course covers concepts of various data structures like stack, queue, list, tree and graph. Additionally, the course includes idea of sorting and searching.

Course Outcome: After completing the course, students will be able to

CO1 Understand basic data structures and their use in fundamental algorithms.

CO2 Select appropriate data structure as applied to specified problem definition.

CO3 Compare asymptotic notations of algorithms to analyze the consumption of resources

CO4 Apply searching, sorting, insertion, deletion, traversing mechanism on primitive and non-primitive data structures

CO5 Apply abstract data types using arrays and linked list

Detailed Syllabus:

Unit 1 **Introduction to data structure:** Definition, types of data structure, The Arrays as an ADT: Using One-Dimensional Arrays, Using Two-Dimensional Arrays, Definition and Examples, **Searching & Sorting searching -** classification on the basis of big-O notation , Different sorting techniques, such as selection sort, bubble sort, merge sort, quick sort, heap sort, shell sort, radix sort, comparisons between different sorting techniques, Sequential searching, index Sequential searching binary searching.

Unit 2 **The Stacks& Queues :** The stack as an ADT, Operations on stack, Stack implementations, Stack applications, The queue and its sequential representation, The queue as an ADT, Basic Definition, types of queue as Circular Queue, priority queue, applications of queue

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Unit 3 Linear Data Structure & their representation : Definition, concept, types of linked lists, singly linked list, Circular linked lists, singly circular linked list, Doubly linked lists, Operations like insertion, deletion, insertion in order, searching, updating , Applications of linked lists such as polynomial manipulation, Comparison of singly linked, circularly linked & doubly linked list

Unit 4 Trees: Definition, Basic terminology, operation on binary trees, linked storage representation for binary search trees, Basic operation on binary search tree such as creating a binary search tree, searching, modifying ,inserting & deleting the element, destroy a binary search tree, tree traversals ,in-order, pre-order, post-order , tree application for expression evaluation , height balanced trees, B trees, B+ trees, AVL trees

Unit 5 Graph: Definitions, basic terminology, matrix representation & implementation of graphs, graph travels, DFS, BFS, Shortest path - Dijkstra's algorithm, Floyd's algorithm, spanning tree- Prim's algorithm, Kruskal's algorithm

Text Books & Reference Books

1. Yedidyah Langsam, Moshe J. Augenstein, Aaron M.Tenenbaum, "Data Structures using C and C++", Pearson Pub.
2. G.S. Baluja, "Principles of Data Structures using C and C++"
3. G. S. Baluja, "Data Structures Through (A Practical approach)Dhanpat Rai & Co(P) LTD.
4. Yashavant P Kanetkar, "Data Structures through C", BPB Pub.
5. Ellis Horowitz, Sartaj Sahni, "Fundamentals of Data Structures"
6. Robert L Kruse, "Data Structures and Program Design", PHI

Web Resources

1. https://nptel.ac.in/courses/106102064 Data Structures And Algorithms, IIT Delhi
2. https://nptel.ac.in/courses/106106127 Programming, Data Structures and Algorithms, IIT Madras
3. https://repository.dinus.ac.id/docs/ajar/Principles_of_Data_Structures_Using_C_and_C++.pdf
4. https://cse01-iiith.vlabs.ac.in/ Virtual Lab Data Structures

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes

Course outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	1	1	2								3	3	3
CO2	2	3	2	2	3								3	3	2
CO3	2	2	3	2									2	2	2
CO4	3	3	2	2	3								3	2	3
CO5	3	2	2	3	3								3	2	2

3– High 2 – Medium 1 - Low

Assessment:

ISE I: Class Test-I of Maximum Marks-15

ISE II: Class Test-II of Maximum Marks-15

ISE III: Teacher's Assessment of Maximum Marks-10

Teachers Assessment of 10 marks is based on one of the / or combination of few of following

1) Power point presentation
2) Question & answer / Numerical solution
3) Surprise test
4) Any other activity suggested by course coordinator

ESE: End Semester Examination of Maximum Marks-60

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	End Semester Examination
K1	Remember	05	05	00	10
K2	Understand	10	10	05	25
K3	Apply	00	00	05	25
K4	Analyze	00	00	00	00
K5	Evaluate	00	00	00	00
K6	Create	00	00	00	00
Total Marks 100		15	15	10	60

Assessment table:

Assessment Tool	K1	K2	K3
	CO1	CO2,CO3	CO4,CO5
ISE I (15 Marks)	05	10	00
ISE II (15 Marks)	05	10	00
ISE III (10 Marks)	00	05	05
ESE Assessment (60 Marks)	10	25	25
Total Marks 100			

ITPCC2003 : Object Oriented Programming		
Teaching Scheme	**Examination Scheme**	
Lectures: 03 hrs/ week	**ISE I**	**15 Marks**
Tutorial: 0	**ISE II**	**15 Marks**
Credits:03	**ISE III**	**10 Marks**
	End Semester Examination	**60 Marks**

Course description: Object Oriented Programming is designed to create sophisticated programs to solve real-world problems using object oriented approach. The course emphasizes to improve the logical thinking of the students.

Course Outcomes: After completing the course, students will able to:

CO1 Explain the necessity for Object Oriented Programming paradigm over Procedure Oriented Programming.

CO2 Demonstrate the fundamental concepts and principles of object oriented programming.

CO3 Make use of Java standard API library to write an object oriented system.

CO4 Apply Multithreading and Exception handling concepts to develop efficient and error free codes.

CO5 Select object oriented principles and techniques to implement real world applications.

Detail Syllabus:

Unit 1 **Introduction to Object Oriented Concepts:**

Procedure Oriented Programming, Object Oriented Programming, Comparison of Object Oriented Programming with Procedure Oriented Programming, The Byte code, Java Development Kit (JDK), Garbage collection, Console I/O, variables and reference variables, arrays, operators, control statements, type conversion and casting, Function Prototyping, Function Overloading, Introduction to Classes and Objects, member functions and member data, objects and functions, objects and arrays, Constructors, Static block, Static Data, Static Method, String and String Buffer Classes

Unit 2 **Inheritance, Polymorphism, Packages and Interfaces:**

Basic concepts, Types of inheritance, Member access rules, Usage of this and Super key word, Method Overloading, Method overriding, Abstract classes, Dynamic method dispatch, Usage of final keyword, Defining package, Access protection, importing packages, Defining and Implementing interfaces, and Extending interfaces

Unit 3 **Exception handling and Multithreading:**

Exception types, Usage of Try, Catch, Throw, Throws and Finally keywords, Built-in Exceptions, Creating own Exception classes, Concepts of Thread, Thread life cycle, creating threads using Thread class and Runnable interface, Synchronization, Thread priorities, Inter Thread communication

Unit 4 **JDBC:**

Introduction, JDBC Architecture, Types of Drivers, Making the Connection, Statement, Result Set , Prepared Statement, Callable Statement, Executing SQL commands, Executing queries. BLOB & CLOB

Unit 5 **Collection Framework:**

Introduction, util Package interfaces, List, Set, Map, List interface & its classes, Set interface & its classes, Map interface & its classes, Introduction to Tree, Hash, Stack, Queue.

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Text and Reference Books:

1. Herbert Schildt, "*The Complete Reference Java2",* 7th Edition, TMH Publications.
2. E Balguruswamy, *"Programming with Java - A Primer"*
3. Cay S. Horstmann, Gary Cornell*, "Core Java Volume II"* - Pearson Education.
4. StevenHolzner, "*Java 2 Black Book*", Dreamtech Pub.
5. Head First Java, O'rielly publications
6. T. Budd (2009), An Introduction to Object Oriented Programming, 3rd edition,PearsonEducation, India.
7. Y. Daniel Liang (2010), Introduction to Java programming, 7th edition, Pearson education, India.

Web Resources:

NPTEL course : Programming In Java https://onlinecourses.nptel.ac.in/noc22_cs47

Virtual Lab: Core Java Programming https://java-iitd.vlabs.ac.in/

Mapping of Course outcome with Program Outcomes:

Course outcome	Program Outcomes												PSO's		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1														
CO2		1									1	1	1	1	
CO3														2	
CO4									1					2	
CO5	2	2	3	1	1	1		1	2	2	2	1	3	3	1

3 – High 2 – Medium 1 – Low

Assessment:

ISE I: Class Test-I of Maximum Marks-15

ISE II: Class Test-II of Maximum Marks-15

ISE III: Teacher's Assessment of Maximum Marks-10

Teachers Assessment of 10 marks is based on one of the / or combination of few of following

1) Course projects
2) Powerpoint presentation
3) Question & answer
4) Any other activity suggested by course coordinator

ESE: End Semester Examination of Maximum Marks-60

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	End Semester Examination
K1	Remember	00	00	00	00
K2	Understand	03	03	05	24
K3	Apply	12	12	05	36
K4	Analyze	00	00	00	00
K5	Evaluate	00	00	00	00
K6	Create	00	00	00	00
Total Marks 100		15	15	10	60

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Assessment Table:

Assessment Tool	**K2**	**K3**
	CO1, CO2	CO3,CO4, CO5
ISE I (15 Marks)	03	12
ISE II (15 Marks)	03	12
ISE III (10 Marks)	00	10
ESE (60 Marks)	24	36

ITPCC2004: Computer Networks		
Teaching Scheme	**Examination Scheme**	
Lectures: 03 hrs/ week	**ISE I**	**15 Marks**
Tutorial: 0	**ISE II**	**15 Marks**
Credits:03	**ISE III**	**10 Marks**
	End Semester Examination	**60 Marks**

Course Description: From conventional small-scale networks to modern high-speed mobile and wireless Internet, the Internet domain has evolved at a rapid pace. To meet the demands for establishing a secure and highly trustworthy information technology infrastructure, a vast number of methodologies, systems, and designs were developed at each protocol level. The course is designed in Top-down approach to understand the network architecture, protocols and their functionalities and also the requirements for the future Internet design.

Course Outcomes: After completing the course, students will able to:

CO1 Differentiate between layered network architectures and components used in networking
CO2 Explain functionalities of various protocols at different layers
CO3 Describe the network components, protocols and services used for establishing computer network
CO4 Use appropriate protocols and algorithms based on the networking requirements
CO5 Distinguish between different routing, transportation and application strategies for the Internet

Detailed Syllabus:

Unit 1 **Introduction to Computer Networks**
Types of networks, Topologies, Network Models: ISO-OS and TCP/IP network architectures, Services at the Different Layers, Circuit Switching and Packet Switching, Delay, Loss, and Throughput, Network under Attack

Unit 2 **Application Layer:**
Principles of Network Applications, The Web and HTTP , File Transfer Protocol (FTP), Electronic Mail in the Internet, DNS-The Internet's Directory Service, Peer-to-Peer Sharing

Unit 3 **Transport Layer**
Introduction and Transport-Layer Services, Multiplexing and Demultiplexing, Connectionless Transport-UDP, Principles of Reliable Data Transfer , Connection-Oriented Transport , Principles of Congestion Control , TCP Congestion Control
Socket Programming

Unit 4 **Network Layer**
Introduction, Virtual Circuit and Datagram Networks, Working of Router, The Internet Protocol (lP): Forwarding and Addressing in the Internet, Routing Algorithms, Routing in the Internet, Broadcast and Multicast Routing

Unit 5 **The Link Layer and Local Area Networks**
Link Layer: Introduction and Services , Error-Detection and -Correction Techniques, Flow Control, Error Control, Media Access Control - Channel Access Protocols, Framing, Multiple Access Protocols, Link-Layer Addressing, Ethernet, Link-Layer Switches, PPP: The Point-to-Point Protocol , Link Virtualization: A Network as a Link Layer

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Text and Reference Books

1. "Computer Networking- a top-down approach featuring the Internet", by James F. Kurose and Keith W. Ross, Person Education, ISBN-10- 0132856204, 6th Edition.
2. "Data Communications and Networking", by Forouzan B. A, Tata McGraw-Hill Publications, 2006, ISBN-0-07-063414-9, 4th edition.
3. "Computer Networks", by Tanenbaum A. S., Pearson Education , 2008, ISBN- 978-81-7758-165-2, 4th Edition
4. "Computer Networks- A Systems Approach", by Larry L. Peterson and Bruce S. Davie, Morgan Kaufmann, ISBN-978-81-312-1045-1, 4th Edition.
5. "Computer Networks and Internet", by Comer D., Pearson Education, ISBN-81-297- 0330-0, 2nd Edition.

Web Resources:

NPTEL course : Computer Networks And Internet Protocol :
:https://nptel.ac.in/courses/106/105/106105183/

Virtual Lab: Advanced Computer Networks http://vlabs.iitkgp.ac.in/ant/

Virtual Lab: Computer Networks http://vlabs.iitb.ac.in/vlabs-dev/labs_local/computer-networks/labs/explist.php

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes

Course outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2						1					1		
CO2	1	2													
CO3	1			1											
CO4	1		2	2								2	2		2
CO5	1		2	3							1	2	2	1	3

3 – High 2 – Medium 1 - Low

Assessment:

ISE I: Class Test-I of Maximum Marks-15

ISE II: Class Test-II of Maximum Marks-15

ISE III: Teacher's Assessment of Maximum Marks-10

Teachers Assessment of 10 marks is based on one of the / or combination of few of following

1) Quiz
2) Question & answer / Numerical solution
3) Power point presentation
4) Simulation
5) Mini projects
6) Virtual Lab Assignments
7) Any other activity suggested by course coordinator

ESE: End Semester Examination of Maximum Marks-60

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	End Semester Examination
K1	Remember	05	00	00	10
K2	Understand	10	05	00	20
K3	Apply	00	10	05	20
K4	Analyze	00	00	05	10
K5	Evaluate	00	00	00	00
K6	Create	00	00	00	00
Total Marks 100		15	15	10	60

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Assessment Tool	**K2**	**K2**	**K3**	**K4**
	CO1,CO2	CO1,C02,CO3	CO3, CO4	CO5
ISE I (15 Marks)	10	05	00	00
ISE II (15 Marks)	10	05	00	00
ISE III (10 Marks)	00	00	05	05
ESE Assessment (60 Marks)	15	15	20	10
Total Marks 100				

ITPCC2005: Lab Data Structure		
Teaching Scheme	**Examination Scheme**	
Practical: 2Hrs/Week	**ISE I (Term Work)**	**25 Marks**
Credits:01	**End Semester Evaluation**	**25 Marks**

Course Outcomes: After completion of this course students will be able to:	
CO1	Interpret neat code by selecting appropriate data structure
CO2	Discover the ability to write reusable code and abstract data types in C
CO3	Identify appropriate data types and algorithms for solving real life problems
CO4	Design and implement abstract data types with static or dynamic representation.

List of the Experiments:

The student shall perform minimum ten experiments of the following using TURBO C, C++/ Code Blocks.

Sr. No.	Title of the Experiments	Skill / Knowledge Level	CO
1	Create an array of n integers. Perform following operations on array 1. Accept a value(item) from user and insert it into specified position 2. Delete a value(item) from specified position from given array 3. Display the content of the array	S2	CO1, CO3
2	Implement following program 1.Sort the following lists in ascending order using selection sort and quick sort Eg.56, 57, 92,38,44,90,61,73,22,87,54,21	S1	CO1, CO2
3	Implement following program 1.Sort the following lists in ascending order using radix sort and bubble sort Eg. 156, 57, 192,38,44,9,1,713,122,87,54,21	S1	CO1, CO2
4	Accept n array elements, perform following operations: a) Accept a number from user b) Apply following searching techniques on it, if number is found in given array; display the position of the number. 1. Linear search 2. Binary search	S3	CO2, CO3
5	Implement C program to accomplish the following stack operations. a)Push b)Pop c) Stack empty d)Stack Full e)Stack Empty	S2	CO2, CO3, CO4
6	Write C Program to convert following infix expression into prefix , postfix. Eg.(A+B)*(C^D)/H	S3	CO4, CO3, CO4
7	Implement Simple queue and Circular queue to perform following operations. 1. Insert an elements 2. Deleting an element 3. Queue is Empty 4. Queue is Full 5. Display the element of queue.	S3	CO2, CO3, CO4
8	Implement Singly linked list to perform following operations. 1. Insert a number in the beginning , Specified position and ending position of the list 2. Delete a number from the beginning , Specified position and ending position of the list	S3	CO2, CO3, CO4

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

9	Implement Circular Doubly linked list to perform following operations. 3. Insert a number in the beginning , Specified position and ending position of the list 4. Delete a number from the beginning , Specified position and ending position of the list	S3	CO2, CO3, CO4
	Any Two		
10	Create a binary tree to perform following operations 1. Insert a node 2. Search for a node 3. Deletion of a node 4. Traverse tree in inorder, preorder, postorder	S4	CO2, CO3, CO4
11	Implement a program to Traverse a Given graph using BFS and DFS	S4	CO2, CO3, CO4
12	Implement a c program to find shortest path using following techniques. 1. Dijkstra's Algorithm 2. Prim's Algorithm 3. Kruskal's Algorithm	S4	CO2, CO3, CO4

Assessment:
ISE I (Term Work) : In-Semester Evaluation of 25 marks each will be based on practical assignments completed and timely submission

End Semester Evaluation: The ESE will be based on oral / practical performance of the students

Assessment Table:

Assessment Tool	K1	K2	K3	K3
	CO1	CO2	CO3	CO4
Term work (25Marks)	06	07	06	06
Practical Examination & Viva Voce (25 Marks)	06	07	06	06

Assessment Pattern: Use the relevant table for assessment pattern.

Assessment Pattern Level No.	**Knowledge Level**	**ISE I**	**End Semester Examination**
S1	Imitation	06	06
S2	Manipulation	07	07
S3	Precision	06	06
S4	Articulation	06	06
S5	Naturalization	00	00
Total Marks		25	25

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes

Course outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	3		2								3	2	1
CO2	3	3	3		3								3	2	2
CO3	3	3	3	3	2							2	1	3	1
CO4	3	3	3	1	2								2	3	3

3 – High 2 – Medium 1 – Low

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

ITPCC2006: Lab Object Oriented Programming		
Teaching Scheme	**Examination Scheme**	
Practical: 2Hrs/Week	**ISE I (Term Work)**	**25 Marks**
Credits:01	**End Semester Evaluation**	**25 Marks**

Course Outcomes After completion of this course students will be able to:	
CO1	Understand the development environment for compiling, debugging and executing Java program.
CO2	Implement Object Oriented Programming concepts using Java programming.
CO3	Make use of Collection framework and streams.
CO4	Demonstrate exception handling, multithreading and JDBC

List of the Experiments:

The student shall perform minimum ten experiments of the following using Java

Sr. No.	Title of the Experiments	Skill / Knowledge Level	CO
1	Write a Java program to convert time in seconds to hours, minutes and seconds and display the output in format HH:MM:SS	S1	CO1
2	Write a Java program to rearrange all the elements of a given array of integers so that all the odd numbers come before all the even numbers.	S2	CO2
3	Write a Java program that accepts three integers from the user and return true if two or more of them (integers) have the same rightmost digit. The integers are non- negative.	S2	CO2
4	Create a Java class called Complex with the following details as member variables within it. (i) Real (ii) Imaginary. Develop a Java program to perform addition and subtraction of two complex numbers by using the method add() and subtract( ) respectively, by passing object as parameter and display result using method display(). Initialize the real and imaginary values of the complex number using parameterized constructor. Also demonstrate overloading constructors and methods.	S2	CO2
5	Design an Address class with member variables Street num, city, state and country and appropriate constructor. Design a Student class with constructor (Student (String USN, String Name, String addr)), College class with constructor (College (String Name, String addr)) and Employee class with constructor (Employee (String EmpID, String Name, String addr)). Write a Java program to create 'n' Student objects, College Objects and Employee objects and print the student, college and employee addresses respectively and demonstrate passing of object as a parameter to the constructor.	S2	CO2
	Any Three		
6	**JDBC:** Develop a Java application to perform CRUD operation using JDBC.	S3	CO4
7	**Collection Framework:** Demonstrate the concept of different types of Collection Framework like List, Map and Set etc.	S3	CO3

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

8	**Exception Handling:** Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw Number Format Exception. If Num2 were Zero, the program would throwan Arithmetic Exception. Display the exception in a message dialog box.	S3	CO4
9	**Multithreading:** Write a Java program that implements a multithreaded program with three threads. First thread generates a random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd the third thread will print the value of cube of the number.	S3	CO4
10	**Abstract classes, Inheritance & polymorphism:** Write a java program to create an abstract class named shape that contains two integers and an empty method named printArea(). Create three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class shape. Each one of the class contains only the method printArea() that print the area of the given shape	S3	CO2
	Any Two		
11	Write a Java program for the following: i) Create a doubly linked list of elements. ii) Delete a given element from the above list. iii) Display the contents of the list after deletion	S3	CO4
12	Write a java program to simulate a traffic light. The program lets the user select one of the three lights: red, yellow or green. On selecting a button, an appropriate message with ”Stop” or “Ready” or “ Go” should appear above the buttons selected color.	S3	CO4
13	Write a Java program that implements Quick sort algorithm for sorting a list of names in ascending order.	S3	CO4

Assessment:
ISE I (Term Work) : In-Semester Evaluation of 25 marks each will be based on practical assignments completed and timely submission

End Semester Evaluation: The ESE will be based on oral / practical performance of the students

Assessment Table:

Assessment Tool	**S1**	**S2**	**S3**
	CO1	CO2, CO3	CO4
ISE I (Term Work)	00	10	15
End Semester Evaluation (Practical Examination & Viva Voce)	00	10	15

Assessment Pattern:

Assessment Pattern Level No.	**Knowledge Level**	**ISE I**	**End Semester Examination**
S1	Imitation	05	05
S2	Manipulation	10	10
S3	Precision	10	10
S4	Articulation	00	00
S5	Naturalization	00	00
	Total Marks	25	25

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes:

Course outcome	Program Outcomes												PSO's		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1		1	2	1								1	1	1
CO2			2	1	1								1	1	1
CO3					2		1		1		2	2	1	1	1
CO4							2		3		2	3			

3 – High 2 – Medium 1 - Low

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

ITPCC2007 : Lab Computer Networks		
Teaching Scheme	**Examination Scheme**	
Practical: 2Hrs/Week	**ISE I**	**25 Marks**
Credits:01	**End Semester Evaluation**	**25 Marks**

Course Outcomes: After completion of this course students will be able to:

CO1 Exercise delay, throughput, addressing and network commands

CO2 Demonstrate algorithms and protocols used on different layers

CO3 Develop an ability to simulate LAN, routing, flow control, congestion control and reliable data transfer

CO4 Analyze network packets using Tools

Suggestive list of the Experiments:

The student shall perform minimum ten experiments of the following using TURBO C/C++/ Java/Python

Sr. No.	Title of the Experiments	Skill / Knowledge Level	CO
1	Write a program for data transfer to simulate working of Physical Layer. Write two separate programs for sender and receiver, Sender Side: 1) accept a string, convert each character into ASCII and ASCII to Binary. Receiver Side: 1) Read Binary values sent by the sender, convert into ASCII and further convert ASCII to Character and finally display the string received.	S1	CO1
2	Use *ping* command along with at least five options for five different hosts and compare the results **ping** [**-t**] [**-a**] [**-n** *count*] [**-l** *size*] [**-f**] [**-i** *TTL*] [**-v** *TOS*] [**-r** *count*] [**-s** *count*] [**-w** *timeout*] [**-R**] [**-S** *srcaddr*] [**-p**] [**-4**] [**-6**] *target* [/**?**]P Perform a Trace Route for destination on three times hours of the day. a. Find the average and standard deviation of the round-trip delays at each of the three hours. b. Find the number of routers in the path at each of the three hours. Did the paths change during any of the hours? c. Try to find the physical location of the destination and check if the delay is influenced by the distance **TraceRoute Command Syntax** **tracert** [**-d**] [**-h** *MaxHops*] [**-w** *TimeOut*] [**-4**] [**-6**] *target* [/**?**]	S1	CO2
3	Write a program to find the Class of an IP address and also check the subnet mask	S1	CO2

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

4	To explore propagation delay and transmission delay, consider two hosts, A and B, connected by a single link of rate R bps. Suppose that the two hosts are separated by m meters, and suppose the propagation speed along the link is s meters/sec. Host A is to send a packet of size L bits to Host B. Write a program to calculate i) propagation delay, dprop = m/ s ii) transmission time of the packet, dtrans= L /R. iii) endtoend delay de-to-e = dprop+ dtrans (ignoring processing and queuing delays) (Eg Suppose s = $2.5*10^8$, L = 120 bits, and R = 56 kbps. Find the distance m so that dprop equals dtrans. Check the output for different input values)	S2	CO1
5	Host A then groups the bits into y-byte packets. There is one link between Hosts A and B; its transmission rate is z Mbps and its propagation delay is d msec. As soon as Host A gathers a packet, it sends it to Host B. As soon as Host B receives an entire packet, it converts the packet's bits to an analog signal. To calculate the time elapse from the time a bit is created (from the original analog signal at Host A) until the bit is decoded (as part of the analog signal at Host B). Write a program to calculate : i) Time required to build the packet = (y/x) msec ii) Time required to transmit the packet=(y/z) msec iii) Consider propagation delay w msec, and calculate Total delay	S2	CO2
6	Leaky bucket consists of a bucket that can hold up to *b* tokens. If the bucket is filled with less than *b* tokens when a token is generated, the newly generated token is added to the bucket; otherwise the newly generated token is ignored, and the token bucket remains full with *b* tokens. Write a program to simulate Leaky bucket algorithm	S2	CO3
	Any three		
7	Write a program for DNS lookup. Given an IP address input, it should return URL and vice-versa.	S2	CO1
8	Write a program for error detection and correction for 7/8 bits ASCII codes using CRC	S3	CO3
9	Write a program to simulate the behavior of link state routing protocol to find suitable path for transmission	S3	CO3
10	Write a program to simulate the behavior of distance vector routing protocol	S3	CO4
	Any two		
11	Simulate a Local Area Network using Network Simulator 2 (Virtual Labs may be used) OR Use Wireshark for Packet sniffing and analysis		
12	Write a program to simulate Go back N Mode of Sliding Window Protocol in peer to peer mode	S3	CO3
13	Write a program to simulate Selective Repeat Mode of Sliding Window Protocol in peer to peer mode	S3	CO3
14	Write a program using sockets for wired network to implement Peer to Peer Chat	S3	CO1

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Assessment:
ISE I (Term Work) : In-Semester Evaluation of 25 marks each will be based on practical assignments completed and timely submission

End Semester Evaluation: The ESE will be based on oral / practical performance of the students

Assessment Pattern:

Assessment Pattern Level No.	**Knowledge Level**	**ISE I**	**End Semester Examination**
S1	Imitation	04	04
S2	Manipulation	08	08
S3	Precision	10	05
S4	Articulation	03	03
S5	Naturalization	00	05
Total Marks		25	25

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes

Course outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	3	2										2		3
CO2	1	2	2										2		1
CO3	1		2										2		1
CO4	1	3	1	2	3								2		3

3 – High 2 – Medium 1 - Low

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

ITOEC0010/ ITMDM5001/ITMDM6001 : Data Structures and Algorithm		
Teaching Scheme	**Examination Scheme**	
Lectures: 03 hrs/ week	**ISE I**	**15 Marks**
	ISE II	**15 Marks**
Credits: 03	**ISE III**	**10 Marks**
	End Semester Examination	**60 Marks**

Course description:
The course covers basics of data structures and algorithms. Topics covered in this course include abstraction, stack, queues, lists, trees, and graphs, sorting and complexity of algorithm. The course enables the students to design good efficient solutions to real world problems.
Course Outcomes: After completing the course, students will able to:

- **CO1** Describe data structures arrays, stacks and queues
- **CO2** Interpret linked lists, trees and graphs
- **CO3** Demonstrate best-case, average-case and the worst-case running times of algorithms using asymptotic analysis for various sorting and searching problems
- **CO4** Choose the standard design techniques of algorithms and their applications

Detailed Syllabus:

Unit 1 Introduction to data structures, Concept of Data type, Data object, Need of Data Structure, Types of Data Structure, Linear data structures, Introduction to Arrays, sorting algorithms with efficiency, Stacks, static and dynamic representation of stack, Stack Operations , Applications of stack, Queues, static & dynamic representation of queues, Operations on queues, Circular queue, priority queues

Unit 2 Linked List, Implementation of List, Types of Linked List, Operations on List, Applications of Linked List, Trees, basic terminology, operation on binary trees, linked storage representation for binary search trees, basic operations on binary search tree, tree traversals, applications of trees

Unit 3 Graphs: basic terminology, matrix representation & implementation of graphs, graph traversals, spanning trees. Algorithm: definition, characteristics, Need for Analysis, Space complexity, time complexity, Asymptotic notations, Space complexities

Unit 4 Divide and conquer basic strategy and its complexity, Sorting algorithms such as selection sort, insertion sort, bubble sort, heap sort, binary search, quick sort, merge sort

Unit 5 Greedy method - Basic strategy and its complexity, application to job sequencing with deadlines problem, Knapsack problem. Dynamic Programming - Basic strategy and its complexity, principle of optimality, multistage graphs, travelling salesman problem, Backtracking basic strategy, 8-Queen's problem, Hamiltonian cycles

Text and Reference Books

1. Yedidyah Langsam, Moshe J. Augenstein, Aaron M.Tenenbaum, "Data Structures using C and C++ " , Pearson Pub.
2. G.S. Baluja, "Principles of Data Structures using C and C++", Dhanpat Rai & Co.,4th Edition
3. Computer Algorithms : Horowitz, Sahani, Rajsekharan , Galgotia Publications Pvt.Ltd
4. Fundamentals of Algorithms: Brassard, Bratley , Prentice Hall

Web Resources

1. https://nptel.ac.in/courses/106102064
2. https://nptel.ac.in/courses/106106127
3. https://www.coursera.org/specializations/data-structures-algorithms

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Mapping of Course outcomes with Program Outcomes and Program Specific Outcomes

Course outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12
CO1	3	2	1	1	1							1
CO2	3	2	1	1	1							1
CO3	3	2	1	1	1							
CO4	3	2	1	1	1							1

3 – High 2 – Medium 1 - Low

Assessment:
ISE I- Maximum Marks-15
ISE II- Class Test of Maximum Marks-15
ISE III-Teacher's Assessment of Maximum Marks-10

ISE I and ISE III -May be based on one of the / or combination of few of following

1) Class Test/ Surprise test/ MCQ Test
2) Assignment
3) Quizzes
4) Any other activity suggested by course coordinator

ESE-End Semester Examination of Maximum Marks-60

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	End Semester Examination
K1	Remember	05	05	2	10
K2	Understand	05	05	3	25
K3	Apply	05	05	5	25
K4	Analyze	-	00	00	00
K5	Evaluate	-	00	00	00
K6	Create	-	00	00	00
Total Marks 100		**15**	**15**	**30**	**60**

Assessment table:

Assessment Tool	K2	K2	K3	K3
	CO1	CO2	CO3	CO4
ISE I(15 Marks)	6	5	2	2
ISEII(15 Marks)	2	3	5	5
ISEIII (10 Marks)	2	2	3	3
ESE Assessment (60 Marks)	10	20	20	10
Total Marks 100	**20**	**30**	**30**	**20**

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

ITMDM5002/ITMDM6002 : Lab Data Structures and Algorithm		
Teaching Scheme	**Examination Scheme**	
Practical: 2Hrs/Week	**ISE I (Term Work)**	**25 Marks**
Credits:01		

Course Outcomes: After completion of this course students will be able to:

CO1 Interpret neat code by selecting appropriate data structure

CO2 Discover the ability to write reusable code and abstract data types in C

CO3 Identify appropriate data types and algorithms for solving real life problems

CO4 Design and implement abstract data types with static or dynamic representation.

List of the Experiments:

The student shall perform minimum ten experiments of the following using TURBO C, C++/ Code Blokes.

Sr. No.	Title of the Experiments	Skill / Knowledge Level	CO
1	Create an array of n integers. Perform following operations on array 1. Accept a value(item) from user and insert it into specified position 2. Delete a value(item) from specified position from given array 3. Display the content of the array	S2	CO1, CO3
2	Implement following program Sort the lists in ascending order using any sorting method	S1	CO1, CO2
3	Implement C program to accomplish the following stack operations.a)Push b)Pop c) Stack empty d)Stack Full e)Stack Empty	S1	CO1, CO2
4	Accept n array elements, perform following operations: a) Accept a number from user b) Apply following searching techniques on it, if number is found in given array; display the position of the number. 1. Linear search	S3	CO2, CO3
5	Implement Simple queue to perform following operations. 1. Insert an elements 2. Deleting an element 3. Queue is Empty 4. Queue is Full Display the element of queue.	S2	CO2, CO3, CO4
6	Write C Program to convert following infix expression into prefix , postfix. Eg.(A+B)*(C^D)/H	S3	CO4, CO3, CO4
7	Implement Singly linked list to perform following operations. 1. Insert a number in the beginning , Specified position and ending position of the list Delete a number from the beginning , Specified position and ending position of the list	S3	CO2, CO3, CO4
8	plement recursive and iterative algorithms for specific problems.	S2	CO3, CO4
9	Write a program for finding maximum and minimum using divide and	S2	CO3

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

	conquer approach		

Assessment:

ISE I (Term Work) : In-Semester Evaluation of 25 marks each will be based on practical assignments completed and timely submission

Assessment Table:

Assessment Tool	K1	K2	K3	K3
	CO1	CO2	CO3	CO4
Term work(25Marks)	06	07	06	06

Assessment Pattern: Use the relevant table for assessment pattern.

Assessment Pattern Level No.	**Knowledge Level**	**ISE I**	**End Semester Examination**
S1	Imitation	06	06
S2	Manipulation	07	07
S3	Precision	06	06
S4	Articulation	06	06
S5	Naturalizatio n	00	00
Total Marks		25	25

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes

Course outcome	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12
CO1	3	2	3		2							
CO2	3	3	3		3							
CO3	3	3	3	3	2							2
CO4	3	3	3	1	2							

3 – High 2 – Medium 1 – Low

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

ITPCC2010: Statistics, Random Variables and Linear Algebra	
Teaching Scheme **Lectures : 3 Hrs/Week** **Total Credits : 03**	**Examination Scheme** **Class Test-I : 15 Marks** **Class Test-II : 15 Marks** **Teachers Assessment : 10 Marks** **End Semester Exam : 60 Marks**

Course Description: MABS 2012 Engineering Mathematics-IV is a compulsory course for second year IT students of the institute. The course aims to equip the students with statistical tools and concepts that help in decision-making. This course is intended to provide engineering students a coherent and balanced account of probability and statisticsthat form the basis of many engineering analysis tools. This course gives exposure on vector spaces and linear mapping.

Course objectives:

1. Create interest in students in statistical thinking.
2. To understand, analyze, and solve problems on random variables statistics, significance testing and goodness of fit tests for probability distributions
3. Understand vector spaces
4. Understand concepts of linear mapping and orthogonality.

Course Outcomes expected: On completion of this course student should be able to:

CO1 Define the basic concepts of probability distributions, random variable and sampling, vector spaces, subspaces, basis, linear transformation, eigenvalues, eigen vectors.

CO2 Explain the concepts of random variable, probability distributions and population parameters of large or small size sample, range and kernel of LT, inverse of LT, symmetric, skew-symmetric, and orthogonal matrices, Gram-Schmidt orthogonalization.

CO3 Find lines of regression, best fit of curve by least square methods. probability by using binomial distribution, poisson distribution, normal distribution, variance, standard deviation in terms of expectations, matrix associated with a linear map.

CO4 Compute and interpret the results of bi-variate regression and correlation analysis, for forecasting

CO5 Apply the regression techniques (least square method) and correlation techniques to the sample data, testing hypothesis for small and large samples, non-parametric tests for significance testing and goodness of fit of the probability distribution. Gram-Schmidt orthogonalization to find Orthogonal Basis.

Detailed Syllabus:

Unit-I Statistics: Measures of central tendency, dispersion, moments, skewness and kurtosis, correlation coefficient, lines of regression, curve fitting, method of least square, straight lines, second degree parabola, exponential and power curves, binomial distribution, poisson distribution, normal distribution.

Unit-II Random Variables: Random variable, discrete random variables, continuous random variables, definition of distribution and types of distribution: p.d.f, p.m.f, c.d.f. of random variables, characteristic function of random variables, univariate and bivariate distribution and its marginal distribution. Mathematical Expectations: Mathematical expectation: definition and properties, mean, variance, standard deviation in terms of expectations, moment generating function, characteristics function.

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Unit-III Sampling and Tests of Significance: Basic concepts sampling and its type (simple random, stratified and cluster), its needs; types of hypothesis, types of error, critical region; level of significance, procedure of testing hypothesis, test of significance: large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations, test for single mean, difference of means and correlation coefficients, test for ratio of variances - chi-square test for goodness of fit and independence of attributes.

Unit-IV **Linear Algebra-I:** Vector space, linear dependence of vectors, basis, dimension; linear transformations (maps), range and kernel of a linear map, rank and nullity, inverse of a linear transformation, rank-nullity theorem, composition of linear maps, matrix associated with a linear map.

Unit-V **Linear Algebra-II:** Eigen values, eigenvectors, symmetric, skew-symmetric, and orthogonal matrices, eigen bases, Diagonalization; inner product spaces, Gram-Schmidt orthogonalization.

Text and Reference Books:

1. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, S. Chand & Sons.
2. S.C. Gupta , Fundamentals of Statistics, Himalaya Publishing House
3. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010
5. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
6. Ross, S.M., "Introduction to Probability and Statistics for Engineers and Scientists", Elsevier, New Delhi, 5th Edition, 2004.

Mapping of Course outcome with Program Outcomes (Information Technology)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2										2
CO2	3	2		1								2
CO3	3	2	1	2								2
CO4	3	2	2	2								2
CO5	3	2	2	3								2

3 – High, 2 – Medium, 1 – Low

Teaching Strategies:

The teaching strategy planned through the lectures, and team based home works. Exercises assigned weekly to stimulate the students to actively use and revise the learned concepts, which also help the students to express their way of solving the problems fluently in written form. Most critical concepts and mistakes emphasized

Assessment:

ISE I-Class Test-I of Maximum Marks-15
ISE II-Class Test-II of Maximum Marks-15
ISE III-Teacher's Assessment of Maximum Marks-10

Teachers Assessment of 10 marks is based on one of the / or combination of few of following

1) Surprise test
2) Question & answer / Numerical solution
3) Quiz
4) Assignment using Mathematical tools like Mathematica/MatLab or similar
5) Any other activity suggested by course coordinator

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I (Class Test-1)	ISE II (Class Test-2)	ISE III (TA + Surprise Test)	End Semester Examination
K1	Remember	01	03		
K2	Understand	14	12	10	60
K3	Apply				
K4	Analyze				
K5	Evaluate				
K6	Create				
Total Marks 100		15	15	10	60

ITPCC2011 : Database Management System		
Teaching Scheme	**Examination Scheme**	
Lectures: 03 hrs/ week	**ISE I**	**15 Marks**
Tutorial: 0	**ISE II**	**15 Marks**
Credits:03	**ISE III**	**10 Marks**
	End Semester Examination	**60 Marks**

Course Description: Database Management System. In short, a DBMS is a database program.
Technically speaking, it is a software system that uses a standard method of cataloging, retrieving, and running queries on data. The DBMS manages incoming data, organizes it, and provides ways for the data to be modified or extracted by users or other programs. Some DBMS examples include MySQL, PL/SQL, Microsoft Access, SQL Server, FileMaker, Oracle, RDBMS, dBASE, and FoxPro. Since there are so many database management systems available, it is important for there to be a way for them to communicate with each other.

Course Outcome: After completing the course, students will able to

CO1	Understand the basic concepts and architecture associated with DBMS
CO2	Translate entity-relationship diagrams into relational tables, populate a relational database and formulate SQL queries on the data
CO3	Apply normalization steps in database design and removal of data anomalies
CO4	Identify basic database storage structures and access techniques: file and page organizations, indexing methods
CO5	Analyze the principles and concepts of information integrity, security, confidentiality and transaction control

Detailed Syllabus:

Unit 1 **Introduction:** Database defination, Necessity of database, DBMS, Examples, Characteristics of the Database Approach, Advantage of using a Database Approach, Database System Architecture, Data Models, Schemes and Instances, Data Independence, Database Languages and Interfaces, Database System Environment, Classification of Database Management Systems. Database users and administrator.

Unit 2 **ER Models, Relational Models:** Different types of integrity constraints-Primary Key, Unique , Foreign key, Check, Not Null, Super key, Candidate Key,
E-R model- Entity, Entity set, Strong and Weak entity ,Entity-Relationship Diagrams, Entity-Relationship Design Issues, Weak Entity Sets, Attributes- Simple, Derived, Composite, Multi valued, Identifier, Relationship, Associative entity, Cardinality constraints, Degree of relationship. E-R diagram naming conventions and design issues. Examples, Extended E_R Features.
Relational Models:-the Relational Data Model, the Relational Algebra: Fundamental Relational-Algebra Operations, Additional Relational-Algebra Operations, Extended Relational-Algebra operations. ER-to-Relational Mapping

Unit 3 **SQL:** Background, Structure of SQL Queries, Data Definition language-Create, alter, Describe, Drop, Truncate clause, create table using Integrity constraints Select clause, Set Operations, Functions-single row functions-general, conversion, date, character, Multiple row functions -Aggregate Functions, Group by clause, Having clause, Nested Sub queries, Complex Queries, Views, Modification of the Data-DML-Insert, Update, Delete, Different types of joins
Advanced SQL :, Authorization and transaction control SQL clauses, Embedded SQL, Introduction to PL/SQL-Cursor, triggers, Procedures.

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Unit 4 Database Designing and Storage: Relational Database Design: Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Functional-Dependency Theory, Decomposition Using Functional Dependencies, Decomposition using Multivalued Dependencies, More Normal Forms up to BCNF.

Unit 5 Query Processing and Transaction Processing: Overview of Query Processing, Measures of Query Cost, Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation. Transaction support in SQL Concurrency control techniques, concurrency control based on timestamp based protocol, validation based protocol, deadlock handling, Database Recovery Techniques based on Immediate Update, Failure classification, Shadow Paging, Log based recovery, failure with loss of Nonvolatile Storage

Text Books & Reference Books

1. Abraham Silberschatz and Henry Korth, Sudarshan : Database System Concepts, 5th Edition, ISBN : 0-07-120413X, Tata McGraw-Hill. Author, Title of the book, Publisher, Edition, Year of publication
2. Elmasri and Navathe : Fundamentals of Data base Systems (5th Ed.), Addison-Wesley, 1999.
3. Raghu Ramakrishnan, "Database Management System", Tata McGraw-Hill Publishing Company, 2003.
4. Hector Garcia–Molina, Jeffrey D.Ullman and Jennifer Widom- "Database System Implementation"- Pearson Education- 2000. 3. Peter Rob and Corlos Coronel- "Database System Concepts", Cengage Learning Edition 2008

Web Resources

1. **https://onlinecourses.nptel.ac.in/noc19_cs46/preview**
2. https://onlinecourses.swayam2.ac.in/cec21_cs11/course

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	2	2	1									1		
CO2	1	2	2										2	2	2
CO3		2	3	3									2	2	3
CO4		1	1											1	
CO5			2	3									1	1	

3– High 2 – Medium 1 – Low

Assessment:

ISE I-Class Test-I of Maximum Marks-15
ISE II-Class Test-II of Maximum Marks-15
ISE III-Teacher's Assessment of Maximum Marks-10

Teachers Assessment of 10 marks is based on one of the / or combination of few of following

1) Surprise test
2) Question & answer / Numerical solution
3) Quizzes
4) Power point presentation
5) Any other activity suggested by course coordinator

ESE-End Semester Examination of Maximum Marks-60

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	End Semester Examination
K1	Remember	05	05	00	05
K2	Understand	10	10	05	25
K3	Apply	00	00	05	18
K4	Analyze	00	00	00	12
K5	Evaluate	00	00	00	00
K6	Create	00	00	00	00
Total Marks 100		15	15	10	60

Assessment table:

Assessment Tool	**K2**	**K2**	**K3**	**K4**
	CO1	CO2,CO3	CO4	CO5
ISE I (15 Marks)	05	10	00	00
ISE II (15 Marks)	05	10	00	00
ISE III (10 Marks)	00	02	05	03
ESE Assessment (60 Marks)	10	20	18	12
Total Marks 100				

ITPCC2012: Operating System		
Teaching Scheme	**Examination Scheme**	
Lectures: 03 hrs/ week	**ISE I**	**15 Marks**
Tutorial: 0	**ISE II**	**15 Marks**
Credits:03	**ISE III**	**10 Marks**
	End Semester Examination	**60 Marks**

Course Description: This course covers mechanisms, algorithms, and techniques used to build an operating system. It gives description about the operating system structure and the hardware support for building modern operating systems. We will cover processes, threads, inter-process communication, synchronization, and CPU scheduling. We will discuss in detail memory management. Finally, we will introduce I/O, file systems, and OS security issues.

Course Outcome: After completing the course, students will able to

CO1 Interpret fundamental concepts, structures, layers and types of OS

CO2 Apply process scheduling using various types of system call to find process states

CO3 Analyze synchronization techniques for interprocess communication.

CO4 Classify the mechanisms adopted for memory management and file management

CO5 Examine the issues related to security in OS

Detailed Syllabus:

Unit 1 **Introduction to operating system:** introduction to OS, evolution of Oss, functions of OS, OS structure, types of operating systems, basics of system calls.

Unit 2 **Process Management:** Concept of a process: states, operations with examples from UNIX (fork, exec) and/or Windows. Process scheduling, interprocess communication (shared memory and message passing), UNIX signals.
Threads: multithreaded model, scheduler activations, examples of threaded programs.
Scheduling: multi-programming and time sharing, Context switch, scheduling algorithms, multiprocessor scheduling, and thread scheduling (examples using POSIX threads).

Unit 3 **Process Synchronization**: critical sections, classical two process and n-process solutions, hardware primitives for synchronization, semaphores, monitors, classical problems in synchronization (producer-consumer, readers-writer, dining philosophers, etc.).
Deadlocks: characterization, prevention and avoidance, detection and recovery.

Unit 4 **Memory Management:** Basic concepts of memory, types of memory, swapping, paging segmentation, fragmentation, demand paging, virtual memory, page replacement algorithms, working set model, implementations from operating systems such as UNIX, windows, current Hardware support for paging e.g. Pentium/ MIPS processor.

Unit 5 **File Management and security of OS:** Secondary storage and Input/output, device controllers and device drivers file systems, directory structure, disks, disk space management, disk scheduling, NFS, RAID, other devices, Operations on them, UNIX FS, UFS protection and security, NFS. Protection and security: Illustrations of security model of UNIX and other OSs. Examples of attacks.

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Text Books & Reference Books

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Operating System Concepts, 8th Ed., John Wiley, 2008.
2. William Stallings, Operating Systems: Internals and Design Principles. Prentice-Hall, 6th Ed., 2008.
3. AS Tanenbaum, Modern Operating Systems, 3rd Ed., Pearson, 2009.
4. AS Tanenbaum, AS Woodhull, Operating Systems Design and Implementation, 3rd Ed., Prentice Hall, 2006.
5. M. J. Bach. Design of the Unix Operating System, Prentice Hall of India, 1986.

Web Resources

- https://nptel.ac.in/courses/106106144
- https://www.os-book.com/OS9/slide-dir/index.html

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes

Course outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	3	1	2	2								3	2	2
CO2		1	2	3	2								2	3	2
CO3		1	1	3	3						2		2	3	2
CO4			1	2	3		2						2	2	3
CO5				2	3	2	2	2			2	1	2	2	3

3– High2 – Medium 1 – Low

Assessment:

ISE I-Class Test-I of Maximum Marks-15
ISE II-Class Test-II of Maximum Marks-15
ISE III-Teacher's Assessment of Maximum Marks-10

Teachers Assessment of 10 marks is based on one of the / or combination of few of following

1) Surprise test
2) Question & answer / Numerical solution
3) Quizzes
4) Power point presentation
5) Any other activity suggested by course coordinator

ESE-End Semester Examination of Maximum Marks-60

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	End Semester Examination
K1	Remember	05	00	00	05
K2	Understand	10	05	05	20
K3	Apply	00	05	05	20
K4	Analyze	00	05	00	10
K5	Evaluate	00	00	00	05
K6	Create	00	00	00	00
Total Marks 100		15	15	10	60

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Assessment table:

Assessment Tool	**K1**	**K2**	**K3**
	CO1	CO2,CO3	CO4,CO5
ISE I (15 Marks)	05	10	00
ISE II (15 Marks)	00	10	05
ISE III (10 Marks)	00	05	05
ESE Assessment (60 Marks)	10	25	25
Total Marks 100			

ITPCC2013: Lab Database Management System		
Teaching Scheme	**Examination Scheme**	
Practical: 2Hrs/Week	**ISE I (Term Work)**	**25 Marks**
Credits:01	**End Semester Evaluation**	**25 Marks**

Course Outcomes: After completion of this course students will be able to:

- **CO1** Identify and test SQL queries using DDL and DML commands
- **CO2** Discover the need for logical operation, set operators, UNION, DISTINCT, LIKE, and use them appropriately
- **CO3** Evaluate PL/SQL queries
- **CO4** Design ER-models to represent simple database application scenarios

List of the Experiments:

Sr. No.	Title of the Experiments	Skill / Knowledge Level	CO
1	To Study different types of Oracle/ MySQL etc Data types	S1	CO1,CO2
2	To Study and Implement different types of DDL commands.	S1	CO1
3	To study and Implement different types of DML commands.	S2	CO1
4	To study and Implement different integrity constraints	S3	CO1,CO2
5	To Implement different types SQL functions	S3	CO1,CO2
6	To Implement subqueries.	S3	CO1,CO2 , CO4
7	To study and Implement views.	S3	
8	To Implement different types of joins	S3	CO1,CO2 , CO4
9	Study of Open Source Databases : MySQL	S4	CO1,CO2
10	Design at least 10 SQL queries for suitable database application using SQL DML statements: Insert, Select, Update, Delete with operators, functions, and set operator	S3,S4	CO1,CO2 ,CO3
11	To study and Execute cursor and procedure in PL/SQL	S4	CO1,CO2 , CO3
12	To study and Execute trigger in PL/SQL	S4	CO1,CO2 , CO4

Assessment:
ISE I (Term Work): In-Semester Evaluation of 25 marks will be based on practical assignments completed and timely submission
End Semester Evaluation: The ESE will be based on oral / practical performance of the students

Assessment Table:

Assessment Tool	S1	S2	S3	S4
	CO1	CO2	CO3	CO4
Term work(25Marks)	06	07	06	06
Practical Examination & Viva Voce(25 Marks)	06	07	06	06

Assessment Pattern: Use the relevant table for assessment pattern.

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Assessment Pattern Level No.	Knowledge Level	ISE I	End Semester Examination
S1	Imitation	06	06
S2	Manipulation	07	07
S3	Precision	06	06
S4	Articulation	06	06
S5	Naturalization	00	00
Total Marks		25	25

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes

Course outcome	O1	O2	O3	O4	O5	O6	O7	O8	O9	O 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	2	1											1	
CO2	1	2	2	3									1	1	2
CO3	1	2	3	2										2	2
CO4		2	3	3	2									3	3

3 – High 2 – Medium 1 - Low

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

ITPCC2014 : Lab Operating System		
Teaching Scheme	**Examination Scheme**	
Practical: 2Hrs/Week	**ISE I (Term Work)**	**25 Marks**
Credits:01	**End Semester Evaluation**	**25 Marks**

Course Outcomes: After completion of this course students will be able to:	
CO1	Make use of different system and I/O calls, UNIX commands and shell programming.
CO2	Demonstrate algorithms for process scheduling and process synchronization.
CO3	Determine interprocess communication and memory management schemes.
CO4	Select and implement security solutions, file handling to manage projects.

List of the Experiments:

The student shall perform minimum ten experiments of the following using variants of OSs

Sr. No.	Title of the Experiments	Skill / Knowledge Level	CO
1	Installation guidelines of various operating systems.	S1	CO1
2	Basic commands interpretation using OS features.	S1	CO1
3	Implement shell programming.	S1	CO1
4	Implement system calls fork (), exec () etc. and observe process states.	S2	CO1,CO2
5	Simulate the following CPU scheduling algorithms (any two) a) FCFS b) SJF c) Round Robin d) Priority.	S3	CO2
6	Simulate Bankers Algorithm for Dead Lock Avoidance and Dead Lock Prevention	S3	CO3
7	Write a C program to simulate producer-consumer problem using Semaphores.	S3	CO2,CO3
8	Write a C program to simulate the concept of Dining-philosophers problem.	S3	CO2,CO3
9	Write a C program to simulate the following contiguous memory allocation Techniques a) Worst fit b) Best fit c) First fit.	S3	CO3,CO4
10	Simulate all page replacement algorithms (any two) a)FIFO b) LRU c) OPTIMAL	S4	CO3,CO4
11	Write a C program to simulate disk scheduling algorithms(any two) a) FCFS b) SCAN c) C-SCAN	S4	CO3,CO4
12	Simulate all file allocation strategies a) Sequential b) Indexed c) Linked.	S4	CO3,CO4

Assessment:

ISE I (Term Work): In-Semester Evaluation of 25 marks will be based on practical assignments completed and timely submission

End Semester Evaluation: The ESE will be based on oral / practical performance of the students

Assessment Table:

Assessment Tool	S1	S2	S3	S4
	CO1	CO2	CO3	CO4
Term work(25Marks)	06	07	06	06

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Practical Examination & Viva Voce(25 Marks)	06	07	06	06

Assessment Pattern: Use the relevant table for assessment pattern.

Assessment Pattern Level No.	**Knowledge Level**	**ISE I**	**End Semester Examination**
S1	Imitation	06	06
S2	Manipulation	07	07
S3	Precision	06	06
S4	Articulation	06	06
S5	Naturalization	00	00
Total Marks		25	25

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1		3	2	3								1	3	3
CO2			2	3	3								1	3	3
CO3					2		3		3		2	2	1	3	3
CO4							3		2		1	1			

3 – High 2 – Medium 1 – Low

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

ITVSE2001: Computer Programming Lab-I		
Teaching Scheme	**Examination Scheme**	
Practical: 2Hrs/Week	**ISE I (Term Work)**	**25 Marks**
Credits:01		

Course Outcomes: After completion of this course students will be able to:

- **CO1** Understand python environment and implement codes with object oriented concepts
- **CO2** Identify built-in libraries of Python and requirements appropriate to its solution.
- **CO3** Apply appropriate method for data visualization
- **CO4** Select and apply appropriate techniques on reading data from a file using Python

Suggested list of Practicals in Python

Sr. No.	Title of the Experiments	Skill / Knowledge Level	CO
1	**Programming List Control Statements** A. Write a program to display reverse of the entered number. B. Program to print Fibonacci series upto nth number. C. Write a program to display multiplication tables from 1 to 5. D. Read the String "Hello World" from the user. Make use of ***continue*** keyword and remove space.	S1	CO1, CO3
2	**Programming List on Functions** A. Program to find the factorial of a number. B. Write a simple program to demonstrate the use of keyword andpositional argument. C. Write a program to pass a number and return square and cub of numbersimultaneously. D. Write a function calc_Distance(x1, y1, x2, y2) to calculate the distancebetween two points represented by Point1(x1, y1) and Point2 (x2, y2). *Theformula for calculating distance is given below:* $Distance = \sqrt{(\square_2 - \square_1)^2 + (\square_2 - \square_1)^2}$	S2	CO1, CO2
3	**Programs on List, Tuple and Dictionaries** A. Consider the list with 5 different Celsius values. Convert all those Celsiusvalues to Fahrenheit. B. Write a Program to traverse the tuples from a list. C. Consider the following example of tuple, T = (1, 3, 2, 4, 6, 5) Write a program to store numbers present at odd index into the new tuple. D. Write a function histogram that takes string as parameter and generatesa frequency of characters contained in it. Input:S = "AAPPLE". The program should create a dictionary D= {'A': 2, 'E': 1, 'P': 2, 'L': 1}.	S2	CO2, CO3

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

4	**Program on Module (Math Module)** A. Write a program to calculate the hypotenuse of Right angle triangle givenbelow. B. Programs on String: Write a program to print all the letters fromword1 that also appear in word2. Example: Word1 = USA North AmericaWord2= USA South America. C. Program on Class and Object-Oriented Programming. D. Write a program to calculate the volume of a box. Note: Make use of Constructor, Member variable, and Member Functions.	S3	CO2, CO3, CO4
5	**To use of Matplotlib library** A. Make use of Jupiter Notebook to run the codes to represent the following datain plots. (Line plot,Barplot,scatter plot). B. Draw subplot for following line equations : 1.Y=x 2.Y=x^2 3.Y=X^3. C. Draw sine wave and cosine wave in same plot.	S3	CO2, CO3, CO4
6	**To use of Matplotlib library** A. Make use of Jupyter Notebook to run the codes to represent the following datain plots. (Line plot,Barplot,scatter plot). B. Draw subplot for following line equations : 1.Y=x 2.Y=x^2 3.Y=X^3. C. Draw sine wave and cosine wave in same plot.	S3	CO2, CO3, CO4
7	To create Graphical User interfaces (GUIs) in python	S4	CO2, CO3, CO4
8	To create connectivity between Python and MySQL DATABASE.	S4	CO2, CO3, CO4

Text and Reference Books

1. Mark Lutz, Programming Python O'REILLY.
2. John M. Zelle Python Programming: Introduction to Computer Science.
3. https://www.geeksforgeeks.org/creating-a-pandas-series/

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO8	PO 9	PO 10	PO11	PO 12	PS O1	PS O2	PS O3
CO1	3	2	3		2								3	2	1
CO2	3	3	3		3								3	2	2
CO3	3	3	3	3	2							2	1	3	1
CO4	3	3	3	1	2								2	3	3

1 –Low 2 – Medium 3 – High

Mapping of Course outcome with Program Outcomes

Assessment Table

Assessment Tool	S1	S2	S3	S4
	CO1	CO2	CO3	CO4
Term Work (50 Marks)	12	14	12	12

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Recommended Assessment pattern

Assessment Pattern Level No.	Skill Level	Term Work	End Semester Examination
S1	Imitation	12	12
S2	Manipulation	14	14
S3	Precision	12	12
S4	Articulation	12	12
S5	Naturalization	00	00
Total		50	50

ISE I (Term Work): In-Semester Evaluation of 25 marks will be based on practical assignments completed and timely submission
End Semester Evaluation: The ESE will be based on oral / practical performance of the students

ITVSE2002: Computer Programming Lab-II (Full Stack Web Development)		
Teaching Scheme	**Examination Scheme**	
Practical : 2Hrs/Week	**ISE I (Term Work)**	**25 Marks**
Credits:01		

Course Outcomes After completion of this course students will be able to:	
CO1	Use HTML,CSS for Front-End Web UI using modern Frameworks and Tools
CO2	Implement JavaScript and Query for manipulation of the DOM
CO3	Experiment with Angular, React, NodeJS, Express, and MongoDB for server-side development
CO4	Develop a fully-functional website

List of the Experiments:

Sr. No.	Title of the Experiments	Skill / Knowledge Level	CO	
Front-End Web UI Development Frameworks and Tools(HTML5, CSS3, BOOTSTRAP5)				
1	Create a webpage with HTML describing your department with following specification: a. Change the background color of page. At the bottom create a link to take user to the top of the page. b. Insert an image and create a link such that clicking on image takes user to other page. c. Also apply font styling like italics, underline, and two other fonts to words you find appropriate. Also use header tags.	S2	CO1	
2	Design a web page using for a Technical Festival, responsive with media queries	S2	CO2	
BASICS OF JS, DOM, JQUERY				
3	Create a web pages of a e-commerce website using Bootstrap framework. 1. Index page 2. Login page with validations.	S2	CO2	
4	Create a simple web page to demonstrate **JS, DOM, JQUERY**	S3	CO2	
NODEJS, EXPRESS JS				
5	Install node js and create a server using express js and create a weather application using weather api from rapid api.	S3	CO3	
6	Create a news webpage using html, css, bootstrap with node js and expressjs at backend with news api	S3	CO3	
ANGULAR, REACTJS, GIT, GITHUB				
7	Develop angular and react components Or Create a calculator using react and angular	S3	CO3	
8	Upgrade keeper app using react props, react devtools, mapping components, etc	S4	CO3	
MONGODB, DEPLOYMENT				
9	Design and develop MongoDB Queries using CRUD operations	S3,S4	CO3	

Assessment Table:

Assessment Tool				
	CO1	CO2	CO3	CO4
Term work (25Marks)	03	10	22	15

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Assessment Pattern: Use the relevant table for assessment pattern.

Assessment Pattern Level No.	Knowledge Level	ISE I
S1	Imitation	00
S2	Manipulation	09
S3	Precision	17
S4	Articulation	09
S5	Naturalization	15
Total Marks		25

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes

Course outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1			1	3							2		1	
CO2	1	2	2		3							2	3	2	
CO3		2	2	2	3							2	1	2	
CO4		3	3	2	3							2	2	1	3

3 – High 2 – Medium 1 - Low

Assessment Table:

Assessment Tool	S2	S2	S3	S3	S4
	CO1	CO2	CO3	CO4	CO4
Term work	2	3	5	5	5

Assessment:

Assessment Pattern Level No.	Knowledge Level	ISE I
S1	Imitation	00
S2	Manipulation	05
S3	Precision	05
S4	Articulation	10
S5	Naturalization	05
Total Marks		25

ISE I (Term Work): In-Semester Evaluation of 25 marks will be based on practical assignments completed and timely submission

End Semester Evaluation: The ESE will be based on oral / practical performance of the students

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

ITOEC1020/ITMDM5003/ ITMDM6003: Introduction to Database Management System		
Teaching Scheme	**Examination Scheme**	
Lectures: 03 hrs/ week	**ISE I**	**15 Marks**
Tutorial: 0	**ISE II**	**15 Marks**
Credits:03	**ISE III**	**10 Marks**
	End Semester Examination	**60 Marks**

Course Description: Database Management System. In short, a DBMS is a database program. Technically speaking, it is a software system that uses a standard method of cataloging, retrieving, and running queries on data. The DBMS manages incoming data, organizes it, and provides ways for the data to be modified or extracted by users or other programs. Some DBMS examples include MySQL, PL/SQL, Microsoft Access, SQL Server, FileMaker, Oracle, RDBMS, dBASE, and FoxPro. Since there are so many database management systems available, it is important for there to be a way for them to communicate with each other.

Course Outcome:	
CO1	Understand the basic concepts and architecture associated with DBMS
CO2	Translate entity-relationship diagrams into relational tables, populate a relational database and formulate SQL queries on the data
CO3	Identify basic database storage structures and access techniques: file and page organizations, indexing methods
CO4	Analyze the principles and concepts of information integrity, security, confidentiality and transaction control

Detailed Syllabus:

Unit 1	**Introduction:** Database defination, Necessity of database, DBMS, Examples, Characteristics of the Database Approach, Advantage of using a Database Approach, Database System Architecture, Data Models, Schemes and Instances, Data Independence, Database Languages and Interfaces,
Unit 2	**ER Models, Relational Models:** Different types of integrity constraints-Primary Key, Unique , Foreign key, Check, Not Null, Super key, Candidate Key, **E-R model**- Entity, Entity set, Strong and Weak entity ,Entity-Relationship Diagrams, Entity-Relationship Design Issues, Weak Entity Sets, Attributes- Simple, Derived, Composite, Multi valued, Identifier, Relationship, Associative entity, Cardinality constraints, Degree of relationship. E-R diagram naming conventions and design issues. **Relational Models:**- Relational Data Mode and Relational Algebra: Fundamental Relational-Algebra Operations, Additional Relational-Algebra Operations, Extended Relational-Algebra operations. ER-to-Relational Mapping
Unit 3	**SQL:** Background, Structure of SQL Queries, Data Definition language-Create, alter, Describe, Drop, Truncate clause, create table using Integrity constraints Select clause, Set Operations, Functions-single row functions-general, conversion, date, character, Multiple row functions -Aggregate Functions, Group by clause, Having clause, Nested Sub queries, Complex Queries, Views, Modification of the Data-DML-Insert, Update, Delete, Different types of joins
Unit 4	**Relational Database Design**: Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Functional-Dependency Theory, Decomposition Using Functional Dependencies, Decomposition using Multivalued Dependencies, Normalization
Unit 5	**Query Processing and Transaction Processing:** Overview of Query Processing, Measures of Query Cost,Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation. Transaction support in SQL Concurrency control techniques

Text Books & Reference Books

1. Abraham Silberschatz and Henry Korth, Sudarshan : Database System Concepts, 5th Edition, ISBN : 0-07-120413X, Tata McGraw-Hill. Author, Title of the book, Publisher, Edition, Year of publication
2. Elmasri and Navathe : Fundamentals of Data base Systems (5th Ed.), Addison-Wesley, 1999.
3. Raghu Ramakrishnan, "Database Management System", Tata McGraw-Hill Publishing Company, 2003.
4. Hector Garcia–Molina, Jeffrey D.Ullman and Jennifer Widom- "Database System Implementation"- Pearson Education- 2000. 3. Peter Rob and Corlos Coronel- "Database System Concepts", Cengage Learning Edition 2008

Web Resources

https://onlinecourses.nptel.ac.in/noc19_cs46/preview

https://onlinecourses.swayam2.ac.in/cec21_cs11/course

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes

Course outcome	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12
CO1	1	2	2	1								
CO2	1	2	2									
CO3		2	3	3								
CO4		1	1									
CO5			2	3								

3– High 2 – Medium 1 - Low

Assessment Pattern:

Assessment Pattern Level No.	**Knowledge Level**	**ISE I**	**ISE II**	**ISE III**	**End Semester Examination**
K1	Remember	05	05	00	05
K2	Understand	10	10	05	25
K3	Apply	00	00	05	18
K4	Analyze	00	00	00	12
K5	Evaluate	00	00	00	00
K6	Create	00	00	00	00
Total Marks 100		15	15	10	60

Assessment table:

Assessment Tool	**K2**	**K2**	**K3**	**K4**
	CO1	CO2,CO3	CO4	CO5
ISE I (15 Marks)	05	10	00	00
ISE II(15 Marks)	05	10	00	00
ISE III (10 Marks)	00	02	05	03
ESE Assessment (60 Marks)	10	20	18	12
Total Marks 100				

Special Instructions if any: Nil

Teacher's Assessment: Teachers Assessment of 10 marks is based on one of the / or combination of few of following

1) Power point presentation
2) Question & answer / Numerical solution
3) Surprise test

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

ITEEM0010 : Professional Ethics and Cyber Laws		
Teaching Scheme	**Examination Scheme**	
Lectures: 02 hrs/ week	**ISE I**	**10 Marks**
Tutorial: 0	**ISE II**	**10 Marks**
Credits: 02	**End Semester Examination**	**30 Marks**

Course Description:

This course is aimed at to make students familiar with the fundamental concepts of computer ethics, ethical decision making, Cybercrimes and cyber laws. Also it covers fundamental; rights, Intellectual Property Issues in Cyber Space and international perspectives of cyber laws and jurisdiction.

Course Outcome: After completion of this course students will be able to:

CO1 Define the fundamental concepts of computer ethics, ethical decision making, cyber crime and cyber law

CO2 Illustrate computer ethics, ethical decision making, cyber crime and cyber law

CO3 Identify and classify various cybercrimes with respect to organizational weaknesses.

CO4 Apply Information to individual role and ethics responsibility towards society.

CO5 Determine the legal bases for the right to privacy and freedom of expression in one's own nation and how those concepts vary from country to country.

Detailed Syllabus:

Unit 1 An Overview of Ethics. Moral v/s Ethics, Why Computer Ethics, Philosophical Ethics: Distinguishing Descriptive and Normative Claims, Ethical Relativism, Utilitarianism, Deontological Theories, Rights, Virtue Ethics, Ethics for IT Professionals and IT Users – Various Scenarios. Foundations of Information Ethics. Ethical Issues Involving Computer Security: Hacking, Hacktivism, and Counter hacking

Unit 2 Ethical Decision Making: Types of ethical choices, Making defensible decisions, Ethical dilemmas, law and ethics. Crime incident Handling Basics: Hacking, cyber activism, Tracking hackers, clues to cyber crime, privacy act, search warrants, common terms, organizational roles, procedure for responding to incidents, reporting procedures, legal considerations Information Technology Act 2000,IT. Scope, jurisdiction, offense and contraventions, powers of police, adjudication

Unit 3 Introduction: Cybercrime and Information Security, Cybercriminals, Classifications of Cybercrimes Cyber offenses How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Digital Forgery, Cyber Stalking/Harassment, Cyber Pornography, Identity Theft & Fraud, Cyber terrorism.

Unit 4 Fundamental rights and duties in Cyberspace, Right to Privacy, Right to Data Protection, Intellectual Property Issues in Cyber Space: Copyright Law, Patent Law, Trademarks & Domain Names Related issues, right and liabilities of the government and public servant, The judicature.

Unit 5 Introduction: Perspectives of Various Stakeholders and Challenges for International Law, Jurisdiction and Attribution of State Responsibility in Cyberspace, Regulation of Cyberspace and Human Rights, Cyber Terrorism, Future Prospects of Public International Law of Cyberspace

Text Books & Reference Books

1. Deborah G Johnson, " *Computer Ethics*", Pearson Education Pub., ISBN : 81-7758-593-2
2. Nina Godbole, Sunit Belapure, "Cyber Security", Wiley India, New Delhi
3. Public International Law of Cyberspace by Kriangsak Kittichaisaree
4. Earnest A. Kallman, J.P Grillo, "*Ethical Decision making and IT: An Introduction with*

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Cases", McGraw Hill Pub.
5. Dr. Durga Das Basu introduction to constitution of India

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						3	1		2		3	
CO2						3	1		2		3	
CO3				2		1	3					
CO4						3					2	
CO5						1			2			

3– High 2 – Medium 1 – Low

Assessment:

ISE I It shall be based on one of the / or combination of few of: Class test, MCQs test, Surprise test, Mini project, Case studies etc. Maximum marks shall be 15

ISE II It shall be based on class test of maximum 15 marks

ISE III It shall be based on one of the / or combination of few of: Power point presentation, Question & answer / Numerical solution, Surprise test/classroom activity, Attendance, punctuality and sincerity throughout semester, assignments etc. Maximum marks shall be 10

ESE It shall be based on written examination of maximum 60 marks

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	End Semester Examination
K1	Remember	05	00	00	10
K2	Understand	05	05	00	10
K3	Apply	00	05	00	10
K4	Analyze	00	00	00	00
K5	Evaluate	00	00	00	00
K6	Create	00	00	00	00
Total Marks 100		10	10	00	30

Assessment Tool	**K2**	**K2**	**K3**	**K4**
	C01	**C02**	**C03**	**CO4**
ISE I (10 Marks)	05	05	00	00
ISE II (10Marks)	00	05	05	00
ISE III (00 Marks)	00	00	00	00
ESE Assessment (60 Marks)	05	05	10	10
Total Marks 100	**10**	**15**	**15**	**10**

ITEEM1020: Business Intelligence		
Teaching Scheme	**Examination Scheme**	
Lectures: 02hrs/ week	**ISE I**	**10 Marks**
Tutorial: 0	**ISE II**	**10 Marks**
Credits:02	**End Semester Examination**	**30 Marks**

Course Description: To expose the students to the basics of business intelligence system with an understanding of modeling aspects behind Business Intelligence.

Course Outcome:

CO1 Understand the need for business intelligence its applications

CO2 Know the business intelligence life cycle and its techniques

CO3 Explore different tools and techniques for analysis and decision making

CO4 Discuss modeling and analysis of data

Detailed Syllabus:

Unit 1 Business Intelligence: Effective and timely decisions – Data, information and knowledge – Role of mathematical models – Business intelligence architectures: Cycle of a business intelligence analysis – Enabling factors in business intelligence projects – Development of a business intelligence system – Ethics and business intelligence.

Unit 2 Decision Making, Systems, Modeling: Introduction and Definitions, Models, Phases of the Decision-Making Process, Decision Making: The Intelligence Phase, Decision Making: The Design Phase, Decision Making: The Implementation Phase

Unit 3 Decision Support System: How Decisions Are Supported, Decision Support System Configurations, Decision Support System Characteristics and Capabilities, Decision Support System Classifications, Components of Decision Support Systems

Unit 4 Modeling and Analysis: Management Support Systems Modeling, Structure of Mathematical Models for Decision Support, Certainty, Uncertainty, and Risk Management Support Systems, Mathematical Programming Optimization, Spreadsheet Model, Linear Programming, Multiple Goals, Sensitivity Analysis, What-If Analysis, and Goal Seeking, Decision Analysis with Decision Tables and Decision Trees

Unit 5 Business Intelligence Applications: Digital Marketing models: Google analytics, Search Engine marketing, Email marketing, Social media marketing, Sales force management, Business case studies, Logistic and Production models – Supply chain optimization, Optimization models for logistics planning, Revenue management system, Business Case studies.

Text Books & Reference Books

1. Efraim Turban, Ramesh Sharda, Dursun Delen, "Decision Support and Business Intelligence Systems", 9th Edition, Pearson 2013.
2. Business Intelligence: Data Mining and Optimization for Decision Making Carlo VercellisPolitecnico di Milano, Italy. A John Wiley and Sons, Ltd., Publication.
3. The Art of Digital Marketing: The Definitive Guide to Creating Strategic, Targeted, and Measurable, Ian Dodson, Wiley publications
4. Larissa T. Moss, S. Atre, "Business Intelligence Roadmap: The Complete Project Lifecycle of Decision Making", Addison Wesley, 2003.
5. Carlo Vercellis, "Business Intelligence: Data Mining and Optimization for Decision Making", Wiley Publications, 2009.
6. David Loshin Morgan, Kaufman, "Business Intelligence: The Savvy Manager"s Guide",

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Second Edition, 2012.

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12
CO1						2	1	1			1	2
CO2		1				1					1	1
CO3						1	3	1	1	2		1
CO4										2		2
CO5						2	1	1			1	2

3– High 2 – Medium 1 – Low

Assessment:

ISE I- Maximum Marks-15

ISE II- Class Test-I of Maximum Marks-15

ISE III-Teacher's Assessment of Maximum Marks-10

ISE I and ISE III -May be based on one of the / or combination of few of following

1) Class Test/ Surprise test/ MCQ Test
2) Assignment
3) Quizzes
4) Any other activity suggested by course coordinator

ESE-End Semester Examination of Maximum Marks-60

Assessment Pattern:

Assessment Pattern Level No.	**Knowledge Level**	**ISE I**	**ISE II**	**ISE III**	**End Semester Examination**
K1	Remember	00	00	00	00
K2	Understand	05	05	00	10
K3	Apply	05	05	00	10
K4	Analyze	00	00	00	10
K5	Evaluate				
K6	Create				
Total Marks 100		10	10	00	30

Assessment table:

Assessment Tool	**K2**	**K2**	**K3**	**K4**
	C01	**C02**	**C03**	**CO4**
ISE I (10 Marks)	05	05	00	00
ISE II(10Marks)	00	05	05	00
ISE III (00 Marks)	00	00	00	00
ESE Assessment (60 Marks)	05	05	10	10
Total Marks 100	**10**	**15**	**15**	**10**

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

INVEC0010 : Universal Human Values -II Understanding Harmony		
Teaching Scheme	**Examination Scheme**	
Lectures: 02 Hrs. / Week	ISE I Online Examination	10 Marks
Credits: 02	ISE II Online Examination	10Marks
	End Semester Examination Online Examination	30 Marks

Course Objective: The objective of the course is fourfold:

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
3. Strengthening of self-reflection
4. Development of commitment and courage to act.

Course Outcomes : After completing the course students will be

By the end of the course, students are expected to become more aware of themselves, and their surroundings (family,society,nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. They would have better critical ability. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society). It is hoped that they would be able to apply what they have learnt to their own self in different day-to- day settings in real life, at least a beginning would be made in this direction.

This is only an introductory foundational input. It would be desirable to follow it up by

a) faculty-student or mentor-mentee programs throughout their time with the institution
b) Higher level courses on human values in every aspect of living. E. g. as a professional

Detailed Syllabus:

Unit 1	**Course Introduction - Need, Basic Guidelines, Content and Process for Value Education** Purpose and motivation for the course, recapitulation from Universal Human Values-I Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario. Method to fulfil the above human aspirations: understanding and living in harmony at various levels. **Home Work:** Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co- existence) rather than as arbitrariness in choice based on liking-disliking
Unit 2	**Understanding Harmony in the Human Being - Harmony inMyself!** Understanding human being as a co-existence of the sentient 'I' and the material'Body'. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer). Understanding the characteristics and activities of 'I' and harmony in 'I'. Understanding theharmonyofIwiththe Body:SanyamandHealth;correctappraisalofPhysicalneeds, meaning of Prosperity in detail. Programs to ensure Sanyam andHealth. **Home Work:** Include practice sessions to discuss the role others have played in making materialgoods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing withdisease

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Unit 3	**Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship** 1Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship. Understanding the meaning of Trust; Difference between intention and competence. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family. **Home Work:** Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives.
Unit 4	**Understanding Harmony in the Nature and Existence - Whole existence as Coexistence** Understanding the harmony in the Nature. Interconnectedness and mutual fulfilment amongthefourordersofnaturerecyclabilityandself-regulationinnature.Understanding ExistenceasCo-existenceofmutuallyinteractingunitsinallpervasivespace.Holistic perception of harmony at all levels of existence. **Home Work:** Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.
Unit 5	**ImplicationsoftheaboveHolisticUnderstandingofHarmonyonProfessionalEthics** Naturalacceptanceofhumanvalues.DefinitivenessofEthicalHumanConduct.Basisfor Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics: a.Abilitytoutilizetheprofessionalcompetenceforaugmentinguniversalhumanorderb. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. **Some Case Studies can be given as home work:** Case studies of typical holistic technologies, management models and production systems Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations Sum up. **HomeWork:** Include practice Exercises and Case Studies will be taken up in Practice Sessions eg. To discuss the conduct as an engineer or scientist etc.

Text and Reference Books

1. HumanValuesandProfessionalEthicsbyRRGaur,RSangal,GPBagaria,ExcelBooks,New Delhi,2010
2. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak,1999.
3. HumanValues,A.N.Tripathi,NewAgeIntl.Publishers,NewDelhi,2004.3.TheStoryofStuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi 5. Small is Beautiful - E. FSchumacher.
5. Slow is Beautiful - CecileAndrews
6. Economy of Permanence - J CKumarappa
7. Bharat Mein Angreji Raj – PanditSunderlal
8. Rediscovering India - byDharampal

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

9. Hind Swaraj or Indian Home Rule - by Mohandas K.Gandhi
10. India Wins Freedom - Maulana Abdul KalamAzad
11. Vivekananda - Romain Rolland(English)
12. Gandhi - Romain Rolland(English)

MODE OF CONDUCT

Lectures hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them. While analyzing and discussing the topic,the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements. Such observations and their analyses are shared and discussed with other students and facultymentor,inagroupsitting. Tutorials(experimentsorpractical)areimportantforthecourse. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment,namelybehavingandworkingbasedonbasichumanvalues.Itisrecommendedthat this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, highercourses.

This course is to be taught by faculty from every teaching department, including HSS faculty.

Teacher preparation with a minimum exposure to at least one 8-day FDP on Universal Human Values is deemed essential.

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

EEAEC2010: Technical Communication		
Teaching Scheme	**Examination Scheme**	
Lectures: 02Hrs. /Week	ISEI	10 Marks
Credit: 02	ISEII	10 Marks
	End Semester Examination	30 Marks

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

CO1	Understand the nature and objective of Technical Communication relevant for the work place as Engineers.
CO2	Utilize the technical writing for the purposes of Technical Communication and its exposure in various dimensions
CO3	Imbibe inputs by presentation skills to enhance confidence in face of diverse audience.
CO4	Evaluate their efficacy as fluent & efficient communicators by learning the voice-dynamics.

Detailed Syllabus:

Unit I	**Fundamentals of Technical Communication:** Technical Communication: Features; Distinction between General and Technical Communication; Language as a tool of Communication; Dimensions of Communication: Reading & comprehension; Technical writing: sentences; Paragraph; Technical style: Definition, types & Methods; The flow of Communication: Downward; upward, Lateral or Horizontal; Barriers to Communication.
Unit II	**Forms of Technical Communication:** 7 Cs of effective business writing: concreteness, completeness, clarity, conciseness, courtesy, correctness, consideration; Technical Report: Definition & importance; Thesis/Project writing: structure & importance; C.V./Resume writing; Technical Proposal: Types, Structure & Draft. Seminar & Conference paper writing.
Unit III	**Technical Presentation:** Strategies & Techniques Presentation: Forms; interpersonal Communication; Classroom presentation; style; method; Individual conferencing: essentials: Public Speaking: method; Techniques: Clarity of substance; emotion; Humour; Modes of Presentation; Overcoming Stage Fear: Confident speaking; Audience Analysis & retention of audience interest
Unit IV	**Technical Communication Skills and Kinesics & Voice Dynamics:** Interview skills; Group Discussion: Objective & Method; Seminar/Conferences Presentation skills: Focus; Content; Style; Critical thinking; Nuances: Exposition narration & Description; Socio-linguistic competence: Strategic competence: Solution of communication problems with verbal and non verbal means. Definitions; importance; Features of Body Language; Voice Modulation: Quality, Pitch; Rhythm; intonation; Pronunciation; Articulation; stress & accent; Linguistic features of voice control: Vowel & Consonant Sounds.

Text and Reference Books

1. Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, New Delhi.
2. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., New Delhi.
3. Practical Communication: Process and Practice by L.U.B. Pandey; A.I.T.B.S. Publications India Ltd.; Krishan Nagar, Delhi.
4. Modern Technical Writing by Sherman, Theodore A (et.al); Apprentice Hall; New Jersey; U.S.

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

5. A Text Book of Scientific and Technical Writing by S.D. Sharma; Vikas Publication, Delhi.

Mapping of Course outcomes with Program outcomesand Program Specific Outcomes:

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1										2				
CO2										3				1
CO3										2				
CO4										3				

1 – Low, 2 – Medium, 3 – High

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

CEVEC0010: Environmental Science		
Teaching Scheme	**Examination Scheme**	
Lectures: 02 Hrs. / Week	ISE I	10 Marks
Credits: 02	ISE II	10 Marks
	End Semester Examination	30 Marks

Course Objectives:

1. To become aware about the various types of pollution, its sources, effects and control measures
2. To become aware about present environmental issues
3. To become aware of the importance of natural resources and environmental legislation
4. To become aware about environmental biotechnology and bio monitoring
5. To become aware of the biodiversity, conservation methods and factors for the loss of biodiversity

Course Outcomes : After completing the course students will able to	
CO1	Learn about the basics of environment.
CO2	Understand the harmful effects of human activities on environment and their solutions
CO3	Understand the biodiversity, conservation methods and factors for the loss of biodiversity
CO4	Understand the concept of climate change, global warming, acid rain, various disasters and its mitigation measures

Detailed syllabus:

Unit-I	**A) Understanding Environment** - Environment: concept and importance - Components of environment: Physical, Biological and Social - Ecosystem Concept, Structure and Function - Producers, Consumers and Decomposers - Food chain, Food web and Ecological pyramids - Energy flew in an Ecosystem. - Ecosystem services Ecological, economic, social, aesthetic and informational **B) Natural Resources** - Land resources: global land use patterns, concept land degradation and desertification - Forest resources: Use and consequences of over-exploitation - Water resources: Use and consequences of over-utilization, concept of water harvesting and watershed management, water conflicts - Energy resources Renewable and non-renewable energy sources, growing energy needs and alternate energy sources
Unit-II	**A) Biodiversity and its conservation** - Biodiversity definition, levels (genetic, species and ecosystem) and values - Threats to biodiversity: habitat loss, poaching of wildlife, biological invasions - Concept of endemism and hot spots of biodiversity - Conservation of biodiversity: In-situ and Ex-situ concepts **B) Environmental Pollution** -Causes, effects and control measures of Air, water, soil, noise, thermal, nuclear; -Solid waste management -Liquid waste management
Unit-III	**Environmental issues, policies and practices** - Global environmental issues: Increase in greenhouse gases, climate change, Acid rain and stratospheric ozone layer depletion - Salient features of Environment Protection Act, 1986 - Environmental education: Formal and Informal education - Environmental Movements (Chipko Movement, Silent valley) and Environmental ethics

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Text and Reference Books

1. A Text Book of Environmental Studies by Bharucha E, University Press (India) Pvt. Ltd
2. Text Book of Environmental Studies by Nadaf F. M., Pawaskar V. R., Intellectual Book Bureau, Bhopal
3. Fundamental of Ecology by Odum E. P, Natraj Publishers, Dehradun
4. Introduction to Environmental Engineering and science by Gilbert M and Wendell P., Pearson Education India
5. Environmental Science by S.C Santra, New Central Book Agency
6. Environmental Education by Sharma R. A

Mapping of Course outcomes with Program outcomesand Program Specific Outcomes:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		1									
CO2	3		1									
CO3	3		1									
CO4	3		1									

1 – Low, 2 – Medium, 3 – High

Assessment Pattern

Assessment Pattern Level No.	**Knowledge Level**	**ISE-I**	**ISE-II**	**End Semester Examination**
K1	Remember	02	02	10
K2	Understand	04	04	10
K3	Apply	04	04	10
K4	Analyze	00	00	00
K5	Evaluate	00	00	00
K6	Create	00	00	00
Total Marks 50		10	10	30

Assessment table

Assessment Tool	CO1	CO2	CO3	CO4
	K1+K3	K1+K3	K1+K3	K1+K3
ISE I (10 Marks)	5	5	5	
ISE II (10 Marks)		5	5	5
ESE Assessment (30 Marks)				

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024

Structure of B. Tech. in Information Technology with multidisciplinary minor for DSY Students:

Course Types/ Semester	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**Total**
Programme Core Course (PCC)	15	11+ 02*	11	11	--	--	50
Programme Elective Course (PEC)	--	--	7	10	3	-	20
Multidisciplinary Minor (MD M)	4	3	4	3			14
Open Elective (OE) Other than a particular program	3	3	2	--	--		8
Vocational and Skill Enhancement Course (VSEC)		2		2	--	--	4
Ability Enhancement Course (AEC - 01, AEC-02)	--	2	--	--	--	--	2
Entrepreneurship/Economics/ Management Courses	2	2				--	4
Indian Knowledge System (IKS)		--	--	--	--	--	0
Value Education Course (VEC)	2	2	--	--	--	--	4
Research Methodology	--	--	--	--		4	4
Comm. Engg. Project (CEP)/Field Project (FP)	2	--	--	--		--	2
Project	--	--	--	--	4	--	4
Internship/ OJT			--	--	06	06	12
Co-curricular Courses (CC)		--	--	--	--	-	-
Total Credits / Semester with MDM	**30**	**25**	**24**	**26**	**13**	**10**	**128**

Approved in XXV IIIth Academic Council
Dated: 25th Jun 2024