



आईएफटीएम विश्वविद्यालय, मुरादाबाद, उत्तर प्रदेश
IFTM University, Moradabad, Uttar Pradesh
NAAC ACCREDITED

IFTM University Moradabad

Course Structure & Evaluation Scheme

B. Tech. in Computer Science & Engineering
(Effective from Session 2022-23)

Sanjeev Doss
REGISTRAR
IFTM UNIVERSITY
MORADABAD

CURRICULUM STRUCTURE

B.TECH (CSE)

B.TECH (CSE) YEAR I, SEMESTER- I												
S.N.	COURSE CATEGORY	COURSE CODE	COURSE NAME	PERIODS			EVALUATION SCHEME				COURSE TOTAL	CREDITS
				L	T	P	MID TERM EXAM			EXTERNAL EXAM		
							CT	AS +AT	TOTAL			
THEORY												
1.	FSC	TEMA -101	Engineering Mathematics-I	3	1	0	20	10	30	70	100	4
2.	FSC	TEPH -101	Engineering Physics-I	3	1	0	20	10	30	70	100	4
3.	FSC	TECH -101	Engineering Chemistry	3	1	0	20	10	30	70	100	4
4.	HML	TPSD -101	Professional Skill Development-I	3	0	0	20	10	30	70	100	4
5.	FSC	TEEE -101	Electrical Engineering	3	1	0	20	10	30	70	100	4
6.	FSC	TEME -102	Materials & Manufacturing	3	1	0	20	10	30	70	100	4
Total											600	24
LABORATORY COURSE												
7.	ELC	TEPH -151	Physics Lab	0	0	2	20	10	30	70	100	1
8.	ELC	TEEE -151	Electrical Engg. Lab	0	0	2	20	10	30	70	100	1
9.	ELC	TEME -152	Manufacturing Lab	0	0	2	20	10	30	70	100	1
10.	ELC	TEME -153	Engineering Drawing Lab	0	0	2	20	10	30	70	100	1
11.	PDT	TEGP -101	General Proficiency	-	-	-	-	-	100	-	100	1
Total											500	5
SEMESTER TOTAL				18	06	08	-	-	-	-	1100	29

Parmis
Director

School of Computer Science & Applications
IFTM University, Moradabad

Sanjeev Prasad
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MORADABAD.

CURRICULUM STRUCTURE

B.TECH (CSE)

B.TECH (CSE) YEAR I, SEMESTER- II												
S.N.	COURSE CATEGORY	COURSE CODE	COURSE NAME	PERIODS			EVALUATION SCHEME				COURSE TOTAL	CREDITS
				L	T	P	MID TERM EXAM		EXTERNAL EXAM			
							CT	AS +AT		TOTAL		
THEORY												
1.	FSC	TEMA -201	Engineering Mathematics-II	3	1	0	20	10	30	70	100	4
2.	FSC	TEPH -201	Engineering Physics-II	3	1	0	20	10	30	70	100	4
3.	VAC	TECH -202	Environmental Science	3	0	0	20	10	30	70	100	4
4.	FSC	TEME -201	Engineering Mechanics	3	1	0	20	10	30	70	100	4
5.	FSC	TEEC -201	Electronics Engineering	3	1	0	20	10	30	70	100	4
6.	FSC	TECS -201	Computer Fundamentals & Programming	3	1	0	20	10	30	70	100	4
Total											600	24
LABORATORY COURSE												
7.	ELC	TECH -251	Chemistry Lab	0	0	2	20	10	30	70	100	1
8.	ELC	TECS -251	Computer Lab	0	0	2	20	10	30	70	100	1
9.	ELC	TEEE -251	Electrical Engg. Lab	0	0	2	20	10	30	70	100	1
10.	ELC	TEME -251	Mechanical Engg. Lab	0	0	2	20	10	30	70	100	1
11.	PDT	EGP-201	General Proficiency	-	-	-	-	-	100	-	100	1
Total											500	5
SEMESTER TOTAL				18	06	08	-	-	-	-	1100	29

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YEAR: II

SEMESTER: III

B.TECH (CSE) YEAR II, SEMESTER- III												
S.N.	COURSE CATEGORY	COURSE CODE	COURSE NAME	PERIODS			EVALUATION SCHEME			COURSE TOTAL	CREDITS	
				L	T	P	MID TERM EXAM		EXTERNAL EXAM			
							CT	AS +AT				TOTAL
THEORY												
1.	ECC	ECS301N	Data Structures Using C/C++	3	1	0	20	10	30	70	100	4
2.	ECC	ECS302N	Object Oriented Programming using JAVA	3	1	0	20	10	30	70	100	4
3.	ECC	ECS303N	Digital Electronics	3	1	0	20	10	30	70	100	4
4.	ECC	ECS304	Operating System	3	1	0	20	10	30	70	100	4
5.	ECC	ECS305	Discrete Mathematical Structures	3	1	0	20	10	30	70	100	4
6.	VAC	EHU301	Disaster Management*	3	1	0	20	10	30	70	100	0
7.	HML	PSD301	Professional Skill Development -2	3	0	0	20	10	30	70	100	4
Total											600	24
LABORATORY COURSE												
7.	ELC	ECS351	Data Structure Lab	0	0	2	20	10	30	70	100	1
8.	ELC	ECS352N	JAVA Programming Lab	0	0	2	20	10	30	70	100	1
9.	ELC	ECS353N	Digital Electronics Lab	0	0	2	20	10	30	70	100	1
10.	ELC	ECS354	OS Lab	0	0	2	20	10	30	70	100	1
11.	PDT	EGP301	General Proficiency						100	--	100	1
Total											500	5
SEMESTER TOTAL				18	06	08	-	-	-	-	1100	29

*Disaster Management will be offered as a compulsory audit course and each student has to pass the subject at the minimum by getting 35 marks out of 100.

Pamir
Director

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YEAR: II

SEMESTER: IV

S. NO	COURSE CODE	SUBJECT	PERIODS			SESSIONAL				ESE	TOTAL	CREDITS
			L	T	P	TA	AT	CT	Total			
1.	ECS401	Data Communication & Network	3	1	0	5	5	10+10	30	70	100	4
2.	ECS402	Design and Analysis of Algorithms	3	1	0	5	5	10+10	30	70	100	4
3.	ECS403	Database Management System	3	1	0	5	5	10+10	30	70	100	4
4.	ECS404	Introduction to Microprocessor	3	1	0	5	5	10+10	30	70	100	4
5.	ECS405	Software Engineering	3	1	0	5	5	10+10	30	70	100	4
6.	EMA401	Computer Based Numerical & Statistical Techniques	3	1	0	5	5	10+10	30	70	100	4
PRACTICALS/Seminar/Projects												
7.	ECS451	Computer Networks Lab	0	0	2	10	10	30	50	50	100	1
8.	ECS452	DAA Lab	0	0	2	10	10	30	50	50	100	1
9.	ECS453	DBMS Lab	0	0	2	10	10	30	50	50	100	1
10.	ECS454	Microprocessor Lab	0	0	2	10	10	30	50	50	100	1
11.	EGP401	General Proficiency							100	--	100	1
											1100	29

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Director
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YEAR: III

SEMESTER: V

S. NO	COURSE CODE	COURSE NAME	PERIODS			SESSIONAL				ESE	TOTAL	CREDITS
			L	T	P	TA	AT	CT	Total			
1.	ECS501	Computer Graphics	3	1	0	5	5	10+10	30	70	100	4
2.	ECS502	Internet & Java Programming	3	1	0	5	5	10+10	30	70	100	4
3.	ECS503	Artificial Intelligence	3	1	0	5	5	10+10	30	70	100	4
4.	ECS504	Theory of Computation	3	1	0	5	5	10+10	30	70	100	4
5.	ECS505	Computer Architecture	3	1	0	5	5	10+10	30	70	100	4
6.	EHU501	Human Values & Professional Ethics	3	1	0	5	5	10+10	30	70	100	4
PRACTICALS/Seminar/Projects												
7.	ECS551	Computer Graphics Lab	0	0	2	10	10	30	50	50	100	1
8.	ECS552	Internet & Java Programming Lab	0	0	2	10	10	30	50	50	100	1
9.	ECS553	AI Lab	0	0	2	10	10	30	50	50	100	1
10.	ECS554	CBNST LAB	0	0	2	10	10	30	50	50	100	1
11.	EGP501	General Proficiency							100	--	100	1
											1100	29

Ramita

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S. NO	COURSE CODE	SUBJECT	PERIODS			SESSIONAL				ESE	TOTAL	CREDITS
			L	T	P	TA	AT	CT	Total			
1.	ECS601	Object Modeling Techniques & UML	3	1	0	5	5	10+10	30	70	100	4
2.	ECS602	Web Technology & E-Commerce	3	1	0	5	5	10+10	30	70	100	4
3.	ECS603	Compiler Design	3	1	0	5	5	10+10	30	70	100	4
4.	ECS604	Principles of Programming Language	3	1	0	5	5	10+10	30	70	100	4
5.	ECS605	Elective-I	3	1	0	5	5	10+10	30	70	100	4
6.	ECS606	Elective-II	3	1	0	5	5	10+10	30	70	100	4
PRACTICALS/Seminar/Projects												
7.	ECS651	Mini Project-I	0	0	2	10	10	30	50	50	100	1
8.	ECS652	Web Technology & Multimedia Lab	0	0	2	10	10	30	50	50	100	1
9.	ECS653	Compiler Design Lab	0	0	2	10	10	30	50	50	100	1
10.	ECS654	Python Lab	0	0	2	10	10	30	50	50	100	1
11.	EGP601	General Proficiency							100	--	100	1
											1100	29


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YEAR: IV

SEMESTER: VII

S. NO	COURSE CODE	COURSE NAME	PERIODS			SESSIONAL				ESE	TOTAL	CREDITS
			L	T	P	TA	AT	CT	Total			
1.	ECS701	Elective-III	3	1	0	5	5	10+10	30	70	100	4
2.	ECS702	Digital Image Processing	3	1	0	5	5	10+10	30	70	100	4
3.	ECS703	Data Mining & Warehousing	3	1	0	5	5	10+10	30	70	100	4
4.	ECS704	Elective-IV	3	1	0	5	5	10+10	30	70	100	4
5.	ECS705	Cryptography & Network Security	3	1	0	5	5	10+10	30	70	100	4
6.	EHU701	Industrial Management	3	1	0	5	5	10+10	30	70	100	4
PRACTICALS/Seminar/Projects												
7.	ECS751	Distributed Computing Lab	0	0	2	10	10	30	50	50	100	1
8.	ECS752	DIP Lab	0	0	2	10	10	30	100	--	100	1
9.	ECS753	Colloquium & Summer Training Viva	0	0	2	10	10	30	50	50	100	1
10.	ECS754	Mini Project-II	0	0	2	10	10	30	50	50	100	1
11.	EGP701	General Proficiency							100	--	100	1
		Colloquium & Summer Training Viva									1100	29



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MORADABAD.

YEAR: IV

SEMESTER: VIII

S. NO	COURSE CODE	SUBJECT	PERIODS			SESSIONAL				ESE	TOTAL	CREDITS
			L	T	P	TA	A T	CT	Total			
1.	ECS801	Elective-V	3	1	0	5	5	10+10	30	70	100	4
2.	ECS802	Elective-VI	3	1	0	5	5	10+10	30	70	100	4
3.	ECS804	Big Data and Analytics	3	1	0	5	5	10+10	30	70	100	4
PRACTICALS/ Seminar/ Projects												
4.	ECS851	Project	0	0	-	75	75	150	300	300	600	15
5.	ECS852	Seminar	0	0	-	0	0	0	100	--	100	1
6.	EGP801	General Proficiency							100	--	100	1
											1100	29

R. K. Singh
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List of Electives

Elective I		
1	ECS- 605(1)	Software Project Management
2	ECS- 605(2)	Cyber Security
3	ECS- 605(3)	Mobile Computing
4	ECS- 605(4)	Dot net framework for application development
5	ECS- 605(5)	Soft and Evolutionary Computing
Elective II		
1	ECS 606(1)	Multimedia Technology
2	ECS 606(2)	Organizational Behaviour
3	ECS 606(3)	Managerial Economics
4	ECS 606(4)	Data Compression
5	ECS 606(5)	Software Quality Engineering
Elective V		
1	ECS-801 (1)	Basic of Research & Development
2	ECS-801 (2)	Parallel Computing
3	ECS-801 (3)	Management and entrepreneurship for it industry
4	ECS-801 (4)	Software architecture and design patterns
5	ECS-801 (5)	Internet of things technology
Elective VI		
1	ECS-802 (1)	Wireless & Sensor Networks
2	ECS-802 (2)	Human Computer Interaction
3	ECS-802 (3)	Cloud Computing and its Applications
4	ECS-802 (4)	Multi-core Architecture and programming
5	ECS-802 (5)	Computer Vision and Robotics


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List of Electives

Elective III		
1	ECS-701 (1)	Distributed Computing
2	ECS-701 (2)	Web search and Mining
3	ECS-701 (3)	TCP/IP & Web Technology
4	ECS-701 (4)	Quantum Computing
5	ECS-701 (5)	Software Reusability
Elective IV		
1	ECS-704(1)	Introduction to Bioinformatics
2	ECS-704 (2)	Advanced Web Applications
3	ECS-704 (3)	Advanced JAVA and J2EE
4	ECS-704 (4)	Introduction to Software Testing
5	ECS-704 (5)	Mobile Application Development

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IFTM University, Moradabad
Bachelor of Technology (B.Tech) Computer Science & Engineering
B.Tech Ist Year (I Semester)
 (Effective from the session 2022-23)

Department of Computer Science & Engineering

Programme		Bachelor of Technology(B.Tech)			Branch		Computer Science & Engineering (CSE)			
Semester		1/2			Version					
Effective from Academic Year				2021-2022		Effective for the Batch Admitted in				2021
Subject Code		T ECS101			Subject Name		COMPUTER FUNDAMENTALS & PROGRAMMING			
Teaching Scheme					Examination Scheme(Marks)					
Per Week	Lecture		Practical(Lab)		Total		TS/PS	TE/PE	Total	
	L	T	P	TW						
Credit	3	1	0	-	4	Theory	30	70	100	
Hours	3	1	0	-	4	Practical	-	--	-	

COURSE OBJECTIVE

The objective of this course is to introduce the concepts of computer basics & programming with particular attention to Engineering examples and to learn the fundamentals of the C programming language for skill development and employability.

Syllabus

UNIT-I

Introduction: Introduction to Computer Systems, Generation of Computers, BIOS, Various types of memories, CPU organization, ALU, registers. Introduction to various operating Systems. Number systems: Binary, hexadecimal, octal and their inter conversions. Computer Languages and Software & hardware: High Level Languages and Low Level Language, Various types of software. Firmware, Compiler, Interpreter and Assembler for skill development. File Allocation Table, Hardware.

UNIT -II

Input, Output and storage units: Introduction to various Input and output Devices. Printers: Various type of Impact and Non- Impact Printers. Introduction to algorithm and Flow chart: Representation of an algorithm, flowchart symbols and levels of flow chart, advantage and limitations of flowchart and pseudo code. Basics of programming: Introduction to the design and implementation of correct, efficient and maintainable programs for skill development and employability. Use of high level programming languages for the development of programs.

UNIT-III

Standard I/O in "C", Fundamental Data Types and Storage Classes: Character types, Integer, short, long, unsigned, single and double-precision floating point, storage classes, automatic, register, static for skill development and external, Operators and Expressions: Using numeric and relational operators, mixed operands and type conversion, Logical operators, Bit operations, Operator precedence and associativity.

UNIT-IV

Conditional Program Execution: Applying if and switch statements, nesting if and else, restrictions on switch values, use of break and default with switch, Program Loops and Iteration: Uses of while, do and for loops, multiple loop variables, assignment operators, using break and continue for skill development.

UNIT-V

Modular Programming: Passing arguments by value, scope rules and global variables, separate compilation, and linkage, building your own modules. Arrays: Array notation and representation, manipulating array elements, using multidimensional arrays, arrays of unknown or varying size. Structure, union, enumerated data types. Functions: Introduction, types of functions, functions with array, recursive functions. Introduction to pointers. Introduction to file handling, standard C preprocessors, defining and calling macros, conditional compilation, passing values to the compiler helpful in skill development and employability.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Basic knowledge of components of Computer in global environment for skill

Note: Adhere to the latest editions of the Suggested Readings

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	development.
CO2	Understanding the concept of input and output devices of Computers and how it works and recognize the basic terminology used in computer programming for skill development and employability.
CO3	For skill development Write, compile and debug programs in C language and use different data types for writing the programs.
CO4	For skill enhancement student design programs using the concepts decision statements, loops, functions, arrays pointers etc.
CO5	Programming by using function, recursion and pointers is helpful in employability.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	1	1	1
CO2	1	2	1
CO3	3	1	1
CO4	3	1	1
CO5	3	3	1

SUGGESTED READINGS:

- "Let us C", Yashvant Kanitkar
- "Programming with C", Byron Gottfried
- "Computer Fundamentals", Anita Goel, Pearson Education
- "Computer Concepts and Programming in C", E Balaguruswami, McGraw Hill
- "C programming", Kernighan and Ritchie, PHI
- "Computer Fundamentals and Programming in C", Reema Thareja, Oxford Publication

WEBSITE RESOURCES:

- www.swayam.gov.in
- onlinecourses.nptel.ac.in

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IFTM University, Moradabad
Bachelor of Technology (B.Tech) Computer Science & Engineering
B.Tech Ist Year (I Semester)
 (Effective from the session 2021-22)

Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)				Branch	Computer Science & Engineering (CSE)				
Semester	2				Version					
Effective from Academic Year					2021-2022		Effective for the Batch Admitted in			2021
Subject Code			T ECS201			Subject Name		COMPUTER FUNDAMENTALS & PROGRAMMING		
Teaching Scheme						Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total		TS/PS	TE/PE	Total	
	L	T	P	TW						
Credit	3	1	0	-	4	Theory	30	70	100	
Hours	3	1	0	-	4	Practical	-	--	-	

COURSE OBJECTIVE

The objective of this course is to introduce the concepts of computer basics & programming with particular attention to Engineering examples and to learn the fundamentals of the C programming language for skill development and employability.

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COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Basic knowledge of components of Computer in global environment for skill

Note: Adhere to the latest editions of the Suggested Readings

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 IFTM University, Moradabad

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	development.
CO2	Understanding the concept of input and output devices of Computers and how it works and recognize the basic terminology used in computer programming for skill development and employability.
CO3	For skill development Write, compile and debug programs in C language and use different data types for writing the programs.
CO4	For skill enhancement student design programs using the concepts decision statements, loops, functions, arrays pointers etc.
CO5	Programming by using function, recursion and pointers is helpful in employability.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	1	1	1
CO2	1	2	1
CO3	3	1	1
CO4	3	1	1
CO5	3	3	1

SUGGESTED READINGS:

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- "Computer Fundamentals", Anita Goel, Pearson Education
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- "Computer Fundamentals and Programming in C", Reema Thareja, Oxford Publication

WEBSITE RESOURCES:

- www.swayam.gov.in
- onlinecourses.nptel.ac.in

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Note: Adhere to the latest editions of the Suggested Readings

Department of Computer Science & Engineering

Programme		Bachelor of Technology(B.Tech)			Branch		Computer Science & Engineering (CSE)			
Semester		3			Version					
Effective from Academic Year				2021-2022		Effective for the Batch Admitted in				2021
Subject Code		ECS 301			Subject Name		DATA STRUCTURES USING C/ C++			
Teaching Scheme					Examination Scheme(Marks)					
Per Week	Lecture		Practical(Lab)		Total		TS/PS	TE/PE	Total	
	L	T	P	TW						
Credit	3	1	0	-	4	Theory	30	70	100	
Hours	3	1	0	-	4	Practical	-	--	-	

COURSE OBJECTIVE

1. To teach efficient storage mechanisms of data for an easy access.
2. To improve the logical ability
3. To design and implementation of various basic and advanced data structures.
4. To introduce various techniques for representation of the data in the real world.
5. To develop applications using data structures.

Syllabus

UNIT-I

Introduction: Elementary Data Organization. Algorithm. Asymptotic notations. Space and Time Complexity of an algorithm. Time Space Trade off. Information and its storage representation, Representation and its manipulation of Strings. Pattern Matching

Array: Linear data structures, Arrays, Single and Multidimensional Array, Representation of Array in memory, sparse matrices. Linear search, binary search.

UNIT-II

Linked List: Single Linked list, Array and Linked representation of Linked List, Two Way List, Operations on linked lists, Polynomial representation and addition using linked list.

UNIT-III

Queues: Queue operations, Circular queue, Priority queues, Array and linked representation of Queue, Dequeue.

Stacks: Stack operations, Array and linked representation of stack, Application of Stack, Prefix and postfix expressions. Recursion. Tower of Hanoi problem,

UNIT-IV

Non-Linear data structures: Trees, Binary tree. Inorder, Preorder and Postorder traversals of a Binary tree. Extended binary tree. complete tree. Huffman Algorithm, Multi linked structure, graphs and their representation, spanning trees, dynamic storage management.

Sorting: Selection sort, Bubble sort, Radix sort, Merge Sort, Quick Sort, Insertion Sort, Bucket Sort, Heap Sort, topological sorting, external sorting, internal sorting etc.

UNIT-V

Search Trees: Binary Search Tree, AVL Tree, B Trees

Hashing: Hashing functions, Collision resolution techniques, Application of Hashing techniques

File structures: external storage devices, sequential files, indexed sequential files, direct files, external searching, linear and virtual hashing

COURSE OUTCOME (CO)

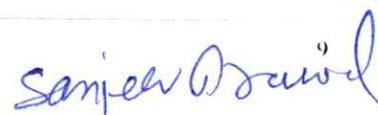
	DESCRIPTION
CO1	Able to choose appropriate data structure as applied to specified problem definition.
CO2	Able to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
CO3	Able to apply concepts learned in various domains like DBMS, compiler construction etc.
CO4	Able to use linear and non-linear data structures like stacks, queues, linked list, tree etc.
CO5	Able to use searching, sorting of data.

Mapping Matrix of CO and PO

Note: Adhere to the latest editions of the Suggested Readings


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

SUGGESTED READINGS:

- SEYMOUR LIPSCHUTZ, "Data structures", McGraw Hill International Edition.
- Sartaj Sahni, Data structures, Algorithms and Applications in Java , , McGraw Hill.
- J.P.Tremblay and Paul G. Sorenson, "An introduction to data structures with applications".TMII.
- Robert Kruse C.L. Tondo and Bruce Leung, "Data Structures and Program Design in C". Pearson Edu.
- Tenenbaum A.M and Augenstein M.J, " Data Structures using C ".Prentice Hall of India

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in
- <http://courses.cs.vt.edu/csonline/DataStructures/Lessons/>
- <https://www.geeksforgeeks.org/>

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Department of Computer Science & Engineering

Programme		Bachelor of Technology(B.Tech)			Branch		Computer Science & Engineering (CSE)			
Semester		3			Version					
Effective from Academic Year				2022-2023		Effective for the Batch Admitted in				2021
Subject Code		ECS 302 N			Subject Name		OBJECT ORIENTED PROGRAMMING USING JAVA			
Teaching Scheme						Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total	TS/PS	TE/PE	Total		
	L	T	P	TW						
Credit	3	1	0	-	4	Theory	30	70	100	
Hours	3	1	0	-	4	Practical	-	--	-	

COURSE OBJECTIVE

COURSE OBJECTIVE

1. Understanding the basic concept of object oriented programming.
2. Understanding the detail concept of java in real life.
3. Understanding the concept of data types and conditional statement used in java.
4. Understanding application of java and its modules.

Syllabus

UNIT 1

Java programming: An Overview of Java, Data Types: Integers, Floating-Point Types, Characters, A Closer Look at Literals, Variables, Arrays, Operators: Arithmetic Operators, the Bitwise Operators, Relational Operators, Boolean Logical Operators, the Assignment Operator, Control Statements: Java's Selection Statements, Iteration Statements, Jump Statements, Introducing Classes.

UNIT 2

OOP concepts: Introduction, Object Oriented paradigm, Basic Concepts: Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, A Closer Look at Methods and Classes: Overloading Methods, Overloading Constructors, Using Objects as Parameters, A Closer Look at Argument Passing, Returning Objects, Recursion, Introducing Access Control, Packages and Interfaces, Exception Handling.

Data Abstraction and Encapsulation, Inheritance: Inheritance Basics, Using super, Creating a Multilevel Hierarchy, Method Overriding, Polymorphism, Dynamic Binding, Benefits of OOPS, Application of OOPS.

UNIT 3

Exception Handling: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch Multiple catch Clauses, Nested try Statements.

Multithreaded Programming: The Java Thread Model, The Main Thread, Creating a Thread, Creating Multiple Threads.

UNIT 4

String Handling : The String Constructors, String Length, Special String Operations: String Literals, String Concatenation, String Concatenation with Other Data Types, String Conversion and toString(). Character Extraction: charAt(), getChars(), getBytes(), toCharArray(), String Comparison : equals() and equalsIgnoreCase(), regionMatches(), startsWith() and endsWith(), equals() Versus ==, compareTo(), Searching Strings, Modifying a String substring(), concat(), replace(), trim().

UNIT 5

Introducing the AWT: Working with Windows, Graphics, and Text: AWT Classes, Window Fundamentals, Working with Frame Windows, Creating a Frame Window in an Applet, Working with Color.

Using AWT Controls, Layout Managers, and Menus: Control Fundamentals, Labels, Using Buttons, Applying Check Boxes, Using Lists, Managing Scroll Bars, Using a TextArea, Images.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Understand the principles of object oriented programming in the construction of robust maintainable programs which satisfy the requirements.
CO2	Discuss the principles of inheritance and polymorphism and demonstrate through problem analysis assignments..
CO3	Competence in the use of Java Programming language in the development of small to medium sized application.

Note: Adhere to the latest editions of the Suggested Readings

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CO4	Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc
CO5	Develop program using the java collection API as well as the java standard class library

Mapping Matrix of CO and PO

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

SUGGESTED READINGS

1. Patrick Naughton & Herbert Schildt, The Complete Reference JAVA2, Tata Mc Graw Hill
2. Balagurusamy E., Programming in JAVA, Tata McGraw Hill
Deitel, "Java for programmers". Pearson Education

REFERENCES

- 1 Introduction to Java Programming (Comprehensive Version), Daniel Liang, Seventh Edition, Pearson.
- 2 Programming in Java, Sachin Malhotra & Saurabh Chaudhary, Oxford University Press.
- 3 Murach's Beginning Java 2, Doug Lowe, Joel Murach and Andrea Steelman, SPD.
- 4 Core Java Volume-I Fundamentals, Eight Edition, Horstmann & Cornell, Pearson Education

WEBSITE SOURCES:

- <https://nptel.ac.in/courses/106/105/106105191/>
https://spoken-tutorial.org/tutorial-search/?search_foss=Java&search_language=ENGLISH

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Department of Computer Science & Engineering

Programme		Bachelor of Technology(B.Tech)			Branch		Computer Science & Engineering (CSE)			
Semester		3			Version					
Effective from Academic Year				2022-2023		Effective for the Batch Admitted in				2021
Subject Code			ECS 303 N			Subject Name		DIGITAL ELECTRONICS		
Teaching Scheme						Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total		TS/PS	TE/PE	Total	
	L	T	P	TW						
Credit	3	1	0	-	4	Theory	30	70	100	
Hours	3	1	0	-	4	Practical	-	--	-	

COURSE OBJECTIVE

COURSE OBJECTIVES :

- 1 Understand working of logic gates.
- 2 To design and implement combinational and sequential logic circuits
- 3 Understand the process of analog to digital and digital to analog conversion
- 4 To understand various logic families

Syllabus

UNIT I

Boolean Algebra and Logic Gates: Introduction, Basic Definition, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates, Integrated Circuit

Gate-Level Minimization: Introduction, The Map Method, Four-Variable Map, Five Variable Map, Product-of-Sums, Simplification, Don't-Care Conditions, NAND and NOR implementation, Other Two level Implementation, Exclusive OR Function, Hardware Description Language

UNIT II

Combinational Logic: Introduction, Combinational Circuit, Analysis Procedure, Design procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers, HDL Models of Combinational Circuits.

UNIT III

Synchronous Sequential Logic: introduction, Sequential Circuits, Storage Elements: Latches, Storage Elements: FlipFlops, - Analysis of Clocked Sequential Circuits, synthesizable HDL Models of Sequential Circuits, State Reduction and Assignment, Design Procedure

Registers and Counters: Registers, Shift Registers, Ripple Counters, Synchronous Counters, Other Counters, HDL for Registers and Counter.

UNIT IV

Memory and Programmable Logic: introduction Random-Access Memory, Memory Decoding, Error Detection and Correction, Read-Only Memory, Programmable Logic Array, Programmable Array Logic, Sequential Programmable Devices

UNIT V

Design at the Register Transfer Level: introduction, Register Transfer Level (RTL) Notation, Register Transfer Level in HDL, Algorithmic State Machines (ASMs), Design Example, HDL Description of Design Example, Sequential Binary Multiplier, Control Logic, HDL Description of Binary Multiplier, Design with Multiplexers, Race-Free Design, Latch-Free Design, Other Language Features..

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Have a thorough understanding of the fundamental concepts and techniques used in digital electronics.
CO2	The ability to understand, analyze and design various combinational and sequential circuits.
CO3	Apply the fundamental knowledge of analog and digital electronics to get different types analog to digitalized signal and vice-versa converters in real world with different changing circumstances.
CO4	Explains memory units. Recognizes RAM, ROM, PROM, EPROM, EEPROM recognizes the properties of memory units.
CO5	Understand basic counter and shift register applications.

Note: Adhere to the latest editions of the Suggested Readings

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13
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Mapping Matrix of CO and PO

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

SUGGESTED READINGS

- Morries Mano- Digital Logic Design- PHI
- Bell-Linear IC & OP AMP—Oxford
- P.Raja- Digital Electronics- Scitech Publications

REFERENCES

- Microelectronics Engineering - Sedra & Smith-Oxford.
- Principles of Electronic Devices & circuits—B L Thereja & Sedha—S Chand
- Digital Electronics – Kharate – Oxford
- Digital Electronics – Logic & Systems by J.Bigmeil & R.Donovan; Cambridge Learning.
- Digital Logic and State Machine Design (3rd Edition) – D.J.Comer, OUP

WEBSITE SOURCES:

<https://nptel.ac.in/courses/106/105/106105191/>

https://spoken-tutorial.org/tutorial-search/?search_foss=Java&search_language=ENGLISH

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Department of Computer Science & Engineering

Programme		Bachelor of Technology(B.Tech)			Branch		Computer Science & Engineering (CSE)			
Semester		3			Version					
Effective from Academic Year				2021-2022		Effective for the Batch Admitted in				2021
Subject Code		ECS 304			Subject Name		OPERATING SYSTEM CONCEPTS			
Teaching Scheme					Examination Scheme(Marks)					
Per Week	Lecture		Practical(Lab)		Total		TS/PS	TE/PE	Total	
	L	T	P	TW						
Credit	3	1	0	-	4	Theory	30	70	100	
Hours	3	1	0	-	4	Practical	-	--	-	
COURSE OBJECTIVE										
<p>This course provides a comprehensive introduction to understand the fundamental principles, techniques and approaches related to CPU, memory and files which requires the complete knowledge of operating systems. The course will highlight the various functionality of CPU scheduling, memory management, disk management and security of operating system.</p>										
Syllabus										
UNIT – I										
Introduction: Definition, objective characteristics, functions and services of Operating system. Categorization of Operating systems. Computer system structure, operating system structure, system calls, Kernels, Monolithic and Microkernel										
UNIT – II										
Process concept: process state, process control block, process scheduling queue, schedulers, operation on the process, cooperating process, inter process communication, threads, benefits of threads, multithreading models, threading issues pthreads, Linux thread, java threads. Principle of Concurrency, Producer Consumer Problem, Mutual Exclusion, Critical Section Problem. Dekker's solution, Peterson's solution, Semaphores, Test and Set operation; Classical Problem in Concurrency- Dining Philosopher Problem, Sleeping Barber Problem: critical region, monitors										
UNIT – III										
CPU Scheduling: Scheduling Concepts, scheduling Criteria, scheduler, preemptive scheduling and non preemptive scheduling. Scheduling Algorithms, Multiprocessor Scheduling, real time scheduling, scheduling algorithm evaluation.										
Deadlock: System model, Deadlock characterization, deadlock handling Strategies, Prevention, Avoidance and detection, Recovery from deadlock										
UNIT – IV										
Memory Management: concept, address binding, Basic, dynamic loading, overlays, swapping, contiguous and non contiguous memory allocation, fragmentation, paging, page tables, segmentation, segmentation with paging, concept of virtual memory, demand paging, page replacement, Thrashing,										
UNIT – V										
I/O Management and Disk Scheduling: I/O devices, and I/O subsystems, I/O buffering, Disk storage and disk scheduling algorithms, File System, File concept, File organization and access mechanism, File directories, and File sharing, file system implementation issues, File system protection and security.										
COURSE OUTCOME (CO)										
					DESCRIPTION					
CO1					Understand the structure and functions of various type of Operating System and their services.					
CO2					Acquire knowledge about the processes, threads and Concept of concurrency control.					
CO3					To learn different algorithms for process scheduling to achieve better CPU utilization. Understand the Deadlock occurrence and prevention techniques					
CO4					Describe the techniques for optimally allocating memory to processes by using the concept of virtual memory as swapping, paging, segmentation, fragmentation and thrashing.					
CO5					Study of I/O management system and file management system.					

Note: Adhere to the latest editions of the Suggested Readings

15

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Mapping Matrix of CO and PO

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

SUGGESTED READINGS:

- Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley
- Sibsankar Halder and Alex A Aravind, "Operating Systems", Pearson Education
- Harvey M Dietel, "An Introduction to Operating System", Pearson Education
- D M Dhamdhare, "Operating Systems: A Concept based Approach", 2nd Edition

WEBSITE RESOURCES:

- www.swayam.gov.in
- onlinecourses.nptel.ac.in

WEBSITE SOURCES:

<https://nptel.ac.in/courses/106/105/106105191/>

https://spoken-tutorial.org/tutorial-search/?search_foss=Java&search_language=ENGLISH

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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)	Branch	Computer Science & Engineering (CSE)						
Semester	3	Version							
Effective from Academic Year		2021-2022	Effective for the Batch Admitted in 2021						
Subject Code		ECS 305	Subject Name DISCRETE MATHEMATICAL STRUCTURES						
Teaching Scheme					Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total		TS/PS	TE/PE	Total
	L	T	P	TW					
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-

COURSE OBJECTIVE

1. Use mathematically correct terminology and notation
2. Construct correct direct and indirect proofs
3. Learn the concept of modern Algebra like Group, Ring and Field.
4. Understand Boolean algebra, Lattice, K Map
5. Apply logical reasoning to solve a variety of problems.

Syllabus

UNIT-I

Set Theory: Introduction, Combination of sets, Multi-sets, Ordered pairs. Proof's of some general identities on sets.
 Relations: Definition, Operations on relations, Properties of relations, Composite Relations, Equality of relations, Recursive definition of relation.
 Order of relations. Functions: Definition, Classification of functions, Operations on functions, Recursively defined functions. Growth of functions.
 Natural Numbers: Introduction, Mathematical Induction, Variants of Induction, Induction with Nonzero Base cases. Proof Methods. Proof by counter – example, Proof by contradiction.

UNIT-II

Algebraic Structures: Definition, Groups, Subgroups and order, Cyclic Groups, Cosets, Lagrange's theorem, Normal Subgroups. Permutation and Symmetric groups, Group Homomorphisms, Definition and elementary properties of Rings and Fields, Integers Modulo n.

UNIT-III

Partial order sets: Definition, Partial order sets. Combination of partial order sets. Hasse diagram. Lattices: Definition, Properties of lattices – Bounded, Complemented, Modular and Complete lattice. Boolean Algebra: Introduction, Axioms and Theorems of Boolean algebra, Algebraic manipulation of Boolean expressions, Simplification of Boolean Functions, Karnaugh maps, Logic gates, Digital circuits and Boolean algebra

UNIT-IV

Propositional Logic: Proposition, well formed formula, Truth tables, Tautology, Satisfiability, Contradiction, Algebra of proposition, Theory of Inference Predicate Logic: First order predicate, well formed formula of predicate, quantifiers, Inference theory of predicate logic.

UNIT-V

Trees: Definition, Binary tree, Binary tree traversal, Binary search tree.
 Graphs: Definition and terminology, Representation of graphs, Multigraphs, Bipartite graphs, Planar graphs, Isomorphism and Homeomorphism of graphs, Euler and Hamiltonian paths, Graph coloring
 Recurrence Relation & Generating function: Recursive definition of functions, Recursive algorithms, Method of solving recurrences.
 Combinatorics: Introduction, Counting Techniques, Pigeonhole Principle.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	To perform the operations associated with sets, functions, and relations.
CO2	Explain the fundamental concepts of advanced algebra such as groups, rings, Field, Normal group and cyclic group their role in modern mathematics and applied contexts
CO3	Understand the concepts of POSET, Lattices, and Boolean Algebra in analysis of various computer science applications
CO4	To understand the concept of predicate logic.

Note: Adhere to the latest editions of the Suggested Readings

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CO5	Able to model and solve real world problems using graphs and trees											
Mapping Matrix of CO and PO												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	2	1	1	1	1	1	2	3
CO2	3	1	3	3	1	1	1	1	1	1	1	2
CO3	1	3	3	2	1	1	1	1	1	1	2	2
CO4	1	3	3	1	2	1	1	1	2	1	1	2
CO5	2	1	2	1	1	1	1	1	1	1	2	2
SUGGESTED READINGS:												
<ol style="list-style-type: none"> 1. Liu and Mohapatra, "Elements of Discrete Mathematics", McGraw Hill 2. Jean Paul Trembley, R Manohar, Discrete Mathematical Structures with Application to Computer Science. McGraw-Hill 3. R.P. Grimaldi, Discrete and Combinatorial Mathematics, Addison Wesley. 4. Kenneth H. Rosen, Discrete Mathematics and Its Applications. McGraw-Hill. 5. B. Kolman, R.C. Busby, and S.C. Ross. Discrete Mathematical Structures. PHI 												
WEBSITE RESOURCES:												
<ul style="list-style-type: none"> • www.swayam.gov.in • onlinecourses.nptel.ac.in 												
WEBSITE RESOURCES:												
<ul style="list-style-type: none"> • swayam.gov.in • onlinecourses.nptel.ac.in • http://courses.cs.vt.edu/csonline/ Discrete Mathematics /Lessons/ 												

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Department of Computer Science & Engineering

Programme		Bachelor of Technology (B.Tech)			Branch	Computer Science & Engineering (CSE)			
Semester		3			Version				
Effective from Academic Year				2021-2022		Effective for the Batch Admitted in		2021	
Subject Code		(PSD-301/PSD-401)			Subject Name	PROFESSIONAL SKILL DEVELOPMENT-II			
Teaching Scheme					Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total		TS/PS	TE/PE	Total
	L	T	P	TW					
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-

COURSE OBJECTIVE

1. To Develop critical thinking, creativity and effective communication.
2. To provide the essential foundational elements for leadership skill-building and student success.
3. To Explore self-awareness that involves identification and articulation of various facets – cultural, social, and familial that contribute to the formation of one's identity.
4. To develop mutually beneficial relationships through communication and cooperation with others. collaborate to achieve group goals, practice living and leading with integrity, and learn about issues of local and global significance in order to become active members of their communities.

Syllabus

UNIT I: Communicative Skills

Communication: Concept, Classification, Purpose, Process, Importance, Flow & Level of Communication, Barriers & Gateways in Communication, 7 C's of Communication, Types of Communication & communication without words

UNIT II: Intrapersonal Relationship Skills

Personality: Characteristics of Healthy & Sick Personality

Self Awareness

Self Esteem

Self Confidence

Assertiveness V/S Aggressiveness

Values: Types & Importance

UNIT III: Interpersonal Relationship Skills

Group: Concepts, Types, Stages

Team: Concepts, Elements, Types, Stages

Presentation Skills & strategies

Interview: Concepts, Types, Process, Interview Preparation Checklist, Interview Handling Skills, Common Interview mistakes

UNIT IV: Argumentative Skills

Debate

Role Play

Speeches

Elocution

Group Discussion

UNIT V: Campus to Company Skills

The corporate Fit: Dressing and Grooming

Basic Etiquette: Office (Do's and Don'ts for men and women), Telephone, Email

Dealing With People in Corporate

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Apply the comprehensive set of skills and knowledge for life success.

Note: Adhere to the latest editions of the Suggested Readings

19

CO2	understand the communication process, its benefits and challenges
CO3	Learn to effectively lead others on a project or in an organization
CO4	Develop and articulate respect for the diversity of talents, ways of knowing and learning.
CO5	To develop personality as per company environment.

Mapping Matrix of CO and PO

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

SUGGESTED READINGS:

- M.K. Sehgal & V. Khetrapal's Business Communication published by Excel Books.
- Rajendra Pal's Business Communication published by Sultan Chand & Sons Publication.
- P. D. Chaturvedi's Business Communication published by Pearson Education, Delhi.
- Elizabeth B. Hurlock's Personality Development by Tata McGraw Hills, Delhi.

WEBSITE RESOURCES:

- www.wikipedia.com
- www.fluentu.com
- www.mindstool.com
- www.digitalcommons.pace.edu

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Department of Computer Science & Engineering

Programme		Bachelor of Technology(B.Tech)			Branch	Computer Science & Engineering (CSE)			
Semester		3			Version				
Effective from Academic Year				2021-2022		Effective for the Batch Admitted in			2021
Subject Code		EHU-301			Subject Name	DISASTER MANAGEMENT			
Teaching Scheme					Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total		TS/PS	TE/PE	Total
	L	T	P	TW					
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-

COURSE OBJECTIVE

1. To provide basic conceptual understanding of disasters and its relationships with development.
2. To gain understand approaches of Disaster Risk Reduction (DRR) and the relationship between vulnerability, disasters, disaster prevention and risk reduction.

Syllabus

UNIT I: Introduction to Disasters

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks; Types of disasters – Earthquake, Landslide, Flood, Drought, Fire, campus shooting, bomb threat, terrorist incidence and financial emergency etc.; Causes and Impacts including social, economic, political, environmental, health, psychosocial, etc.; Differential impacts- in terms of caste, class, gender, age, location, disability; Global trends in disasters- urban disasters, pandemics, complex emergencies, Climate change- Dos and Don'ts during various types of Disasters

UNIT II: Approaches To Disaster Risk Reduction

Disaster life cycle – its analysis, phases, culture of safety, prevention, mitigation and preparedness; Community based DRR (Disaster Risk Reduction), Structural-nonstructural measures; Roles and responsibilities of community; Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stakeholders

UNIT III: Inter-Relationship between Disasters and Development

Factors affecting Vulnerabilities, impact of Development projects such as dams, embankments, changes in Land-use etc.; Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India – Relevance of indigenous knowledge, appropriate technology and local resources, Role of international cooperation's in Disaster Management

UNIT IV: Disaster Risk Management In India

Hazard and Vulnerability profile of India. Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management; Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy – Other related policies, plans, programmes and legislation; Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V: Disaster Management: Applications, Case Studies and Field Works

The project /fieldwork are meant for students to understand vulnerabilities and to work on reducing disaster risks and to build a culture of safety. Projects must be conceived creatively based on the geographic location and hazard profile of the region where the college is located. A few ideas or suggestions are discussed below:

Several governmental initiatives require Urban Local Bodies (ULBs) and Panchayati Raj Institutions (PRIs) to be proactive in preparing DM plans and community based disaster preparedness plans. Information on these would be available with the district collector or Municipal corporations.

Teachers could ask students to explore and map disaster prone areas, vulnerable sites, vulnerability of people (specific groups) and resources. The students along with teacher could work on ways of addressing these vulnerabilities, preparing plans and consultation with local administration or NGOs.

Students could conduct mock drills in schools, colleges or hospitals. They could also work on school safety, safety of college buildings, training in first aid.

Other examples could be- identifying how a large dam, road/ highway or an embankment or the location of an industry affects local environment and resources or how displacement of large sections of people creates severe vulnerabilities may be mapped by student project work.

The suggested topics for Project work for student could be as follows:

- Monitoring and evaluation plan for disaster response

Note: Adhere to the latest editions of the Suggested Readings


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- Low cost Home based water purification methods
- Planning Nutrition intervention programmes
- Safety tips before during and after earthquake, cyclone, floods and fire accidents.
- Mock Drills
- Major disasters in India
- Disaster Management in India
- Flood affected areas and damages in India
- Heat waves in India
- Earth quakes in India
- Historical Tsunamis in India
- Nuclear emergence
- Traffic accidents in India
- Train Accidents
- Major disease outbreak
- Disaster management structure in India
- Precaution, mitigation of disaster in India
- Warning system in India to prevent disaster
- Bhopal gas tragedy
- Kutch earth quake
- Tsunami (2004)
- Kosi Calamity 2008
- Mayapuri radiation exposure Delhi (2010)
- Mock exercises

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Understand the concepts, aspects & impacts of disaster.
CO2	Study the approaches to disaster Risk Reduction roles & responsibilities of community.
CO3	Study the inter- relationship between Disaster and Development
CO4	Understand the Disaster Risk Management in Context to India.
CO5	Study of Applications, Case Studies & Field Works related to Disaster Management.

Mapping Matrix of CO and PO

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

SUGGESTED READINGS:

- SatishModh, Introduction to Disaster Management, Macmillan Publisher India Ltd
- Alexander David, Introduction in 'Confronting Catastrophe', Oxford University Press
- Blaikie, P, Cannon T, Davis I, Wisner B 1997. At Risk Natural Hazards, Peoples' Vulnerability and Disasters, Routledge.
- Damon P. Coppola, Introduction to International Disaster Management, Butterworth-Heinemann.
- Singhal J.P. "Disaster Management", Laxmi Publications. ISBN-10: 9380386427 ISBN-13: 978-9380386423
- Tushar Bhattacharya, "Disaster Science and Management", McGraw Hill India Education Pvt. Ltd., ISBN-10: 1259007367, ISBN-13: 978-1259007361]
- Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi
- KapurAnu Vulnerable India: A Geographical Study of Disasters, IAS and Sage Publishers, New Delhi.
- Carter, Nick. Disaster Management: A Disaster Manager's Handbook. Asian Development Bank, Manila Philippines.
- Cuny, F. Development and Disasters, Oxford University Press. Document on World Summit on Sustainable Development.
- Govt. of India: Disaster Management Act 2005, Government of India, New Delhi. Government of India. 2009.
- Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi Indian Journal of Social Work.

WEBSITE RESOURCES:

- https://www.physio-pedia.com/Disaster_Management
- <http://www.ifrc.org/en/what-we-do/disaster-management>
- <http://www.wcpt.org/disaster-management/what-is-disaster-management>
- en.wikipedia.org

Note: Adhere to the latest editions of the Suggested Readings

Department of Computer Science & Engineering

Programme		Bachelor of Technology (B.Tech)			Branch	Computer Science & Engineering (CSE)			
Semester		4			Version				
Effective from Academic Year				2021-2022		Effective for the Batch Admitted in			2021
Subject Code		ECS-401			Subject Name	DATA COMMUNICATIONS & NETWORKS			
Teaching Scheme					Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total		TS/PS	TE/PE	Total
	L	T	P	TW					
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-

COURSE OBJECTIVE

To provide a solid conceptual understanding of the fundamentals of data communications and computer networks for skill Development, employability as well as entrepreneurship development. More specifically,

1. To learn the basic concepts of data communications.
2. To learn the layered architecture of communication protocols.
3. To learn digital signal transmission and encoding techniques.
4. To learn multiplexing techniques.
5. To learn the concepts and techniques in error detection and correction.
6. To learn data link control and its related protocols.
7. To learn LAN architectures and system

Syllabus

UNIT -I

Introduction: Data Communications, Networks. The internet, Protocols and Standards. Layered Tasks. Goals and Applications of Networks. The OSI reference model, layers in the OSI Model, TCP/IP Protocol Suite, and Addressing. Transmission Media. Coaxial Cable, Fiber Optics, Line Coding. Modems, Internetworking devices, Bridges, router, repeater, switch.

UNIT-II

Data link layer: Introduction, Framing, Error Detection and Correction, Linear block coding, Cyclic Codes, Checksum, Flow and error control, protocols, noiseless channels, noisy channels,
Medium Access sub layer: Channel Allocations, ALOHA protocols, Overview of IEEE standards, FDDI, HDLC, sliding window protocols, Frame relay, switching, Point to point protocols, LAN protocols, Wired LANs Ethernet IEEE 802.3, IEEE 802.4, IEEE 802.5, Wireless LANs

UNIT - III

Network Layer: Point to Point Networks, introduction to routing protocols, distance vector routing, Link state routing, Congestion control, Internetworking, TCP / IP, IP packet, IP addressing, Subnetting, IPv6 addresses, Internetworking, IPv4, IPv6 Protocols.

UNIT - IV

Transport Layer: Design issues, Duties of transport layer: Multiplexing, De-multiplexing, connection management, Sockets, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), Congestion Control
Session Layer: Design issues, Remote procedure call.

UNIT-V

Presentation Layer: Design issues, Data compression techniques, cryptography, Window Management.
Application Layer: File Transfer, Access and Management, Electronic mail, Virtual terminals, other applications. Example Networks - Internet and Public Networks, WWW and HTTP, DNS, FTP, Network Management: SNMP, Network security. Introduction to Digital Signature.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	To learn the basic concepts of signals for skill Development
CO2	To learn digital signal transmission and encoding techniques for skill Development.
CO3	Skill development about Analog Transmission and Digital to Analog Conversion.
CO4	Exceedingly skilled students to use multiplexing techniques for employability.
CO5	Students able to get employment by Manage local or global Network to analyze

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connection establishment and bandwidth sharing with respect to different Network.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	1	1	1
CO2	1	1	1
CO3	3	3	1
CO4	3	2	1
CO5	1	2	1

REFERENCES

- John Scheillor, —Mobile Communication, I Pearson.
- Data Networks, D. Bertsekas and R Gallager, PHI

WEBSITE RESOURCES:

- www.wikipedia.com
- swayam.gov.in
- www.nptel.ac.in



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Department of Computer Science & Engineering

Programme		Bachelor of Technology(B.Tech)			Branch		Computer Science & Engineering (CSE)			
Semester		4			Version					
Effective from Academic Year				2021-2022		Effective for the Batch Admitted in			2021	
Subject Code			ECS-402			Subject Name		DESIGN AND ANALYSIS OF ALGORITHMS		
Teaching Scheme					Examination Scheme(Marks)					
Per Week		Lecture		Practical(Lab)		Total		TS/PS	TE/PE	Total
	L	T	P	TW						
Credit	3	1	0	-	4	Theory	30	70	100	
Hours	3	1	0	-	4	Practical	-	--	-	

COURSE OBJECTIVE

1. To develop proficiency in problem solving and programming for skill Development.
2. To be able to carry out the Analysis of various Algorithms for mainly Time and Space Complexity.
3. To get a good understanding of applications of Data Structures for skill Development..
4. To develop a base for advanced study in Computer Science.

Syllabus

UNIT-I

Introduction: Algorithms, Analyzing algorithms, Complexity of algorithms, Growth of functions, Performance measurements, Recurrence relations, Master's Theorem, Quick sort, Merge sort, Heap sort, Comparison of sorting algorithms, Sorting in linear time – counting sort, radix sort, bucket sort for skill Development.

UNIT -II

Hash Tables, Binary Search Trees, Augmenting Data Structures, Advanced data structures: Red-Black trees, B-trees, Binomial Heaps, Fibonacci Heaps for skill Development Divide and Conquer with examples such as Sorting, Matrix Multiplication and Searching.

UNIT - III

Greedy methods, Knapsack, Huffman codes, Activity selection problem, Minimum Spanning trees – Prim's and Kruskal's algorithms, Amortized Analysis. for skill Development Graph Algorithms: Topological sorting, Single source shortest paths, Dijkstra's and Bellman Ford algorithms, APSP.

UNIT - IV

Dynamic programming with examples such as - Matrix chain multiplication, Longest common subsequences, Knapsack, Backtracking, Branch and Bound, Travelling Salesman Problem, Graph Coloring, n-Queen Problem for skill Development

UNIT -V

Sorting networks, String Matching, Matrix Operations, Number Theoretic Algorithms, Convex hull, Computational Geometry, Fast Fourier Transform, Theory of NP-completeness, Approximation algorithms and Randomized algorithms for skill Development

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms for skill Development.
CO2	Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms for skill Development.
CO3	Describe the divide-and-conquer paradigm and students can improve skills when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation.
CO4	Describe the dynamic-programming paradigm and students can enhance skills when an algorithmic design situation calls for solving any national/ international problem.
CO5	Analyze randomized algorithms and approximation algorithms for student's skill development.

Note: Adhere to the latest editions of the Suggested Readings

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	1	1	1
CO2	2	1	1
CO3	3	1	1
CO4	3	1	1
CO5	3	1	1

SUGGESTED READINGS

- Thomas H. Cormen, Charles E. Leiserson and Ronald L. Rivest, "Introduction to Algorithms", PHI
- E. Horowitz & S Sahni, "Fundamentals of Computer Algorithms",
- Berman, Paul, "Algorithms", Cengage Learning.
- Aho, Hopcraft, Ullman, "The Design and Analysis of Computer Algorithms" Pearson Education. 2008

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in



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Department of Computer Science & Engineering

Programme		Bachelor of Technology(B.Tech)			Branch		Computer Science & Engineering (CSE)			
Semester		4			Version					
Effective from Academic Year				2021-2022		Effective for the Batch Admitted in				2021
Subject Code			ECS-403			Subject Name		DATABASE MANAGEMENT SYSTEMS		
Teaching Scheme					Examination Scheme(Marks)					
Per Week	Lecture		Practical(Lab)		Total		TS/PS	TE/PE	Total	
	L	T	P	TW						
Credit	3	1	0	-	4	Theory	30	70	100	
Hours	3	1	0	-	4	Practical	-	--	-	

COURSE OBJECTIVE

1. To understand fundamental knowledge of file system, database concepts and use of relational database for skill development.
2. To study of different data model and conceptual design using ER diagram.
3. Students can use SQL operations to manipulate the database and learn how to design and create a good database using functional dependencies and normalization for employability.
4. The course provides an overview of transaction management, concurrency control, distributed database and Big Data.

Syllabus

UNIT-I

Introduction: An overview of database management system, database system Vs file system, Database architecture, data models, schema and instances, data independence, database language and interfaces, data definitions language, data manipulation language for skill development.
Data Modeling using the Entity Relationship Model:ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables.

UNIT-II

Relational data Model and Language: Relational data model concepts, integrity constraints, entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus.
Introduction to SQL for employability and entrepreneurship development: Characteristics of SQL, advantage of SQL, SQL data types, Types of SQL commands, SQL operators, Tables, views and indexes, Queries and sub queries, Aggregate functions, Insert, update and delete operations, Joins, Unions, Intersection, Minus, Cursors, Triggers, Procedures in SQL/PL SQL.

UNIT-III

Data Base Design & Normalization: Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependence, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design for skill development.

UNIT-IV

Transaction Processing Concept: Transaction system, Testing of serializability, serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, checkpoints, deadlock handling for skill development and employability
Distributed Database: Concepts of distributed database management systems

UNIT-V

Concurrency Control Techniques: Concurrency control, Locking Techniques for concurrency control, Time stamping protocols for concurrency control, for skill development, validation based protocol, multiple granularity, Multi version schemes, Recovery with concurrent transaction

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	To learn the basic concepts of Database Data Modelling and ER Diagrams for skill development.
CO2	To learn about Relational Data Model and SQL commands for skill development and employability.
CO3	To learn about Database Design and Normalization for skill development.
CO4	To learn about global Transaction Processing Concepts for skill development and

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	employability.
CO5	To learn about Concurrency Control Technique for skill development.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	1	1	1
CO2	1	3	2
CO3	2	1	1
CO4	1	2	1
CO5	3	1	1

SUGGESTED READINGS:

- Korth, Silbertz, Sudarshan, "Database Concepts", McGraw Hill
- Elmasri, Navathe, "Fundamentals of Database Systems", Addison Wesley
- Date, C. J., "An introduction to database systems", 8th Edition, Pearson Education.
- Bipin C. Desai, "An Introduction to Database Systems", Gargotia Publications

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in

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Department of Computer Science & Engineering

Programme		Bachelor of Technology(B.Tech)			Branch	Computer Science & Engineering (CSE)		
Semester		4			Version			
Effective from Academic Year				2021-2022		Effective for the Batch Admitted in		2021
Subject Code		ECS 404			Subject Name	INTRODUCTION TO MICROPROCESSOR		
Teaching Scheme					Examination Scheme(Marks)			
Per Week	Lecture		Practical(Lab)		Total	TS/PS	TE/PE	Total
	L	T	P	TW				
Credit	3	1	0	-	4	Theory	30	70
Hours	3	1	0	-	4	Practical	-	--

COURSE OBJECTIVE

1. To illustrate the architecture of 8085 microprocessors for skill development.
2. To introduce the programming and interfacing techniques of 8085 microprocessor.
3. To analyze the basic concepts and programming of 8051 microcontroller for skill improvement.
4. To understand the interfacing circuits for various applications of 8051 microcontroller.
5. To introduce the architecture of advanced microprocessors and microcontrollers.

Syllabus

UNIT-I

Introduction: Microprocessor evolution and types, microprocessor architecture and operation of its components, addressing modes, interrupts, data transfer schemes, instruction and data flow, timer and timing diagram. Interfacing devices. Architectural advancement of microprocessor helps in skill development. Typical microprocessor development schemes.

UNIT-II

8-bit Microprocessors: Pin diagram and internal architecture of 8085 microprocessor, registers, ALU, Control & status, interrupt and machine cycle. Instruction sets. Addressing modes, Instruction formats useful for skill development.

Instruction Classification: data transfer, arithmetic operations, logical operations, branching operations, machine control and assembler directives.

UNIT-III

16-bit Microprocessor: Architecture of 8086 microprocessor: register organization, bus interface unit, execution unit, memory addressing, memory segmentation, Operating modes for skill improvement, Instruction sets, instruction format, Types of instructions. Interrupts: hardware and software interrupts.

UNIT-IV

Programming: Assembly language programming based on Intel 8085/8086. Instructions. data transfer. arithmetic. logic. branch operations. looping. counting, indexing, programming techniques, counters and time delays, stacks and subroutines. conditional call and return instructions are helping in skill development.

UNIT-V

Peripheral Interfacing: Peripheral Devices: 8237 DMA Controller, 8255 programmable peripheral interface, 8253/8254 programmable timer/counter, 8259 programmable interrupt controller, 8251 USART and RS232C are provide the knowledge for employability.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Understand the basics of 8085 microprocessor and its instruction set for skill development.
CO2	Understand the 8086 architecture and its instruction set for skill development.
CO3	Understand the 8086 programming for skill development.
CO4	Know about the 8089 microprocessor's interfaces and their architecture for skill development.
CO5	Describe the evolution and various types of global microprocessors for skill development as well as employability.

PO-CO Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

Note: Adhere to the latest editions of the Suggested Readings

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

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	3	1	1
CO2	3	1	1
CO3	2	1	1
CO4	3	1	1
CO5	2	3	1

SUGGESTED READINGS:

- Computer System Architecture – M.Moris Mano, IIIrd Edition, PHI / Pearson, 2006.
- Computer Organization – Car Hamacher, ZvonksVranesic, SafwatZaky, V Edition, McGraw Hill, 2002.
- Computer Organization and Architecture – William Stallings Seventh Edition, PHI/Pearson, 2006.

REFERENCES

- Computer Architecture and Organization – John P. Hayes, McGraw Hill International editions, 1998.
- John L. Hennessy and David A. Patterson, Computer Architecture: A Quantitative Approach. Morgan Kaufmann.
- John Paul Shen and Mikko H. Lipasti, Modern Processor Design: Fundamentals of Superscalar Processors. Tata McGraw-Hill.
- M. J. Flynn, Computer Architecture: Pipelined and Parallel Processor Design. Narosa Publishing House.
- Kai Hwang, Advanced Computer Architecture: Parallelism, Scalability, Programmability. McGraw-Hill

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in



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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)			Branch	Computer Science & Engineering (CSE)		
Semester	4			Version			
Effective from Academic Year				2021-2022	Effective for the Batch Admitted in		2021
Subject Code		ECS 405		Subject Name		SOFTWARE ENGINEERING	
Teaching Scheme				Examination Scheme(Marks)			
Per Week	Lecture		Practical(Lab)		Total		
	L	T	P	TW		TS/PS	TE/PE
Credit	3	1	0	-	4	Theory	30
Hours	3	1	0	-	4	Practical	70
						-	--
							100
							-

COURSE OBJECTIVE

The main objective of this course is to introduce the students to software engineering .The study of the fundamentals of software engineering principles and practices, including project management, configurations management, requirements definition, system analysis, design, testing, and deployment will be covered.

Syllabus

UNIT-I:

Introduction: Software: Introduction, software applications, importance of software evolution of software. Software Components, Software Characteristics, Software Crisis & myths. Software Engineering paradigms: introduction, principles & Processes. Software Quality Attributes for skill development. Comparison between software engineering & computer science. & software engineering & Engineering. Some terminologies: product & process, deliverables and milestones, measures, metric & indicators. Programs & software products. Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, RAD model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.

UNIT-II:

Software Requirement Specifications (SRS): Requirement Engineering Process: introduction, Information Modeling, Data Flow Diagrams, Decision Tables. SRS: Document, components, characteristics, IEEE Standards for SRS, validation Entity Relationship Diagrams. Software Reliability and Quality Assurance (SQA): Software Reliability: introduction, Verification and Validation, Software Reliability specification, software quality. Reliability issues, Reliability metrics, Reliability growth model (jelinski-moranda model, little wood and verall's model, step function model) Reliability assessment., etc., fault avoidance , fault tolerance, exception handling, useful in skill development. Software Reliability Assurance (SQA): introduction, properties, plans, goals. SEI-CMM Model. ISO: introduction, ISO 9000 Models, ISO 9126 MODELS. Comparison between ISO 9000 & SEI – CMM Model

UNIT-III:

Software Design and coding structure: Software design: Introduction, properties, principles Architectural Design: introduction, objectives for skill development. Object oriented designs: basic concept, terminologies, and examples. Low Level Design: Modularization, Structure Chart, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, relationship between Coupling and Cohesion, Design Strategies: Functional versus Object Oriented approach, design verification Software Coding: information hiding, programming style, monitoring and control for coding, structured programming, 4GT, etc.. Software Measurement and Metrics: introduction, Various Size Oriented Measures: Halstead's Software Science. Function Point (FP) Based Measures, and Cyclomatic Complexity Measures: Control Flow Graphs.

UNIT-IV:

Software Testing: Testing: definition, principles, objectives, test oracles, test plan, test case design. Levels of testing: unit Testing: procedure. Integration Testing: objectives, approaches (incremental, top down, bottom up regression, smoke & sandwich). system testing: alpha. beta. acceptance testing. Structural Testing (White Box Testing), Functional Testing (Black Box Testing). for employability as well as for entrepreneurship. Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code Inspection, Compliance with Design and Coding Standards, debugging, error fault & failure.

UNIT-V:

Software Maintenance and Software Project Management: Software maintenance: definition, nature of Software Maintenance. Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, use of Software Maintenance, maintenance characteristics, Cost of Maintenance, maintainability, task during maintenance, maintenance side effects, maintenance ALIEN code, maintenance problems, Software Re-Engineering, reverse software Engineering. Software Configuration Management Activities helping to get employability as well as entrepreneurship, Change Control Process, Software Version Control, CASE: introduction, levels of case, architecture, case building blocks, objectives, case repository, characteristics of case tools, categories, Estimation of Various Parameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO), Resource Allocation Models, Software Risk Analysis and Management.

COURSE OUTCOME (CO)

	DESCRIPTION
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Note: Adhere to the latest editions of the Suggested Readings

CO1	To introduce the concepts and important terminologies of software engineering for skill development
CO2	To understand global Software Requirement Specifications and software Reliability for skill development.
CO3	To build up the skills of Software Design and Coding Structure.
CO4	To expand the knowledge and skills development in Software Testing to become an employee as well as entrepreneur.
CO5	Study of Software Maintenance and Software Project Management would be concerned to dig up to get employability as well as entrepreneurship.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	1	1	1
CO2	1	1	1
CO3	3	2	2
CO4	3	1	1
CO5	1	3	3

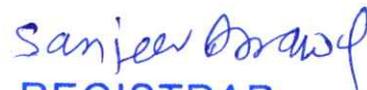
SUGGESTED READINGS:

- R. S. Pressman, Software Engineering: A Practitioners Approach, McGraw Hill.
- Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
- K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers
- Pankaj Jalote, Software Engineering, Narosa Publication
- A. Leon and M. Leon, Fundamentals of Software Engineering, Vikas Publication

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in


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Note: Adhere to the latest editions of the Suggested Readings

Department of Computer Science & Engineering

Programme		Bachelor of Technology(B.Tech)			Branch		Computer Science & Engineering (CSE)		
Semester		4			Version				
Effective from Academic Year				2021-2022		Effective for the Batch Admitted in		2021	
Subject Code			EMA-401			Subject Name		COMPUTER BASED NUMERICAL & STATISTICAL TECHNIQUES	
Teaching Scheme					Examination Scheme(Marks)				
Per Week		Lecture		Practical(Lab)		Total			
	L	T	P	TW			TS/PS	TE/PE	Total
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-
COURSE OBJECTIVE									
To demonstrate understanding of numerical and statistical methods in support of the analysis, design and application for problem solving in the field of information technology for skill development and employability.									
Syllabus									
UNIT-I									
Introduction: Numbers and their accuracy, Computer Arithmetic, Mathematical preliminaries, Errors and their Computation, General error formula, Error in a series approximation									
Solution of Algebraic and Transcendental Equations: Bisection Method, Iteration method, Method of false position, Newton Raphson method. Methods of finding complex roots, Muller's method, rate of Convergence, polynomial equations for skill development.									
UNIT-II									
Solution system of linear equations, gauss- seidal method, LU decomposition method.									
Interpolation: Finite Differences, Differences tables									
Polynomial Interpolation: Newton's forward and backward formula.									
Interpolation with unequal intervals: Lagrange's Interpolation, Newton divided difference formula for skill development..									
UNIT -III									
Numerical Integration and Differentiation: Introduction Numerical differentiation, Numerical Integration: Trapezoidal rule, Simpson's 1/3 and 3/8 rule, Boole's rule, Waddle's rule for skill development..									
Solution of differential equations: Picard's Method, Euler's Method, Taylor's Method, Runge- Kutta Methods, Predictor Corrector Methods.									
UNIT-IV									
Statistical Techniques –I									
Moments, Moment generating functions, Skewness , Kurtosis, Linear, non- Linear and multiple regression analysis, Probability theory, Correlation, Binomial, Poisson and Normal distributions for skill development..									
UNIT-V									
Statistical Techniques –II									
Sampling theory (small and large), Test of significance: Chi-square test, t- test, analysis of variance (one way), Application to engineering, medicine, agriculture etc are able to obtain employability.									
Time series and forecasting (moving and semi-averages), Statistical quality control methods, Control charts. X, R, p, np, and c charts.									
COURSE OUTCOME (CO)									
		DESCRIPTION							
CO1		Be familiar with finite precision computation and interpretation of errors in numerical methods for skill development.							
CO2		For superior skill refinement Solving Linear equations Interpolation and polynomial interpolation.							
CO3		Student can improve their skills by Solving Differentiation, Integration and differential equation using numerical methods.							
CO4		Learning Basic Statistical techniques for skill development.							
CO5		Student would be able to obtain employability by Learn Sampling, Time Series and Forecasting, different types of test and charts for solving problems of national/							

Note: Adhere to the latest editions of the Suggested Readings

21


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international interest.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	2	1	1
CO2	3	1	1
CO3	3	1	1
CO4	2	1	1
CO5	1	3	1

SUGGESTED READINGS:

- B. S. Grewal, "Engineering Mathematics", Khanna Publishers
- B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers
- E. Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons
- C. Ray Wylie & Louis C. Barrett, "Advanced Engineering Mathematics", TMH
- Chandrika Prasad, "Advanced Mathematics for Engineers", Prasad Mudranalaya.
- Gupta & Malik, "Numerical Techniques In Science & Engineering Computer Fundamentals With Programming In C", Krishna Prakashan

WEBSITE RESOURCES:

- www.pdfdrive.com
- www.dmi.gov.in
- www.yourarticlelibrary.com
- onlinecourses.nptel.ac.in
- en.wikipedia.org

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Bachelor of Technology (B.Tech) Computer Science & Engineering
B.Tech 3rd Year (V Semester)

Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)				Branch	Computer Science & Engineering (CSE)			
Semester	5				Version				
Effective from Academic Year					2021-2022	Effective for the Batch Admitted in			2021
Subject Code			ECS501		Subject Name	COMPUTER GRAPHICS			
Teaching Scheme					Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total		TS/PS	TE/PE	Total
	L	T	P	TW					
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-

COURSE OBJECTIVE

To introduce the use of the components of a graphics system and become familiar with building approach of graphics system components and algorithms related with them. To be able to discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications for skill development and employability.

Syllabus

UNIT – I

Introduction and Line Generation: Types of computer graphics, Graphic Displays- Random scan displays, Raster scan displays, Frame buffer and video controller, Points and lines, Line drawing algorithms, Circle generating algorithms for helping skill development, Mid-point circle generating algorithm, and parallel version of these algorithms.

UNIT – II

Transformations: Basic transformation, Matrix representations and homogenous coordinates, Composite transformations, Reflections and shearing
 Windowing and Clipping: Viewing pipeline, Viewing transformations, 2-D Clipping algorithms- Line clipping algorithms such as Cohen Sutherland line clipping algorithm for helping skill development, Liang Barsky algorithm, Line clipping against non rectangular clip windows: Polygon clipping – Sutherland Hodgeman polygon clipping, Weiler and Atherton polygon clipping, Curve clipping, Text clipping.

UNIT – III

Three Dimensional: 3-D geometric primitives, 3-D Object representation, 3-D Transformation, 3-D viewing, projections, 3-D Clipping helpful for helping skill development and employability.

UNIT – IV

Curves and Surfaces: Quadric surfaces, Spheres, Ellipsoid, Blobby objects for helping skill development., Introductory concepts of Spline, B-spline and Bezier curves and surfaces.

UNIT – V

Hidden Lines and Surfaces: Back Face Detection algorithm, Depth buffer method, A- buffer method, Scan line method, basic illumination models – Ambient light, Diffuse reflection, Specular reflection and Phong model, Combined approach, Warn model, Intensity Attenuation, Color consideration, Transparency and Shadows helpful for helping skill development.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Understand the basics of computer graphics, different graphics systems and global applications of computer graphics helpful for skill development.
CO2	Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis helpful for skill development.
CO3	Student will get employability and highly skilled after understand the geometric transformations on graphics objects and their application in composite form.
CO4	Extract scene with different clipping methods and its transformation to graphics

Note: Adhere to the latest editions of the Suggested Readings

	display device for skill development.
CO5	Explore projections and visible surface detection techniques for display of 3D scene on 2D screen passionate students for skill development.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	1	1	1
CO2	1	1	1
CO3	3	3	1
CO4	1	1	1
CO5	3	1	1

SUGGESTED READINGS:

- Computer Graphics C Version, D. Hearn And P. Baker, Pearson Education
- Computer Graphics, Foley and van Dam, Person Education
- Computer Graphics with OpenGL, Hearn and Baker, Pearson
- Procedural Methods for computer graphics, Rogers, TMH
- Computer Graphics with virtual reality systems, R. K. Maurya, Wiley-India
- Computer Graphics, Sinha & Udai, TMH

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in
- [http://courses.cs.vt.edu/csonline/ Computer Graphics /Lessons/](http://courses.cs.vt.edu/csonline/Computer%20Graphics/Lessons/)
- <https://www.geeksforgeeks.org/>

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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)	Branch	Computer Science & Engineering (CSE)			
Semester	5	Version				
Effective from Academic Year		2021-2022	Effective for the Batch Admitted in		2021	
Subject Code		ECS-502	Subject Name		INTERNET AND JAVA PROGRAMMING	
Teaching Scheme			Examination Scheme(Marks)			
Per Week	Lecture	Practical(Lab)	Total	TS/PS	TE/PE	Total
	L	T	P	TW		
Credit	3	1	0	-	4	Theory
Hours	3	1	0	-	4	Practical
						30
						70
						100
						-
						--
						-

COURSE OBJECTIVE

The objectives of this course are as follows

1. To understand the concept of Internet and terms related to Internet helping in employability.
2. To understand some fundamental basic concepts behind the Java Programming.
3. To understand the Java swing concepts and java database connectivity.
4. To understand the concepts of Java Beans and remote method invocation for skill enrichment.
5. To understand the concepts of Java servlets are helping in skill development.

Syllabus

UNIT I:

Internet: Internet, Connecting to Internet: Telephone, Cable, Satellite connection. Choosing an ISP. Introduction to Internet services. E-Mail concepts, Sending and Receiving secure E-Mail, Voice and Video Conferencing helping in employability

UNIT II:

Core Java: Introduction, Operator, Data type, Variable, Arrays, Control Statements, Methods & Classes, Inheritance, Package and Interface, Exception Handling, Multithread programming. I/O, Java Applet, String handling, Networking, Event handling. Introduction to AWT. AWT controls, Layout managers, Menus, Images, Graphics for skill enhancement.

UNIT III:

Java Swing: Creating a Swing Applet and Application, Programming using Panes, Pluggable Look and feel, Labels, Text fields, Buttons, Toggle buttons, Checkboxes, Radio Buttons, View ports, Scroll Panes, Scroll Bars, Lists, Combo box, Progress Bar, Menus and Toolbars, Layered Panes, Tabbed Panes, Split Panes, Layouts, Windows, Dialog Boxes, Inner frame are provide the knowledge for employability
JDBC: The connectivity Model, JDBC/ODBC Bridge, java.sql package, connectivity to remote database, navigating through multiple rows retrieved from a database.

UNIT IV

Java Beans: Application Builder tools, The bean developer kit(BDK), JAR files, Introspection, Developing a simple bean, using Bound properties, The Java Beans API, Session Beans, Entity Beans, Introduction to Enterprise Java beans (EJB), for skill enhancement.
RMI: Introduction to RMI (Remote Method Invocation), A simple client-server application using RMI.

UNIT V

Java Servlets: Servlet basics, Servlet API basic, Life cycle of a Servlet, Running Servlet, Debugging Servlets, Thread-safe Servlets, HTTP Redirects, Cookies, Introduction to Java Server pages (JSP) are useful in employability or entrepreneurship development.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Write Java programs with properly-designed constants, variables, methods and string handling to solve global problems for employability.
CO2	To improve skills design Java object classes based on Object-Oriented concepts.
CO3	Use simple try-catch blocks for Exception Handling and manage I/O streams oriented interactions for skill development
CO4	Develop multi-thread programming for concurrency control based applications helps in skill development.

Note: Adhere to the latest editions of the Suggested Readings

CO5	Construct user interfaces for Java applications and applets using GUI elements to get employment or entrepreneurship.
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PO-CO Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

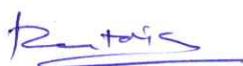
	Skill Development	Employability	Entrepreneurship Development
CO1	1	2	1
CO2	3	1	1
CO3	3	1	1
CO4	3	1	1
CO5	1	3	2

SUGGESTED READINGS

- R. Krishnamoorthy, S. Prabhu, "Internet and Java Programming", New Age International Publishers
- Margaret Levine Young, "The Complete Reference Internet", Tata Mcgraw-hill Education Pvt. Ltd.
- Thampi, "Object Oriented Programming in JAVA" Wiley Dreamtech Publication.
- Balagurusamy E, "Programming in JAVA", Tata Mcgraw-hill Education Pvt. Ltd.
- Dustin R. Callway, "Inside Servlets", Addison Wesley.
- Mark Wutica, "Java Enterprise Edition", QUE.
- Steven Holzner, "Java2 Black book", Wiley Dreamtech Publication.
- Liang, "Introduction to Java Programming, Comprehensive Version", Pearson Education.

WEBSITE SOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in
- www.w3school.com


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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)			Branch	Computer Science & Engineering (CSE)			
Semester	5			Version				
Effective from Academic Year			2021-2022		Effective for the Batch Admitted in			2021
Subject Code		ECS-503			Subject Name		ARTIFICIAL INTELLIGENCE	
Teaching Scheme					Examination Scheme(Marks)			
Per Week	Lecture		Practical(Lab)		Total	TS/PS	TE/PE	Total
	L	T	P	TW				
Credit	3	1	0	-	4	Theory	30	70
Hours	3	1	0	-	4	Practical	-	--

COURSE OBJECTIVE

1. To provide a strong foundation of fundamental concepts in Artificial Intelligence.
2. To provide a basic exposition to the goals and methods of Artificial Intelligence.
3. To enable the student to apply these techniques in applications that involve perception, reasoning and learning, helping in skill development

Syllabus

UNIT-I

INTRODUCTION: Introduction, What is Artificial Intelligence?, Problems and Search improve the skills. The AI Problems. The Underlying Assumption, What is an AI Technique, The Level of the Model.

UNIT-II

STATE SPACE SEARCH : Problems, Problem Spaces, and Search: Defining the Problem as a State Space Search. Production systems. Problem Characteristics, Production System Characteristics, Issues in the Design of Search Programs, Additional Problems. Heuristic Search Techniques: Generate-and- Test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis are helping in skill development.

UNIT-III

KNOWLEDGE REPRESENTATION: Knowledge Representation Issues, Representations and Mappings. Approaches to knowledge Representation. Predicate Logic, Semantic Nets, Frames, The Frame Problem. Syntactic-Semantic Spectrum of Representation. Logic and Slot-and-Filler Structures. Resolution ,Other Representational Techniques. Summary of the Role of Knowledge. Procedural Versus Declarative knowledge. Logic Programming for skill development, Forward versus Back ward Reasoning. Matching. Control Knowledge.

UNIT-IV

EXPERT SYSTEM AND LEARNING: Existing Systems (DENDRAL, MYCIN), domain exploration. Meta . Knowledge. Expertise Transfer. Self Explaining System, Introduction to learning. Various techniques used in learning helping in skill development. introduction to neural networks, applications of neural networks, common sense, reasoning, some example of expert systems.

UNIT-V

STATISTICAL REASONING: Probabilistic reasoning, Baye's theorem, semantic networks, scripts, schemas, frames, conceptual, dependency, fuzzy logic, forward and backward reasoning useful for skill enhancement.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Understand the various searching techniques, constraint satisfaction problem and example problems- game playing techniques helps in skill development.
CO2	Apply these techniques in national / international applications which involve perception, reasoning and learning useful for skill development.
CO3	Explain the role of agents and how it is related to environment and the way of evaluating it and how agents can act by establishing goals.
CO4	Acquire the knowledge of real world Knowledge representation for skill development. Analyze and design a real world problem for implementation and understand the dynamic behavior of a system.
CO5	Use different machine learning techniques to design AI machine and enveloping

Note: Adhere to the latest editions of the Suggested Readings

27

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applications for real world problems helping in skill development.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

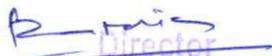
	Skill Development	Employability	Entrepreneurship Development
CO1	2	1	1
CO2	2	1	1
CO3	3	1	1
CO4	2	1	1
CO5	3	1	1

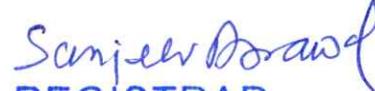
SUGGESTED READINGS:

- Artificial Intelligence, Elaine Rich, Kevin Knight, Tata McGrawHill
- Artificial Intelligence – A modern approach, Stuart Russel, Peter Norwig, Pearson Education
- Principles of Artificial Intelligence, Nelson N.J., Springer Verlag, Berlin

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in
- <http://courses.cs.vt.edu/csonline/artificial-intelligence/Lessons/>
- <https://www.geeksforgeeks.org/>
- <https://builtin.com/artificial-intelligence>
- https://www.sas.com/en_in/insights/analytics/what-is-artificial-intelligence.html


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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)			Branch	Computer Science & Engineering (CSE)			
Semester	5			Version				
Effective from Academic Year			2021-2022		Effective for the Batch Admitted in			2021
Subject Code		ECS504			Subject Name	THEORY OF COMPUTATION		
Teaching Scheme					Examination Scheme(Marks)			
Per Week	Lecture		Practical(Lab)		Total	TS/PS	TE/PE	Total
	L	T	P	TW				
Credit	3	1	0	-	4	Theory	30	70
Hours	3	1	0	-	4	Practical	-	--

COURSE OBJECTIVE

Course should provide a formal connection between algorithmic problem solving and the theory of languages and automata and develop them into a mathematical (and less magical) view towards algorithmic design for helping skills development and in general computation itself. The course should in addition clarify the practical view towards the applications of these ideas in the engineering part of CS.

Syllabus

UNIT-I

Automata: Basic machine, FSM, Transition graph, Transition matrix, Deterministic and non-deterministic FSM'S, Equivalence of DFA and NFA, Mealy & Moore machines, minimization of finite automata, Two-way finite automata, Regular Sets and Regular Grammars: Alphabet, words, Operations, Regular sets, Finite automata and regular expression, Myhill-Nerode theorem Pumping lemma and regular sets, Application of pumping lemma for helping skill development, closure properties of regular sets.

UNIT-II

Context –Free Grammars helping for skills development: Introduction to CFG, Regular Grammars, Derivation trees and Ambiguity, Simplification of Context free grammars, Normal Forms (Chomsky Normal Form and Greibach Normal forms).

UNIT-III

Pushdown Automata: Definition of PDA, Deterministic Pushdown Automata, PDA corresponding to given CFG, CFG corresponding to a given PDA helping for skills development. Context Free Languages: The pumping lemma for CFL's, Closure properties of CFL's, Decision problems involving CFL's.

UNIT-IV

Turing Machines: Introduction, TM model, representation and languages acceptability of TM Design of TM, Universal TM & Other modification, Church's hypothesis, composite & iterated TM. Turing machine as enumerators helping for skills development, Properties of recursive & recursively enumerable languages, Universal Turing machine

UNIT-V

Tractable and Untractable Problems: P, NP, NP complete and NP hard problems, examples of these problems like satisfy ability problems helping for skills development, vertex cover problem, Hamiltonian path problem, traveling sales man problem, Partition problem etc

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	To use basic concepts of formal languages of finite automata techniques helping for skills development
CO2	To Design Finite Automata's for different Regular Expressions and global Languages helping for skills development
CO3	Students achieve greater skill development in the form of deeper knowledge of the Push Down automata and Context Free Grammar.
CO4	To be skilled and develop the strength of mind solves various problems of applying normal form techniques, push down automata and Turing Machines.
CO5	Learn different types of problems like travelling salesman, Hamiltonian path improve the skills

PO-CO Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

Note: Adhere to the latest editions of the Suggested Readings

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

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	1	1	1
CO2	1	1	1
CO3	3	1	1
CO4	3	1	1
CO5	1	1	1

SUGGESTED READINGS:

- K.L.P Mishra & N. Chandrasekaran, "Theory of Computer Science", PHI Learning
- John E. Hopcroft, Jeffery Ullman, "Introduction to Automata theory, Languages & computation", Narosa Publishers.
- Michael Sipsev, "Theory of Computation", Cengage Learning
- John C Martin, "Introduction to languages and theory of computation", McGraw Hill
- Kohavi, "Switching & Finite Automata Theory", TMH

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in
- <https://www.ics.uci.edu/~goodrich/teach/cs162/notes/>
- <https://www.geeksforgeeks.org/>
- https://www.tutorialspoint.com/automata_theory/index.htm



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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)			Branch	Computer Science & Engineering (CSE)				
Semester	5			Version					
Effective from Academic Year			2019-2020	Effective for the Batch Admitted in		2021			
Subject Code		ECS505		Subject Name	COMPUTER ARCHITECTURE				
Teaching Scheme					Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total	TS/PS	TE/PE	Total	
	L	T	P	TW					
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-

COURSE OBJECTIVE

1. Discuss the basic concepts and structure of computers.
2. Understand concepts of register transfer logic and arithmetic operations.
3. Explain different types of addressing modes and memory organization is useful for skill development.
4. Learn the different types of serial communication techniques.
5. Summarize the Instruction execution stages for skill development.

Syllabus

UNIT-I

Overview of von Neumann architecture: Instruction set architecture: The Arithmetic and Logic UNIT, The Control UNIT, Memory, and I/O devices and their interfacing to the CPU; Measuring and reporting performance: CISC and RISC processors for skill development

UNIT II

Pipelining: Basic concepts of pipelining, data hazards, control hazards, and structural hazards; Techniques for overcoming or reducing the effects of various hazards for skill development.

Hierarchical Memory Technology: Inclusion, Coherence and locality properties; Cache memory organizations, Techniques for reducing cache misses; Virtual memory organization, mapping and management techniques, memory replacement policies.

UNIT III

Instruction level parallelism: Concepts of instruction-level parallelism (ILP), Techniques for increasing ILP: Superscalar, super-pipelined and VLIW processor architectures are helping in employability; Vector and symbolic processors: Case studies of contemporary microprocessors.

UNIT IV

Multiprocessor Architecture: Taxonomy of parallel architectures; Centralized shared-memory architecture, synchronization, memory consistency, interconnection networks; Distributed shared-memory architecture for skill improvement, Cluster computers.

UNIT V

Non von Neumann Architectures: Data flow Computers, Reduction computer architectures, Systolic Architectures for skill enhancement.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Discuss the basic concepts and structure of computers for skill development
CO2	To improve skills understand the concepts of register transfer logic and arithmetic operations.
CO3	Explain different types of addressing modes and memory organization for skill development as well as employability.
CO4	Learn the different types of serial communication techniques to solve some national/international problems for skill development.
CO5	Summarize the Instruction execution stages for skill development.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	1	1	1	1	1	1	1	2

Note: Adhere to the latest editions of the Suggested Readings

31

CO2	2	2	1	2	2	2	1	1	1	1	1	1
CO3	1	3	2	3	2	1	1	1	1	1	1	1
CO4	2	2	2	2	3	1	1	1	1	1	1	1
CO5	3	1	3	2	2	2	1	1	1	1	1	2

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	2	1	1
CO2	2	1	1
CO3	3	1	1
CO4	3	1	1
CO5	2	1	1

SUGGESTED READINGS:

- John L. Hennessy and David A. Patterson, Computer Architecture: A Quantitative Approach, Morgan Kaufmann.
- John Paul Shen and Mikko H. Lipasti, Modern Processor Design: Fundamentals of Superscalar Processors, Tata McGraw-Hill.
- M. J. Flynn, Computer Architecture: Pipelined and Parallel Processor Design, Narosa Publishing House.
- Kai Hwang, Advanced Computer Architecture: Parallelism, Scalability, Programmability, McGraw-Hill.

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in

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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)				Branch	Computer Science & Engineering (CSE)			
Semester	5				Version				
Effective from Academic Year					2019-2020	Effective for the Batch Admitted in			2021
Subject Code			EHU501		Subject Name		HUMAN VALUES & PROFESSIONAL ETHICS		
Teaching Scheme					Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total		TS/PS	TE/PE	Total
	L	T	P	TW					
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-

COURSE OBJECTIVE

1. To create an awareness on Engineering Ethics and Human Values.
2. To understand social responsibility of an engineer for skill development.
3. To appreciate ethical dilemma while discharging duties in professional life.

Syllabus

UNIT-I

HUMAN VALUES: Morals, Values and Ethics – Integrity – Work Ethic – Service – Learning – Civic Virtue – Respect for others – Living Peacefully Caring – Sharing - Honesty – Courage –Valuing Time – Co-operation – Commitment - Empathy – Self-Confidence helping in skill development – Character -Spirituality.

UNIT II

2. ENGINEERING ETHICS: Senses of 'Engineering Ethics' - variety of moral issues - types of inquiry - Moral dilemmas - Moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy – Models of Professional Roles useful for employability - theories about right action - Self-interest custom and religion - uses of ethical theories. Valuing Time – Co-operation – Commitment.

UNIT III

ENGINEERING AS SOCIAL EXPERIMENTATION: Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the challenger case study helping in skill development.

UNIT IV

SAFETY, RESPONSIBILITIES AND RIGHTS: Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - the three mile island and chernobyl case studies helping in skill development.
Collegiality and loyalty – Respect for authority – Collective bargaining – Confidentiality – Conflicts of interest – Occupational crime – Professional rights – Employee rights – Intellectual Property rights (IPR) – Discrimination.

UNIT V

GLOBAL ISSUES: Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers consulting engineers and engineers as expert witness and advisors -moral leadership helping in entrepreneurship development. – Sample code of Ethics like ASME, ASCE, IEEE, IETE etc.

COURSE OUTCOME (CO)

DESCRIPTION

CO1	It ensures students sustained happiness through identifying the essentials of human values and skills development.
CO2	It facilitates a correct understanding between profession and happiness
CO3	It helps students understand practically the importance of trust, mutually satisfying human behavior and enriching interaction with nature.
CO4	Ability to develop appropriate technologies and management patterns to create harmony in professional and personal life.
CO5	Summarize the Instruction of national computer ethics for skill development.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	3	3	1	1	1	1	1	1	1	1

Note: Adhere to the latest editions of the Suggested Readings

CO2	2	2	1	2	2	2	1	1	1	1	1	2
CO3	3	3	2	3	3	1	1	1	1	1	1	1
CO4	2	2	2	1	3	1	1	1	1	1	2	2
CO5	1	1	3	1	2	2	1	1	1	1	1	1

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

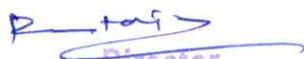
	Skill Development	Employability	Entrepreneurship Development
CO1	2	1	1
CO2	3	1	1
CO3	2	1	1
CO4	2	1	1
CO5	2	1	2

SUGGESTED READINGS:

- Mike Martin and Roland Schinzinger. "Ethics in Engineering", McGraw-Hill, New York 1996.
- Govindarajan M, Natarajan S, Senthil Kumar V. S. "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.
- Jayshree Suresh and B.S.Raghavan. "Human values and Professional Ethics", S.Chand & Company Ltd., New Delhi.

WEBSITE RESOURCES:

- <https://examupdates.in/professional-ethics-and-human-values>
- <https://www.uptunotes.com/universal-human-values-and-professional-ethics>
- <https://lecturenotes.in/>


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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)			Branch	Computer Science & Engineering (CSE)				
Semester	6			Version					
Effective from Academic Year				2021-2022		Effective for the Batch Admitted in			2021
Subject Code			ECS601		Subject Name		OBJECT ORIENTED TECHNIQUES & UML		
Teaching Scheme					Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total		TS/PS	TE/PE	Total
	L	T	P	TW					
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-

COURSE OBJECTIVE

1. To understand the object oriented concepts for designing object oriented models.
2. To understand the use of UML (Unified Modeling Language) for object oriented analysis and design.
3. To describe the step by step object oriented methodology of software development from problem statement through analysis, system design, and class design for skill development.
4. To understand the issues for implementing object oriented designs or models.
5. To understand the problems, communicating with application experts, modeling enterprises, preparing documentation, and designing programs by using object oriented models for skill development.

Syllabus

UNIT I

Introduction: The meaning of Object Orientation, object identity, Abstraction, Encapsulation, information hiding, polymorphism, inheritance, importance of modeling, principles of modeling.

Object Modeling: Objects and classes, links and association, generalization and inheritance, aggregation, abstract class, multiple inheritance, meta data, candidate keys useful for skill development, constraints.

UNIT – II

Dynamic Modeling: Events and states, operations, nested state diagrams and concurrency, advanced dynamic modeling concepts for skill development, a sample dynamic model.

UNIT – III

Functional Modeling: Data flow diagram, nested data flow diagrams, Control flows, specifying operations, constraints, Relation of functional to object and dynamic models for skill development.

UNIT- IV

OMT Methodology, Object Oriented Analysis, Object oriented design, Object design, Combining three models, Designing algorithms, design optimization, Implementation of control, Adjustment of inheritance, Object representation, Physical packaging, Documenting design Decisions. Comparison of Methodologies: Structured analysis and structured design (SA/SD), Jackson Structured Development (JSD) are helping in skill development.

UNIT- V

Mapping object oriented concepts using non-object oriented language, Translating classes into data structures, Passing arguments to methods, Implementing inheritance, associations encapsulation. Object oriented programming style: reusability, extensibility, robustness, programming in the large. Procedural v/s OOP, Object oriented language features are useful for employability: Abstraction & Encapsulation.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Specify simple abstract data types and design implementations, using abstraction functions to solve national/ international problem for skill development.
CO2	To improve skills recognize features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.
CO3	Name and apply some globally accepted object-oriented design patterns and give examples of their use.
CO4	Design applications with an event-driven graphical user interface.
CO5	Design the convenient way for handling of files


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Note: Adhere to the latest editions of the Suggested Readings

23

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	2	1	1
CO2	2	1	1
CO3	3	1	1
CO4	3	1	1
CO5	2	3	1

SUGGESTED READINGS

- James Rumbaugh et. al, "Object Oriented Modeling and Design", PHI
- Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language ser Guide", Pearson Education
- Booch, Maksimchuk, Engle, Young, Conallen and Houston, "Object Oriented Analysis and Design with Applications", Pearson Education

WEBSITE SOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in


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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)			Branch	Computer Science & Engineering (CSE)				
Semester	6			Version					
Effective from Academic Year				2019-2020		Effective for the Batch Admitted in		2021	
Subject Code			ECS-602		Subject Name		WEB TECHNOLOGY AND E COMMERCE		
Teaching Scheme					Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total		TS/PS	TE/PE	Total
	L	T	P	TW					
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-

COURSE OBJECTIVE

The main objective of the course is present the basic web technology concepts that are required for developing web applications. The key technology components are descriptive languages, server side program elements and client side program elements for skill development. In addition the course gives specific contents that are beneficial for developing web-based solutions, like relational data-base communication basics and information security principles and approaches.

Syllabus

UNIT I

Web: Introduction to web, W3C, protocols governing the web, web project and traditional project, web team.

HTML: Elements, list, table, images, frames, forms are for skill development, Introduction to HTML5, difference between HTML4 and HTML5

UNIT II

Cascaded Style Sheet (CSS): Introduction, Style rule, Selectors, Introduction to CSS3, difference between CSS and CSS3. XML: DTD. XML schemas. parsing of XML helpful for skill development.

JavaScript: Introduction, variables, condition statements, operators. JavaScript popup boxes. functions are develop skills. events and event handling: introduction to

AJAX

UNIT III

Web Server: Introduction to web server, Understanding of Tomcat web server, JSP: Introduction, features of JSP, JSP architecture are helping in skill development, types of JSP directives, JSP actions, Error handling within JSP, JSP sessions, Java Database connectivity (JDBC).

UNIT IV

E-Commerce: Introduction to E-Commerce, E-Commerce framework. E-Commerce and Media Convergence. The anatomy of E-Commerce Applications, E-Commerce consumer applications. E-Commerce Organization applications for skill development.

Network Infrastructure for E-Commerce: Market forces influencing the I-Way. Components of the I-Way. Network Access equipment

Network Security and Firewalls: Client-Server Network Security. Emerging Client-Server security threats. Firewall in practice. Data and Message Security

UNIT V

E-Commerce and World Wide Web: Architectural Framework for E-Commerce, World Wide Web as the Architecture, Security and the Web

E-Payment Systems: Types of E-payment systems, Digital Token-Based E-payment systems, smart cards and E-payment Systems, Risk and e-payment Systems for skill development. Electronic Data Interchange: Definition of EDI, EDI vs. E-Mail, EDI Applications in Business, EFT, EDI Legal,

Security and Privacy issues, Supply Change Management

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Learn the best practices for designing Web forms and Usability Reviews for skill development.
CO2	For skill development understand the global principles behind the design and construction of Web applications.
CO3	Develop the application for XML parsers for skill development
CO4	Develop the application that implements the concept of CGI for skill development
CO5	Deploy an Enterprise Application using ASP.NET for skill development as well as employability.

Note: Adhere to the latest editions of the Suggested Readings

25

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PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	2	1	1
CO2	2	1	1
CO3	3	1	1
CO4	3	1	1
CO5	3	2	1

SUGGESTED READINGS:

- Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce", Addison- Wesley.
- Ivan Bayross, "HTML, DHTML, Java Script, Perl & CGI", BPB Publication.
- Ivan Bayross, "HTML5 and CSS3 made simple", BPB Publication.
- Xavier, C, "Web Technology and Design", New Age International
- Deitel, "Java for programmers", Pearson Education
- Jackson, "Web Technologies" Pearson Education
- Patel and Barik, "Introduction to Web Technology & Internet", Acme Learning
- Laudon, "E-Commerce: Business, Technology, Society", Pearson Education

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in
- w3school.com
- tutorialspoint.com

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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)			Branch	Computer Science & Engineering (CSE)				
Semester	6			Version					
Effective from Academic Year				2021-2022		Effective for the Batch Admitted in		2021	
Subject Code			ECS-603		Subject Name		COMPILER DESIGN		
Teaching Scheme					Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total	TS/PS	TE/PE	Total	
	L	T	P	TW					
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-

COURSE OBJECTIVE

The Objectives of this course is to explore the principles, algorithms, and data structures involved in the design and construction of compilers. Topics include context-free grammars, lexical analysis, parsing techniques, symbol tables, error recovery, code generation, and code optimization.

Syllabus

UNIT I

Introduction Language Processors, The Structure of a Compiler, The Science of Building a Compiler, Applications of Compiler Technology, Lexical Analysis The Role of the Lexical Analyzer, Input Buffering, Specification of Tokens, Recognition of Tokens, The Lexical Analyzer LEX, Finite Automata, From Regular Expressions to Automata, Design of Lexical Analyzer Generator for helping skills development.

UNIT II

Syntax Analysis Context Free Grammars, Writing a Grammar, Top Down Parsing, Bottom Up Parsing for helping skills development. Introduction to LR Parsing: Simple LR, More Powerful LR parsers, Using Ambiguous Grammars, Parser Generators.

UNIT III

Syntax Directed Translation Syntax Directed Definitions, Applications of Syntax Directed Translation, Syntax Directed Translation Schemes, Intermediate Code Generation, Variants of Syntax Trees, Three Address Code for helping skills development. Types & Declarations, Translation of Expressions, Type Checking, Control Flow, Back patching, Switch Statements.

UNIT IV

Run Time Environments Storage Organizations, Access to Nonlocal Data on Stack, Heap Management, Introduction to Garbage Collection, Code Generation Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks for helping skills development. A Simple Code Generator.

UNIT V

Machine Independent Optimizations The Principal Sources of Optimizations, Introduction to Data Flow Analysis, Foundations of Data Flow Analysis for employment as well as start their own business. Constant Propagation, Partial Redundancy Elimination, Loops in Flow Graphs, Region Based Analysis, Symbolic Analysis.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Ability to design, develops, and implements a compiler for any global language for helping skills development.
CO2	Able to use LEX and YACC tools for developing a scanner and a parser for helping skills development.
CO3	Able to design and implement LL and LR parsers for helping skills development.
CO4	Able to design algorithms to perform code optimization in order to improve the performance of a program in terms of space and time complexity for helping skills development.
CO5	Ability to design algorithms to generate machine code has an outlook of skill development as well as employments.

PO-CO Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

Note: Adhere to the latest editions of the Suggested Readings

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

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	2	1	1
CO2	1	1	1
CO3	1	1	1
CO4	1	1	1
CO5	3	3	1

SUGGESTED READINGS:

- Compilers, Principles, Techniques & Tools (Second Edition). Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffery D. Ullman.
- C. Fischer and R. LeBlanc. Crafting a Compiler, Benjamin Cummings, 1991.
- V Raghvan, "Principles of Compiler Design", TMH

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in



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Department of Computer Science & Engineering

Programme	Bachelor of Technology (B.Tech)				Branch	Computer Science & Engineering (CSE)				
Semester	6				Version					
Effective from Academic Year					2021-2022		Effective for the Batch Admitted in			2021
Subject Code			ECS604			Subject Name		PRINCIPLES OF PROGRAMMING LANGUAGES		
Teaching Scheme						Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total		TS/PS	TE/PE	Total	
	L	T	P	TW						
Credit	3	1	0	-	4	Theory	30	70	100	
Hours	3	1	0	-	4	Practical	-	--	-	

COURSE OBJECTIVE

1. To introduce the major programming paradigms, and the principles and techniques involved in design and implementation of modern programming languages for skill development.
2. To introduce notations to describe syntax and semantics of programming languages.
3. To analyze and explain behavior of simple programs in imperative languages using concepts such as binding, scope, control structures, subprograms and parameter passing mechanisms.
4. To introduce the concepts of ADT and object oriented programming for large scale software development.
5. To introduce the concepts of concurrency control and exception handling.

Syllabus

UNIT -I

Introduction: Characteristics of programming Languages, Factors influencing the evolution of programming language, developments in programming methodologies, desirable features and design issues. Programming language processors: Structure and operations of translators, software simulated computer, syntax, semantics, structure useful for skill development, virtual computers. binding and binding time.

UNIT -II

Elementary and Structured Data Types: Data object variables, constants, data types, elementary data types, declaration, assignment and initialization, enumeration, characters, strings. Structured data type and objects: Specification of data structured types, vectors and arrays, records, variable size data structure, pointers and programmer constructed data structure, Sets files. Sub Program and programmer defined data types: Evolution of data types, abstractions, encapsulations, information hiding, sub programs, abstract data types for skill development.

UNIT -III

Sequence Control; Implicit and Explicit sequence control, sequence control with within expression and statements, recursive sub programs, exception handling, co routines, Scheduled sub programs, concurrent execution. Data control referencing environments, static and dynamic scope, local data local data referencing environment, shared data: Explicit common environment dynamic scope parameter passing mechanism for skill development.

UNIT -IV

Storage Management: Major run time requirements, storage management phases, static storage management, stack based, heap based storage management. Syntax and translation: General syntactic criteria, syntactic element of a language, stages in translation, formal syntax and semantics helping in skill development.

UNIT -V

Operating and Programming Environment: Batch Processing Environments, Embedded system requirements, Theoretical models, Introduction to Functional Programming, Lambda calculus, Data flow language and Object Oriented language. Comparison in various general and special purpose programming languages e.g. Fortran, C, Pascal, Lisp, etc improve the skills.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Knowledge of, and ability to use, language features used in global programming languages for skill development.
CO2	Improve the skills to program in different language paradigms and evaluate their relative benefits.
CO3	An understanding of the key concepts in the implementation of common features of programming languages for skill development.
CO4	Demonstrate the concepts of concurrency control and exception handling for skill

Note: Adhere to the latest editions of the Suggested Readings

	development.
CO5	To understand the concept of Data flow language and Object Oriented language for skill development.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	2	1	1
CO2	3	1	1
CO3	3	1	1
CO4	3	1	1
CO5	3	1	1

SUGGESTED READINGS:

- Terrance W Pratt, "Programming Languages: Design and Implementation" PHI
- Sebesta, "Concept of Programming Language", Addison Wesley
- E Horowitz, "Programming Languages", 2nd Edition, Addison Wesley
- "Fundamentals of Programming Languages", Galgotia

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in
- w3school.com
- tutorialspoint.com


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ELECTIVE-I

Department of Computer Science & Engineering

Programme		Bachelor of Technology(B.Tech)			Branch		Computer Science & Engineering (CSE)			
Semester		6			Version					
Effective from Academic Year				2021-2022		Effective for the Batch Admitted in			2021	
Subject Code			ECS605 (1)			Subject Name		SOFTWARE PROJECT MANAGEMENT		
Teaching Scheme					Examination Scheme(Marks)					
Per Week		Lecture		Practical(Lab)		Total		TS/PS	TE/PE	Total
	L	T	P	TW						
Credit	3	1	0	-	4	Theory	30	70	100	
Hours	3	1	0	-	4	Practical	-	--	-	
COURSE OBJECTIVE										
<p>This course is aimed at introducing the primary important concepts of project management related to managing software development projects. Student will also improve skills with the different activities involved in Software Project Management. Further, they will also come to know how to successfully plan and implement a software project management activity for employability, and to complete a specific project in time with the available budget.</p>										
Syllabus										
UNIT-I										
Fundamentals of Software Project Management (SPM). Need Identification, Vision and Scope document. Project Management Cycle: SPM Objectives, Management Spectrum, SPM Framework, Software Project Planning, Planning Objectives, Project Plan, Types of project plan, Structure of a Software Project Management Plan, Software project estimation, Estimation methods, Estimation models, Decision process for helping skill development.										
UNIT-II										
Project Elements, Work Breakdown Structure (WBS), Types of WBS, Functions, Activities and Tasks, Project Life Cycle and Product Life Cycle, Ways to Organize Personnel, Project schedule, Scheduling Objectives, Building the project schedule, Scheduling terminology and techniques for skill development, Network Diagrams: PERT, CPM, Bar Charts: Milestone Charts, Gantt Charts.										
UNIT-III										
Dimensions of Project Monitoring & Control. Earned Value Analysis, Earned Value Indicators: Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV), Cost Performance Index (CPI), Schedule Performance Index (SPI). Interpretation of Earned Value Indicators helping in skill development, Error Tracking, Software Reviews, Types of Review: Inspections, Desk checks, Walkthroughs, Code Reviews, Pair Programming.										
UNIT IV										
Testing Objectives, Testing Principles, Test Plans, Test Cases, Types of Testing, Levels of Testing, Test Strategies, Program Correctness, Program Verification & validation, Testing Automation & Testing Tools, Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators for skill development, The SEI Capability Maturity Model (CMM), SQA Activities, Formal SQA Approaches: Proof of correctness, Statistical quality assurance, Clean room process.										
UNIT V										
Software Configuration Management: Software Configuration Items and tasks, Baselines, Plan for Change, Change Control, Change Requests Management, Version Control, Risk Management: Risks and risk types, Risk Breakdown Structure (RBS), Risk Management Process: Risk identification, Risk analysis, Risk planning, Risk monitoring, Cost Benefit Analysis useful for employability. Software Project Management Tools: CASE Tools, Planning and Scheduling Tools, MS-Project.										
COURSE OUTCOME (CO)										
		DESCRIPTION								
CO1		Identify the global project contexts and suggest an appropriate management strategy for skill development.								
CO2		Practice the role of professional ethics in successful software development for skill improvement.								
CO3		Identify and describe the key phases of project management for skill development.								
CO4		Determine an appropriate project management approach through an evaluation of the business context and scope of the project for skill development.								

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Note: Adhere to the latest editions of the Suggested Readings

31

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CO5	Design various estimation levels of cost and effort and acquire the knowledge of managing, economics for conventional, modern and future software projects for employability.
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PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	2	1	1
CO2	3	1	1
CO3	3	1	1
CO4	3	1	1
CO5	1	3	1

SUGGESTED READINGS:

- I.M. Cotterell, Software Project Management, Tata McGraw-Hill Publication.
- Royce, Software Project Management, Pearson Education
- Kieron Conway, Software Project Management, Dreamtech Press
- S. A. Kelkar, Software Project Management, PHI Publication.
- Harold R. Kerzner, Project Management "A Systems Approach to Planning, Scheduling, and Controlling" Wiley.
- Mohapatra, Software Project Management, Cengage Learning

WEBSITE RESOURCES:

- www.nptel.ac.in
- swayam.gov.in

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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)				Branch	Computer Science & Engineering (CSE)				
Semester	6				Version					
Effective from Academic Year					2021-2022		Effective for the Batch Admitted in			2021
Subject Code			ECS605 (2)			Subject Name		CYBER SECURITY		
Teaching Scheme						Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total		TS/PS	TE/PE	Total	
	L	T	P	TW						
Credit	3	1	0	-	4	Theory	30	70	100	
Hours	3	1	0	-	4	Practical	-	--	-	

COURSE OBJECTIVE

The purpose of cyber-security is to prevent data breaches, identity theft, and cyber-attacks as well as risk management in some cases to be skilled as well as get employability.

Syllabus

UNIT-I

Introduction to information systems, Types of information Systems, Development of Information Systems, Introduction to information security, Need for Information security, Threats to Information Systems, Information Assurance, Cyber Security, and Security Risk Analysis for skill development.

UNIT-II

Application security (Database, E-mail and Internet), Data Security Considerations-Backups, Archival Storage and Disposal of Data, Security Technology-Firewall and VPNs, Intrusion Detection, Access Control, Security Threats - Viruses, Worms, Trojan Horse, Bombs, Trapdoors, Spoofs, E-mail viruses, Macro viruses, Malicious Software, Network and Denial of Services Attack for getting employability, Security Threats to E-Commerce-Electronic Payment System, e-Cash, Credit/Debit Cards, Digital Signature, public Key Cryptography helping in employability.

UNIT-III

Developing Secure Information Systems, Application Development Security, Information Security Governance & Risk Management, Security Architecture & Design Security Issues in Hardware, Data Storage & Downloadable Devices using in skill development, Physical Security of IT Assets, Access Control, CCTV and intrusion Detection Systems, Backup Security Measures.

UNIT IV

Security Policies, Why Policies should be developed, WWW policies, Email Security policies, Policy Review Process-Corporate policies-Sample Security Policies for skill improvement, Publishing and Notification Requirement of the Policies.

UNIT V

Information Security Standards-ISO, IT Act, Copyright Act, Patent Law, IPR, Cyber Laws in India: IT Act 2000 Provisions, Intellectual Property Law Copy Right Law, Software License, Semiconductor Law and Patent Law helping in employability.

COURSE OUTCOME (CO)

	DESCRIPTION											
CO1	Protect and defend computer systems and networks from global cyber security attacks useful in skill development.											
CO2	Diagnose and investigate cyber security events or crimes related to computer systems and digital evidence helping in employability.											
CO3	Effectively communicate in a professional setting to address information security issues for skill development.											
CO4	Communication orally and in writing, proposed information security solutions to technical and non-technical decision-makers for skill development.											
CO5	Apply business principles to analyze and interpret data for planning, decision-making, and problem solving in an information security environment for employability.											

PO-CO Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

Note: Adhere to the latest editions of the Suggested Readings

CO4	2	2	2	3	1	2	1	1	1	1	1	2
CO5	2	3	2	1	2	1	1	1	1	1	1	1

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	2	1	1
CO2	3	2	1
CO3	3	1	1
CO4	3	1	1
CO5	1	3	1

SUGGESTED READINGS:

- Charles P. Pfleeger, Shari Lawrence Pfleeger, "Analysing Computer Security". Pearson Education India.
- V.K. Pachghare, "Cryptography and information Security", PHI Learning Private Limited, Delhi India.
- Dr. Surya Prakash Tripathi, Ritendra Goyal, Praveen kumar Shukla, "Introduction to Information Security and Cyber Law" Willey Dreamtech Press.
- Schou, Shoemaker, "Information Assurance for the Enterprise", Tata McGraw Hill.
- Dr. K. K. Goyal, Amit Garg, "Cyber Security", University Science Press.
- Chander, Harish, "Cyber Laws And It Protection", PHI Learning Private Limited, Delhi, India

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in
- <https://www.geeksforgeeks.org/>


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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)			Branch	Computer Science & Engineering (CSE)				
Semester	6			Version					
Effective from Academic Year				2021-2022	Effective for the Batch Admitted in		2021		
Subject Code			ECS605 (3)	Subject Name		MOBILE COMPUTING			
Teaching Scheme					Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total	TS/PS	TE/PE	Total	
	L	T	P	TW					
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-

COURSE OBJECTIVE

1. To provide an overview of Wireless Communication networks area and its applications in communication engineering.
2. To appreciate the contribution of Wireless Communication networks to overall technological growth.
3. To explain the various terminology, principles, devices, schemes, concepts, algorithms and different methodologies used in Wireless Communication Networks.
4. To enable students to compare and contrast multiple division techniques, mobile communication systems, and existing wireless networks

Syllabus

UNIT-I

Introduction, issues in mobile computing, overview of wireless telephony: cellular concept, GSM: air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, GPRS for skill development.

UNIT- II

Wireless Networking, Wireless LAN Overview: MAC issues MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), for skill development and employability, WAP: Architecture, protocol stack, application environment, applications, Dynamic Host Configuration Protocol (DHCP).

UNIT-III

Mobile Transport Layer: Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP helping in skill development. Database Issues: Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.

UNIT-IV

Data Dissemination: Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques for skill development, Adhoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, applications, security in MANETs.

UNIT-V

Research issues in Mobile Ad hoc Networks: Clustering issues in mobile Ad hoc Networks, Energy Conservation and Consumption Issues, QoS issues in MANET, Study of Network Simulators (Glomosim / NS2) helpful in employability.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Impart knowledge and boost up skills over global mobile and wireless computing systems and techniques.
CO2	Understand the knowledge of wireless network for improve skills and get employability.
CO3	Understand the concepts of mobile discovery process for helping improve skill.
CO4	Understand the concepts routing protocols are obliging for skill development.
CO5	Understand the working of mobile tracking in wireless network and grab employability.

PO-CO Mapping

(Please write 3, 2, 1 wherever required)

Note: Adhere to the latest editions of the Suggested Readings

35

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	1	1
CO2	2	2	1
CO3	1	1	1
CO4	3	1	1
CO5	1	3	1

SUGGESTED READINGS:

- Jochen Schiller, "Mobile Communications", Addison-Wesley, second edition, 2004.
- Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002
- Charles Perkins, Mobile IP, Addison Wesley.
- Charles Perkins, Ad hoc Networks, Addison Wesley.
- Upadhyaya, "Mobile Computing", Springer
- Adelstein, Frank, Gupta, Sandeep K.S. Richard III. Golden . Schwiebert. Loren. "Fundamentals of Mobile and Pervasive Computing". ISBN: 0071412379, McGraw-Hill Professional, 2005.
- Hansmann, Merk, Nicklous, Stober, "Principles of Mobile Computing", Springer, second edition, 2003.

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in
- <https://www.geeksforgeeks.org/>

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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)			Branch	Computer Science & Engineering (CSE)				
Semester	6			Version					
Effective from Academic Year				2021-2022		Effective for the Batch Admitted in		2021	
Subject Code		ECS605 (4)		Subject Name		DOT NET FRAMEWORK FOR APPLICATION DEVELOPMENT			
Teaching Scheme					Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total	TS/PS	TE/PE	Total	
	L	T	P	TW					
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-

COURSE OBJECTIVE

Students know about the Dot net framework for following objective

1. Build applications on Visual Studio .NET platform by understanding the syntax and semantics of C#
2. Demonstrate Object Oriented Programming concepts in C# programming language for skill development.
3. Design custom interfaces for applications and leverage the available built-in interfaces in building complex applications.

Syllabus

UNIT-I

Introducing Microsoft Visual C# and Microsoft Visual Studio 2015: Welcome to C#, Working with variables, operators and expressions, Writing methods and applying scope, Using decision statements, Using compound assignment and iteration statements for skill development, Managing errors and exceptions

UNIT-II

Understanding the C# object model: Creating and Managing classes and objects, Understanding values and references, Creating value types with enumerations and structures for skill development, Using arrays

UNIT-III

Understanding parameter arrays, Working with inheritance, Creating interfaces and defining abstract classes for employability, Using garbage collection and resource management.

UNIT – IV

Defining Extensible Types with C#: Implementing properties to access fields, Using indexers, Introducing generics, Using collections helping in skill development.

UNIT V

Enumerating Collections, Decoupling application logic and handling events, Querying in-memory data by using query expressions, Operator overloading will help in skill development.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Evaluate C# and the .NET framework namespace contents for skill development.
CO2	Develop the console and globally accepted GUI applications using C# .Net also manage cookies and sessions as state management techniques for skill development.
CO3	Set up various navigation techniques for integrating web pages within the site for employability.
CO4	Create the dynamic web page using ASP.NET Controls which interact with databases for skill development.
CO5	Explain advanced concepts related to Web Services, WCF and WPF in project development helps in skill development.

PO-CO Mapping

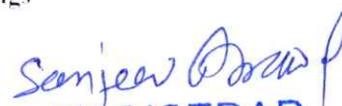
(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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Note: Adhere to the latest editions of the Suggested Readings

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

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	1	1
CO2	2	1	1
CO3	2	2	1
CO4	3	1	1
CO5	2	1	1

SUGGESTED READINGS:

- Christian Nagel, "C# 6 and .NET Core 1.0", 1st Edition, Wiley India Pvt Ltd, 2016. Andrew Stellman and Jennifer Greene, "Head First C#", 3rd Edition, O'Reilly Publications, 2013.
- Mark Michaelis, "Essential C# 6.0". 5th Edition, Pearson Education India, 2016.
- Andrew Troelsen, "Prof C# 5.0 and the .NET 4.5 Framework", 6th Edition. Apress and Dreamtech Press, 2012.

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- swayam.gov.in
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- <https://www.geeksforgeeks.org/>


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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)				Branch	Computer Science & Engineering (CSE)				
Semester	6				Version					
Effective from Academic Year					2021-2022		Effective for the Batch Admitted in			2021
Subject Code			ECS 605 (5)			Subject Name		SOFT AND EVOLUTIONARY COMPUTING		
Teaching Scheme						Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total		TS/PS	TE/PE	Total	
	L	T	P	TW						
Credit	3	1	0	-	4	Theory	30	70	100	
Hours	3	1	0	-	4	Practical	-	--	-	

COURSE OBJECTIVE

The purpose of this subject is to propose a soft computing model based on multi-objective evolutionary algorithm (MOEA), namely, genetic algorithm (GA), in classifying and optimizing the students' online interaction activities as classifier of student skill development. Subsequently, the results are transformed into useful information that may help educator in designing better learning instructions geared towards higher student.

Syllabus

UNIT-I

Introduction to soft computing: ANN, FS,GA, SI, ES, Comparing among intelligent systems helping in skill development. ANN: introduction, biological inspiration, BNN&ANN, classification, first Generation NN, perceptron, illustrative problems.

UNIT-II

Adaline, Medaline, ANN: (2nd generation), introduction, BPN, KNN,HNN, BAM, RBF,SVM and illustrative problems for skill development.

UNIT-III

Learning Introduction, human learning ability, undecidability, probability theory, classical set and fuzzy set, fuzzy set operations, fuzzy relations, fuzzy compositions, natural language and fuzzy interpretations, structure of fuzzy inference system, illustrative problems

UNIT-IV

Introduction to GA, GA, procedures, working of GA, GA applications, applicability, evolutionary programming, working of EP, GA based Machine learning classifier system helping in employability, illustrative problems

UNIT-V

Swarm Intelligent system: Introduction, Background of SI, Ant colony system Working of ACO, Particle swarm Intelligence(PSO) for skill development..

COURSE OUTCOME (CO)

	DESCRIPTION											
CO1	Learn about soft computing techniques and their global applications for skill development											
CO2	Analyze various neural network architectures which helps in skill development											
CO3	Understand perceptrons and counter propagation networks for skill development.											
CO4	Define the fuzzy systems for employability.											
CO5	Analyze the genetic algorithms and their applications for skill development.											

PO-CO Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	1	3	1	1	1	1	1	1	2
CO2	2	2	2	3	3	1	1	1	1	1	2	1

Note: Adhere to the latest editions of the Suggested Readings

CO3	3	3	2	2	1	1	1	1	1	1	1	1
CO4	2	2	2	1	3	1	1	1	1	1	2	1
CO5	3	1	3	3	1	1	1	1	1	1	1	2

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	1	1
CO2	2	1	1
CO3	3	1	1
CO4	3	2	1
CO5	1	2	1

SUGGESTED READINGS:

- Soft computing : N. P Padhy and S P Simon , Oxford University Press 2015.
- Principles of Soft Computing, Shivanandam, Deepa S. N Wiley India, 2011.

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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)				Branch	Computer Science & Engineering (CSE)				
Semester	6				Version					
Effective from Academic Year					2021-2022	Effective for the Batch Admitted in 2021				
Subject Code			ECS606 (1)		Subject Name	MULTIMEDIA TECHNOLOGY				
Teaching Scheme					Examination Scheme(Marks)					
Per Week	Lecture		Practical(Lab)		Total		TS/PS	TE/PE	Total	
	L	T	P	TW						
Credit	3	1	0	-	4	Theory	30	70	100	
Hours	3	1	0	-	4	Practical	-	--	-	

COURSE OBJECTIVE

The course is designed for:

1. Program students who want to broadening their knowledge by including multimedia studies.
2. Visiting program students looking for a foundation from which to pursue advanced topics in multimedia studies.
3. Professional developers who want a technical foundation for skill developing applications with distributed multimedia components.
4. Networks professionals who needs to manage multimedia delivery service.

Syllabus

UNIT-I:

Introduction to Multimedia, Multimedia Information, Multimedia Objects, Multimedia in business and work. Convergence of Computer, Communication and Entertainment products Stages of Multimedia Projects : Multimedia hardware, Memory & storage devices, Communication devices, Multimedia software's, presentation tools, tools for object generations, video, sound, image capturing, authoring tools, card and page based authoring tools helping in skill development.

UNIT-II

Introduction to multimedia components, multimedia hardware, SCSI, IDE, MCI, multimedia data and file formats, RTF, TIFF, MIDI, JPEG, DIB, MPEG, multimedia tools, presentations tools for skill development.

UNIT-III

Huffman Coding, Shannon Fano Algorithm, Huffman Algorithms, Adaptive Coding, Arithmetic Coding Higher Order Modeling, Finite Context Modeling, Dictionary based Compression, Sliding Window Compression, LZ77, LZW compression, Compression, Compression ratio loss less & lossy compression for skill improvement.

UNIT-IV

Digital Audio concepts, Sampling Variables, Loss less compression of sound, loss compression & silence compression helping in skill development.

UNIT-V

Multimedia authoring and user interface, hypermedia messaging, mobile messaging, hypermedia message component, creating hypermedia message make eligible for employability, integrated multimedia message standards, integrated document management, distributed multimedia systems.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Identify the essential features of graphics/image data types, file formats, and color models in images and video helping in skill development.
CO2	Explain the technical details of multimedia data representations. Perform a comparative analysis of the major methods and algorithms for multimedia data compression for skill development.
CO3	Explain the technical details of popular global multimedia compression standards. Also write code and develop a multimedia application using JAI and JMF for skill development.
CO4	Explain the principles and technical details of several wired and wireless networking protocols. Configure and manage multimedia content delivery platforms for skill

Note: Adhere to the latest editions of the Suggested Readings

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	development.
CO5	Identify the essential issues of quality of service in multimedia networking. Also explain technical aspects of popular multimedia web applications for employability, including VoD and VoIP.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)(Please write wherever required)

	Skill Development	Employability	Entrepreneurship Development
CO1	2	1	1
CO2	3	1	1
CO3	3	1	1
CO4	3	1	1
CO5	1	3	1

SUGGESTED READINGS:

- Tay Vaughan "Multimedia, Making IT Work" Osborne McGraw Hill.
- Buford "Multimedia Systems" Addison Wesley.
- Agrawal & Tiwari "Multimedia Systems" Excel.
- Mark Nelson "Data Compression Book" BPB.
- David Hillman "Multimedia technology and Applications" Galgotia Publications.
- Rosch "Multimedia Bible" Sams Publishing.
- Steinreitz "Multimedia System" Addison Wesley.

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in


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Department of Computer Science & Engineering

Programme	Bachelor of Technology (B.Tech)				Branch	Computer Science & Engineering (CSE)			
Semester	6				Version				
Effective from Academic Year					2021-2022		Effective for the Batch Admitted in		2021
Subject Code			ECS 606 (2)		Subject Name	ORGANIZATIONAL BEHAVIOUR			
Teaching Scheme					Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total		TS/PS	TE/PE	Total
	L	T	P	TW					
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-

COURSE OBJECTIVE

- The objective of this course is to understand the various facets of individual, group and organizational behavior which have an impact on personal and organizational effectiveness for skill development.

Syllabus

UNIT-I

Behavioural Concepts: Nature and Concepts of OB, Models of Organizational Behaviour, Relationship with Other Fields, Contemporary challenges. **Learning:** Nature and Significance of Learning, Process of Learning for skill development, Theories of Learning, Behavioural Management: Steps of OB Modification Process.

UNIT-II

Motivation Concepts: Nature of Motivation, Classification of Motives, Motivation Process. Theories of Motivation: Early Theories: Hierarchy of Needs, Two-Factor Theory, McClelland's Theory of Needs; Contemporary Theories: Goal Setting Theories, Self-Efficacy Theory, skill development. Reinforcement Theory, Equity Theory, Expectancy Theory Attitudes: Nature & Dimensions of Attitude, Components of Attitude, Types of Attitude. Cognitive Dissonance Theory, Attitude Formation, Attitude Change

UNIT-III

Perception: Perceptual Process Model, Social Identity Theory, Attribution Theory: Attribution Errors, Self Fulfilling Prophecy, Perceptual Errors in Organizational Setting, Improving Perceptions Personality: Meaning of Personality, Determinants of Personality, Five-Factor Model of Personality, Myers-Briggs Type Indicator (MBTI); Theories of Personality: Freudian Theory (Psychoanalytic Theory of Personality), Erik Erikson Stages of Personality Development helping in skill development, Trait Theory, Jungian Theory given by Carl Jung

UNIT-IV

Group Dynamics: Nature of Group Dynamics, Types, Stages of Group Formation: The Five Stage Model; Group Structure: Group Tasks, Team Development: Nature, Significance, Comparing Work Groups and Work Teams, Types of Work-Teams, Team-Effectiveness Model, Team Process, Contemporary Issues in Managing Teams, Concept of Conflict, Process and Resolution for skill development.

UNIT-V

Leadership: Nature, Leadership Styles, Traits of Effective Leader, Models and Theories of Leadership: Competency Perspectives: Behavioural Perspectives; Transformational Perspective; Leadership Skills for employment.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Demonstrate the applicability of the concept of organizational behavior to understand the behavior of people in any national/ international organization for skill development.
CO2	Demonstrate the applicability of analyzing the complexities associated with management of individual behavior in the organization for skill development.
CO3	Analyze the complexities associated with management of the group behavior in the organization for skill development.
CO4	Demonstrate how the organizational behavior can integrate in understanding the

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	motivation (why) behind behavior of people in the organization for skill development.
CO5	To accept and embrace in working with different people from different cultural and diverse background in the workplace helps in employability.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)(Please ✓ wherever required)

	Skill Development	Employability	Entrepreneurship Development
CO1	2	1	1
CO2	2	1	1
CO3	2	1	1
CO4	2	1	1
CO5	1	2	1

SUGGESTED READINGS:

- Robbins Stephen P, Judge and Sanghi, Organizational Behaviour, 13th Edition, Pearson Education
- Aswathapa K., Organisational Behaviour, Himalaya Publishing House, 9th revised edition
- Luthans Fred, Organizational Behaviour, Tata Mc Graw Hill.
- Rao V S P., Organizational Behaviour, Excel Books, 1st edition

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PO-CO Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)(Please ✓ wherever required)

	Skill Development	Employability	Entrepreneurship Development
CO1	2	1	1
CO2	3	1	1
CO3	2	1	1
CO4	2	2	1
CO5	1	1	1

SUGGESTED READINGS:

- Managerial Economics ,D.N.Dwivedi.Vikas Publication, 7th Ed
- Managerial Economics, GEETIKA, McGraw-Hill Education 2nd Ed.
- Managerial Economics: Concepts and Applications (SIE), THOMAS& MAURICE, McGraw-Hill Education, 9th Ed
- Managerial Economics, H.L Ahuja, S.Chand, 8th Ed
- Managerial Economics – Theory and Applications, Dr.D.M.Mithani, Himalaya Publications, 7th Ed.
- Sociology & Economics for Engineers, Dr. Premvir Kapoor, Khanna Publishing House

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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)			Branch	Computer Science & Engineering (CSE)				
Semester	6			Version					
Effective from Academic Year				2021-2022	Effective for the Batch Admitted in		2021		
Subject Code		ECS 606(4)		Subject Name	DATA COMPRESSION				
Teaching Scheme					Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total	TS/PS	TE/PE	Total	
	L	T	P	TW					
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-

COURSE OBJECTIVE

The aim of data compression is to reduce redundancy in stored or communicated data, thus increasing effective data density. Data compression has important application in the areas of file storage and distributed systems for skill development.

Syllabus

UNIT-I

Compression Techniques: Loss less compression. Lossy Compression. Measures of performance. Modeling and coding. Mathematical Preliminaries for Lossless compression: A brief introduction to information theory for skill development. Models: Physical models. Probability models. Markov models. composite source model, Coding: uniquely decodable codes, Prefix codes.

UNIT-II

The Huffman coding algorithm: Minimum variance Huffman codes, Adaptive Huffman coding: Update procedure, Encoding procedure, Decoding procedure. Golomb codes, Rice codes, Tunstall codes, Applications of Hoffman coding: Loss less image compression, Text compression, Audio Compression helping in skill development.

UNIT-III

Coding a sequence, Generating a binary code, Comparison of Binary and Huffman coding. Applications: Bi-level image compression- The JBIG standard, JBIG2, Image compression. Dictionary Techniques: Introduction, Static Dictionary: Diagram Coding. Adaptive Dictionary. The LZ77 Approach, The LZ78 Approach, Applications: File Compression-UNIX compress, Image Compression: The Graphics Interchange Format (GIF). Compression over Modems: V.42 bits, Predictive Coding: Prediction with Partial match (ppm): The basic algorithm. The ESCAPE SYMBOL. length of context, The Exclusion Principle, The Burrows-Wheeler Transform: Movetofront coding, CALIC, JPEG-LS, Multi-resolution Approaches. Facsimile Encoding, Dynamic Markov Compression helping in skill development.

UNIT-IV

Distortion criteria, Models, Scalar Quantization: The Quantization problem, Uniform Quantizer, Adaptive Quantization, Non uniform Quantization helping in skill development.

UNIT-V

Advantages of Vector Quantization over Scalar Quantization, The Linde-Buzo-Gray Algorithm, Tree structured Vector Quantizers. Structured Vector Quantizers useful for skill development.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Students will able to understand important of data compression for skill development.
CO2	Student will be able to develop a reasonably sophisticated data compression application used in local/ global environment for skill development.
CO3	Student is able to select methods and techniques appropriate for the task to enhance skills.
CO4	Understand the most common formats for image, sound and video which helps in skill development
CO5	Distinguish the basic techniques of lossless compression for skill development.

Note: Adhere to the latest editions of the Suggested Readings

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PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)(Please ✓ wherever required)

	Skill Development	Employability	Entrepreneurship Development
CO1	2	1	1
CO2	1	1	1
CO3	3	1	1
CO4	3	1	1
CO5	2	1	1

SUGGESTED READINGS:

- Khalid Sayood, Introduction to Data Compression, Morgan Kaufmann Publishers
- Elements of Data Compression, Drozdek, Cengage Learning
- Introduction to Data Compression, Second Edition, Khalid Sayood, The Morgan Kaufmann Series
- Data Compression: The Complete Reference 4th Edition by David Salomon, Springer
- Text Compression 1st Edition by Timothy C. Bell Prentice Hall

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- onlinecourses.nptel.ac.in



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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)	Branch	Computer Science & Engineering (CSE)		
Semester	6	Version			
Effective from Academic Year		2021-2022	Effective for the Batch Admitted in		2021
Subject Code		ECS 606(5)	Subject Name		SOFTWARE QUALITY ENGINEERING
Teaching Scheme			Examination Scheme(Marks)		
Per Week	Lecture		Practical(Lab)		Total
	L	T	P	TW	
Credit	3	1	0	-	4
Hours	3	1	0	-	4
				Theory	30
				Practical	70
					100
				-	-
				--	-

COURSE OBJECTIVE

The main objective of software quality engineering is to minimize the cost of guaranteeing quality by a variety of activities performed throughout the skill development and manufacturing processes/stages. These activities prevent the causes of errors, and detect and correct them early in the development process.

Syllabus

UNIT-I

Defining Software Quality, Software Quality Attributes and Specification, Cost of Quality, Defects, Faults, Failures, Defect Rate and Reliability, Defect Prevention, Reduction, and Containment for skill development, Overview of Different Types of Software Review, Introduction to Measurement and Inspection Process, Documents and Metrics

UNIT-II

Product Quality Metrics: Defect Density, Customer Problems Metric, Customer Satisfaction Metrics, Function Points, In-Process Quality Metrics, Defect Arrival Pattern, Phase-Based Defect Removal Pattern, Defect Removal Effectiveness helping in skill development., Metrics for Software Maintenance: Backlog Management Index, Fix Response Time, Fix Quality, Software Quality Indicators

UNIT-III

Modeling Process, Software Reliability Models: The Rayleigh Model, Exponential Distribution and Software Reliability Growth Models, Software Reliability Allocation Models, Criteria for Model Evaluation helps in skill development., Software Quality Assessment Models: Hierarchical Model of Software Quality Assessment.

UNIT-IV

Quality Planning and Control, Quality Improvement Process, Evolution of Software Quality Assurance (SQA), Major SQA Activities, Major SQA Issues, Zero Defect Software, SQA Techniques, Statistical Quality Assurance, Total Quality Management, Quality Standards and Processes helps in employability.

UNIT-V

Verification and Validation, Evolutionary Nature of Verification and Validation, Impracticality of Testing all Data and Paths, Proof of Correctness, Software Testing, Functional, Structural and Error-Oriented Analysis & Testing, Static and Dynamic Testing Tools, Characteristics of Modern Testing Tools useful for skill development..

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Describe software testing and quality assurance model for skill development.
CO2	Recognize the suitable testing technique and quality assurance model for a defined scenario for skill development.
CO3	Apply the identified model and compile the finding of software quality assurance cycle for skill development.
CO4	Students can compute test coverage and yield, according to a variety of global criteria which is helpful for employment.
CO5	Design and implement Test Plans and Procedures for skill improvement.

Note: Adhere to the latest editions of the Suggested Readings

PO-CO Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	1	1
CO2	2	1	1
CO3	3	1	1
CO4	1	3	1
CO5	2	1	1

SUGGESTED READINGS:

- Jeff Tian, Software Quality Engineering (SQE), Wiley-Interscience, 2005; ISBN 0-471-71345-7.
- Metrics and Models in Software Quality Engineering, Stephen H. Kan, AddisonWesley (2002), ISBN: 0202129156

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in


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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)				Branch	Computer Science & Engineering (CSE)			
Semester	7				Version				
Effective from Academic Year					2021-2022	Effective for the Batch Admitted in			2021
Subject Code			ECS 701(1)		Subject Name		DISTRIBUTED COMPUTING		
Teaching Scheme					Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total		TS/PS	TE/PE	Total
	L	T	P	TW					
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-

COURSE OBJECTIVE

1. Study software components of distributed computing systems. Know about the communication and interconnection architecture of multiple computer systems for skill development.
2. Recognize the inherent difficulties that arise due to distributed-ness of computing resources.
3. Mobile & wireless computing and their applications to real world problems.
4. At the end students will be familiar with the design, implementation and security issues of distributed system.

Syllabus

UNIT I

Introduction, Goals of distributed computing. Characterization of distributed system. Theoretical foundation of distributed system. Hardware Concepts, bus based multiprocessor switched multiprocessor, bus based multicomputer, switched multicomputer. Software Concepts, Network Operating Systems helping in skill development. True Distributed System,

UNIT II

Multiprocessor time sharing system, Design issues, Communication, Layered Protocols, ATM networks, Client Server model, Remote Procedure Call, Group Communication useful for skill development. Synchronization: Clock Synchronization, Mutual Exclusion, Election, Algorithms, Atomic Transaction.

UNIT III

Deadlock, Threads, System models, Processor Allocation, Scheduling in Distributed Systems, Fault Tolerance, Real time distributed systems Agreement protocols: Introduction, system model, classification of agreement protocols, Application of agreement protocols, Atomic commit in distributed database system for skill development.

UNIT IV

Distributed file systems: Distributed file system design, implementation, Trends in Distributed File Systems, Distributed shared memory, consistency models, page based distributed shared memory, shared variable distributed shared memory, and distributed programming languages for skill development.

UNIT V

Case studies: Amoeba: Introduction, Objects and capabilities in Amoeba, Process and Memory Management in Amoeba, Communication in Amoeba, The Amoeba Services. DCE: Introduction, Threads, Remote Procedure call, Time, Directory Service and Security Services helps in skill development, Distributed File System.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Acquire the theoretical and conceptual foundations of distributed computing for skill development.
CO2	Conceptualize the ideas of distributed operating systems and its issues for skill development.
CO3	Understand the issues involved in distributed resource environment for skill development

Note: Adhere to the latest editions of the Suggested Readings

35

CO4	Realize the importance of transaction and how to recovery the system from deadlocks for skill development.
CO5	Explore the principles of fault tolerance, its protocols that can be used in global environment.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	1	1
CO2	2	1	1
CO3	3	1	1
CO4	2	1	1
CO5	2	1	1

SUGGESTED READINGS:

- G. Coulouris, J. Dollimore, T. Kindberg, " Distributed systems concepts and design" Pearson
- Andrew S.Tanenbaum, "Distributed Operating Systems", Pearson Education Asia, 2001.
- Mukesh singhal and Niranjana G.Shivaratri, "Advanced concepts in Operating system", Tata McGraw Hill.
- Pradeep.k and Sinha, "Distributed operating systems, PHI, New Delhi, 2001.

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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)			Branch	Computer Science & Engineering (CSE)				
Semester	7			Version					
Effective from Academic Year				2021-2022	Effective for the Batch Admitted in		2021		
Subject Code		ECS 701(2)		Subject Name		WEB SEARCH AND MINING			
Teaching Scheme					Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total	TS/PS	TE/PE	Total	
	L	T	P	TW					
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-

COURSE OBJECTIVE

The objective of Web search and mining helps to improve the power of web search engine by classifying the web documents and identifying the web pages which is helpful for skill development as well as in employability.

Syllabus

UNIT-I

Web Intelligence: Semantic web, Social intelligence, Search engine techniques. Web information retrieval and filtering helps in skill development. Levels of WI, Goal of WI, Characteristics of web intelligence, Challenges and issues of WI, Future of WI.

UNIT-II

Web Information Retrieval: Managing web data. Web search engines, Google searching, Introduction to web crawler. Architecture of a web crawler, Distributed crawling, Focused spiders/crawlers, Collaborative crawling. Some tools and open source for web crawling. Models of information retrieval for skill development.

UNIT-III

Web mining: Introduction to data mining. Classification & clustering. Pattern recognition. Introduction to web mining. Evolution. Process. Web content mining, Web usage mining, Web structure mining helping in employability.

UNIT-IV

Intelligent Web Algorithms: The intelligent-algorithm lifecycle, Classes of intelligent algorithm, Recommendation engines based on users, items, and content for employability.

UNIT-V

Web Analytics: How Web Analytics Works – Basic Concepts, collection of Web Data and other types of data, basic dashboards, Predictive Analytics, Web Analytics Ecosystem and Tools helps in skill development, Data Visualization, Acquisition and Conversions

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Learn about how to process data present on World Wide Web.
CO2	Learn about various types of global information retrieval tool and their working.
CO3	Learn about how to process data present on World Wide Web for skill development.
CO4	Learn about various types of information retrieval tool and their working for skill development.
CO5	Able to design and implement clusters of data set helping in skill development as well as employment.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

Note: Adhere to the latest editions of the Suggested Readings

37

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

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	2	1	1
CO2	3	1	1
CO3	2	2	1
CO4	1	3	1
CO5	2	2	1

SUGGESTED READINGS:

- Intelligent Technologies for Web Applications - Priti Srinivas Sajja, Rajendra Akerkar, CRC Press - Taylor & Francis Group
- Algorithms of the Intelligent Web, Second Edition - Douglas G. McIlwraith, Haralambos Marmanis, and Dmitry Babenko, Manning Publications.
- Mining the Social Web, Third Edition, Matthew A. Russell and Mikhail Klassen, Published by O'Reilly Media
- Data Mining Practical Machine Learning Tools and Techniques, Fourth Edition, Ian Witten, Eibe Frank, Mark Hall, Christopher Pal, Elsevier

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in

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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)			Branch	Computer Science & Engineering (CSE)				
Semester	7			Version					
Effective from Academic Year			2021-2022	Effective for the Batch Admitted in		2021			
Subject Code		ECS 701(3)			Subject Name		TCP/IP & WEB TECHNOLOGY		
Teaching Scheme					Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total		TS/PS	TE/PE	Total
	L	T	P	TW					
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-

COURSE OBJECTIVE

This course presents basic networking technology and terminology, including the ISO OSI Network Reference Model, TCP/IP networking model, IP addressing, and other concepts and information relevant to setting up and using TCP/IP-based networks helps in skill development.

Syllabus

UNIT-I

TCP/IP Overview, TCP/IP and Internet, Layers of TCP/IP, Network Layer: Addressing, Sub netting, concepts of ARP, RARP, ICMP, IGMP, Transport Layer: UDP & TCP, Application Layer: Client server model, BOOTP, DHCP, DNS, TELNET, FTP, SMTP model, HTTP, idea of WWW and CGI for skill development.

UNIT-II

JAVA fundamentals, overview of JAVA operators, control statements, introducing classes, inheritance, exception handling, AWT, working with window graphics and text useful for skill development, AWT controls, Layout manager.

UNIT-III

Advanced JAVA: Introducing threading, advantages, Multi-threading, JAVA and networking for skill development, TCP/IP client sockets, Whois URL, Server sockets, Overview of a caching Proxy HTTP server.

UNIT-IV

Applets and JDBC: Introducing Applets, Architecture of an applet, skeleton, HTML, APPLET tag, Event Handling, JDBC, Connecting to a database, transactions and executing SQL query helping in skill development, JDBC interface, Callable and prepared statements, Introduction to swing.

UNIT-V

CGI Programming Introduction to Web Architecture, Apache Web Server, Perl programming, CGI programming with Perl improve skills

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Summarize basic principles of IPv4 and its Addressing mechanisms for skill development.
CO2	Understand UDP Services and Applications in Transport Layer for skill development.
CO3	Discuss various Flow, Error and Congestion control mechanisms of TCP for skill development.
CO4	Have a Good grounding of Web Application Terminologies, Internet Tools, E-Commerce and other global web services helps in skill development.

Note: Adhere to the latest editions of the Suggested Readings

CO5	Design and implement dynamic websites with good aesthetic sense of designing and latest technology for skill development
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PO-CO Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	1	1
CO2	2	1	1
CO3	3	1	1
CO4	2	1	1
CO5	2	1	1

SUGGESTED READINGS:

- TCP/IP – Forouzan (TMH)
- Internet and World Wide Web, How to Program, Dietel and Dietel, Pearson Education.
- Web Technologies – Achyut S Godbole and Atul Kahate

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in



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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)			Branch	Computer Science & Engineering (CSE)				
Semester	7			Version					
Effective from Academic Year				2021-2022	Effective for the Batch Admitted in		2021		
Subject Code		ECS 701(4)		Subject Name	QUANTUM COMPUTING				
Teaching Scheme				Examination Scheme(Marks)					
Per Week	Lecture		Practical(Lab)		Total	TS/PS	TE/PE	Total	
	L	T	P	TW					
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-

COURSE OBJECTIVE

This subject aims to provide a self-contained, comprehensive introduction to quantum computing, focusing on the design and analysis of quantum algorithms for skill development.

Syllabus

UNIT-I

Fundamental Concepts: Global Perspectives, Quantum Bits, Quantum Computation, Quantum Algorithms helps in skill development, Quantum Information, Postulates of Quantum Mechanisms.

UNIT-II

Quantum Computation: Quantum Circuits – Quantum algorithms, Single Orbit operations, Control Operations, Measurement, Universal Quantum Gates, Simulation of Quantum Systems, Quantum Fourier transform improve skills, Phase estimation.

UNIT-III

Applications, Quantum search algorithms – Quantum counting – Speeding up the solution of NP – complete problems – Quantum Search for an unstructured database is useful for skill development.

UNIT-IV

Quantum Information: Quantum noise and Quantum Operations – Classical Noise and Markov Processes, Quantum Operations. Examples of Quantum noise and Quantum Operations – Applications of Quantum operations. Limitations of the Quantum operations formalism. Distance Measures for Quantum information helpful for employability.

UNIT-V

Quantum Error Correction: Introduction, Shor code, Theory of Quantum Error -Correction, Constructing Quantum Codes, Stabilizer codes, Fault Tolerant Quantum Computation, Entropy and information – Shannon Entropy, Basic properties of Entropy, Von Neumann, Strong Sub Additivity, Data Compression, Entanglement as a physical resource for skill development..

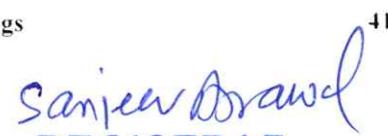
COURSE OUTCOME (CO)

	DESCRIPTION
CO1	The basic principles of quantum computing for skill development.
CO2	The fundamental differences between conventional computing and quantum computing which help in skill development.
CO3	Several basic quantum computing algorithms for solving national/ international problems for skill development.
CO4	The classes of problems that can be expected to be solved well by quantum computers useful for employability.
CO5	Ability to design algorithms to generate machine code for error correction which is to improve skill of students.

Note: Adhere to the latest editions of the Suggested Readings


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PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	2	1	1
CO2	2	1	1
CO3	3	1	1
CO4	1	2	1
CO5	3	1	1

SUGGESTED READINGS:

- Computational Geometry: An Introduction by Franco P. Preparata and Michael Ian Shamos: Springer Verlag, 1985
- Computational Geometry, Algorithms and Applications by Mark de Berg, Marc van Kreveld, Mark Overmars, and Otfried Schwarzkopf; Springer Verlag, 1997. from Springer.
- Algorithmische Geometrie (auf deutsch) by Rolf Klein Addison-Wesley, 1996
- Computational Geometry and Computer Graphics in C++ by Michael J. Laszlo (Nova Southeastern University) Prentice-Hall, 1996

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in

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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)				Branch	Computer Science & Engineering (CSE)			
Semester	7				Version				
Effective from Academic Year					2021-2022	Effective for the Batch Admitted in			2021
Subject Code			ECS 701(5)		Subject Name		SOFTWARE REUSABILITY		
Teaching Scheme					Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total		TS/PS	TE/PE	Total
	L	T	P	TW					
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-

COURSE OBJECTIVE

The main objective of this course is being able to design programs and components with the potential for reusability for skill improvement. Student also is able to incorporate reusable components in the design and development of new software's which is helpful for employability.

Syllabus

UNIT-I

Software reuse success factors: Reuse driven software engineering as business, object oriented software engineering, Applications and Component subsystems, Use case components, Object components helps in skill development

UNIT-II

Design Patterns: Introduction, Creational Patterns – Factory, factory method for skill development, abstract factory, singleton, builder, prototype

UNIT-III

Structural Patterns: Adapter, bridge, composite, decorator, façade, flyweight, proxy. Behavioral Patterns : Chain of responsibility, command, interpreter helpful for employment.

UNIT-IV

Behavioral Patterns: Iterator, mediator, memento, observer, state, strategy, template, visitor helping in skill development. Other design patterns: Whole – part, master – slave, view handler, forwarder – receiver, client dispatcher – server, publisher – subscriber.

UNIT-V

Architectural Patterns – Layers, pipes and filters, black board, broker, model-view controller useful for skill growth, presentation – abstraction – control, micro kernel, reflection.

COURSE OUTCOME (CO)

DESCRIPTION

CO1	Identify and describe the different approaches and techniques to the software reuse development helps in skill improvement.
CO2	Determine and apply the knowledge acquired on software reuse techniques for skill improvement.
CO3	Apply the design patterns in creating an object oriented design which helps in employability.
CO4	Use design patterns for real world situations of national/ international interest for skill development.
CO5	List consequences of applying each pattern for skill development.

PO-CO Mapping (Please write 3, 2, 1 wherever required)
(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

Note: Adhere to the latest editions of the Suggested Readings

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

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

	Skill Development	Employability	Entrepreneurship Development
CO1	3	1	1
CO2	2	1	1
CO3	3	2	1
CO4	1	1	1
CO5	2	1	1

SUGGESTED READINGS:

- I.Ivar Jacobson, Martin Griss, Patrick Johnson, "Software Reuse: Architecture, Process and Organization for Business Success". ACM Press 1997
- Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides – "Design Patterns", Pearson Education, 1995.
- James W Cooper, "Java Design Patterns, a tutorial", Pearson Education, 2000.
- Frank Buschmann etc., - "Pattern Oriented Software Architecture – Volume I". Wiley 1996

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in

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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)			Branch	Computer Science & Engineering (CSE)				
Semester	7			Version					
Effective from Academic Year			2021-2022		Effective for the Batch Admitted in		2021		
Subject Code		EHU 701			Subject Name		INDUSTRIAL MANAGEMENT		
Teaching Scheme					Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total		TS/PS	TE/PE	Total
	L	T	P	TW					
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-

COURSE OBJECTIVE

The objective of this course is to familiarize the students to gain insight about managerial techniques through various assessment tools/models to control and enhance skills the productivity of the work environment.

Syllabus

UNIT-I

Introduction: Concept, Development, application and scope of Industrial Management.

Productivity: Definition, measurement, productivity index, types of production system for skill development. Industrial Ownership.

UNIT-II

Management Function: Principles of Management- Management Tools helping in skill development – time and motion study, work simplification- process charts and flow diagrams, Production Planning, Specification of Production requirements .

UNIT-III

Inventory control: Inventory, cost, Deterministic models, Introduction to supply chain management helpful for employability.

UNIT-IV

Quality control: Meaning, process control, SQC control charts useful in skill development. single, double and sequential sampling. Introduction to TQM.

UNIT-V

Environmental Issues: Environmental Pollution – various management techniques to control Environmental pollution – Various control acts for Air, Water, Solid waste and Noise pollution.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Understanding and explain basic economic theory and productivity concepts and practices for skill development.
CO2	Demonstrate understanding and global application of concepts and techniques associated with the chief functional management disciplines which help in skill development.
CO3	Discuss the relevance of contextual factors in impinging upon productive performance an inventory control helpful in employability.
CO4	Discuss the relevance of management disciplines as a means of improving quality skill development.
CO5	Understanding and explain basic theory and responsibilities related with environment helps in entrepreneurship development.

PO-CO Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	2	3	2	1	1	1	1	1	1	2

Note: Adhere to the latest editions of the Suggested Readings

CO2	3	3	3	3	3	3	1	1	1	1	1	1
CO3	3	2	3	3	3	1	1	1	1	2	1	2
CO4	1	2	2	3	2	1	1	1	1	1	1	2
CO5	1	1	2	3	2	1	1	1	1	1	1	1

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	3	1	1
CO2	2	1	1
CO3	3	3	1
CO4	2	1	1
CO5	2	1	2

SUGGESTED READINGS:

- Khanna O.P.: Industrial Engineering
- T.R. Banga: Industrial Engineering and Management
- Sharma B.R.: Environmental and Pollution Awareness.
- R.K.Singal: Industrial Management, Vayu Education of India Pub.
- Onkar N. Pandey: Industrial Management, S.K.Kataria& Sons (Katson) Pub.
- Dewan J. M. and Sudarshan K. N.: Industrial Management, Discovery Publishing Pvt. Ltd

WEBSITE RESOURCES:

- www.nsf.gov
- en.wikipedia.org
- www.sciencedirect.com
- www.slideshare.net
- www.researchgate.net
- www.sanfoundry.com

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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)			Branch	Computer Science & Engineering (CSE)				
Semester	7			Version					
Effective from Academic Year				2021-2022	Effective for the Batch Admitted in			2021	
Subject Code			ECS 702	Subject Name		DIGITAL IMAGE PROCESSING			
Teaching Scheme					Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total		TS/PS	TE/PE	Total
	L	T	P	TW					
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-

COURSE OBJECTIVE

1. Fundamental concepts of a digital image processing system.
2. Concepts of image enhancement techniques for helping skill development.
3. Understanding of various images transforms models.
4. Compression techniques and Morphological concepts.
5. Various segmentation techniques, and object descriptors
6. Color models and various applications of image processing.

Syllabus

UNIT – I

Digital Image Fundamentals: - Digital image Representation – Functional unit of an Image processing system. Visual perception – Image Model – Image sampling and Quantization – grayscale resolution – pixel relationship – image geometry. Image Transforms – unitary Transform for skill development, Discrete Fourier Transform, Cosine Transform, Sine Transform, Hadamard Transform. Slant and KL Transform

UNIT – II

Image Enhancement – Histogram processing, Spatial domain enhancement, Image smoothing, Image Sharpening, Frequency domains Enhancement, Color Image Processing methods- Color Image Models for skill development.

UNIT –III

Image restoration and compression Degradation Model – Discrete Formulation – Circulant matrices – Constrained and Unconstrained restoration geometric transformations fundamentals – Compression Models – Error Free Compression – Lossy Compression – International Image Compression Standards for skill development.

UNIT – IV

Image Analysis and Computer Vision: Spatial feature Extraction – Transform feature –Edge detection-Boundary Representation-Region Representation-Moment Representation-Structure-Shape Features-Texture-Scene Matching for skill development and Detection-Image Segmentation-Classification techniques-Morphology- Interpolation.

UNIT –V

Sensing 3D shape: how the 3rd dimension changes the problem. Stereo 3D description, 3D model, matching, HNA, Direct 3D sensing-structured light, range finders, range image segmentation. Emerging IT applications: Recognition of characters, Fingerprints and faces-Image databases for skill development as well as employability.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Understand the scope, introduction of global image processing system and image transforms with their properties for skill development.
CO2	Students understand show to enhance the Images lucidity by means of skill improvement.
CO3	Learn different causes for image degradation and overview of image restoration techniques for skill development.
CO4	For skill development understand the image morphology and Image segmentation.
CO5	Learn different feature extraction techniques for image analysis and recognition for

Note: Adhere to the latest editions of the Suggested Readings

45



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skill development as well as employability.

PO-CO Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	1	1	1
CO2	3	1	1
CO3	3	1	1
CO4	1	1	1
CO5	1	3	1

SUGGESTED READINGS:

- Rafael C. Gonzalez & Richard E. Woods, "Digital Image Processing", 2nd Ed. Pearson Edu. 2004
- S.Sridhar, "Digital Image processing", Oxford university press, 2012
- A.K. Jain, "Fundamental of Digital Image Processing", PHI. 2003
- Fundamentals of Digital Image Processing-A.K.Jain
- Image Processing and machine vision-Milan Sonka, Vaclav Hlavac
- Pattern Recognition Principles-J.T. Tou and R.C.Gonzalez

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in
- <https://sisu.ut.ec/imageprocessing/book/1>
- <https://www.geeksforgeeks.org/>

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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)			Branch	Computer Science & Engineering (CSE)			
Semester	7			Version				
Effective from Academic Year				2021-2022	Effective for the Batch Admitted in		2021	
Subject Code		ECS-703		Subject Name	DATA MINING AND WAREHOUSING			
Teaching Scheme				Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total	TS/PS	TE/PE	Total
	L	T	P	TW				
Credit	3	1	0	-	4	Theory	30	70
Hours	3	1	0	-	4	Practical	-	--

COURSE OBJECTIVE

1. Be familiar with mathematical foundations of data mining tools for helping skills development.
2. Understand and implement classical models and algorithms in data warehouses and data mining
3. Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.
4. Master data mining techniques in various applications like social, scientific and environmental context helps to create skill development.

Syllabus

UNIT-I

Introduction: Data Mining Definition & Functionalities, Data Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data, (Binning, Clustering, Regression, Computer and Human inspection), Inconsistent Data, Data Integration and Transformation.

Data Reduction:- Data Cube Aggregation, Dimensionality reduction, Data Compression for helping skill development, Numerosity Reduction, Clustering, Discretization and Concept hierarchy generation.

UNIT-II

Concept Description:- Definition, Data Generalization, Analytical Characterization, Analysis of attribute relevance, Mining Class comparisons, Statistical measures in large Databases, Measuring Central Tendency, Measuring Dispersion of Data, Graph Displays of Basic Statistical class Description, Mining Association Rules in Large Databases, Association rule mining, mining Single-Dimensional Boolean Association rules from Transactional Databases- Apriori Algorithm, Mining Multilevel Association rules from Transaction Databases for helping skill development and Mining Multi Dimensional Association rules from Relational Databases.

UNIT-III

Classification and Predictions: What is Classification & Prediction, Issues regarding Classification and prediction, Decision tree, Bayesian Classification, Classification by Back propagation, Multilayer feed-forward Neural Network, Back propagation Algorithm, Classification methods k-nearest neighbor classifiers, Genetic Algorithm, Cluster Analysis: Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data, Constraint-Based Cluster Analysis, Outlier Analysis, Applications and Trends in Data Mining for helping skill development.

UNIT-IV

Data Warehousing: Overview, Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Mart for helping skill development.

UNIT-V

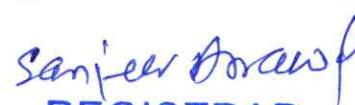
Aggregation, Historical information, Query Facility, OLAP function and Tools helping for employability, OLAP Servers, ROlap, MOlap, HOlap, Data Mining interface, Security, Backup and Recovery, Tuning Data Warehouse, Testing Data Warehouse.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Understand the basic principles, concepts and applications of data mining for helping skill development and Form of Data Preprocessing.
CO2	Study and analysis of various Databases & Concept Description for helping skill development
CO3	Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining for helping skill development.

Note: Adhere to the latest editions of the Suggested Readings


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CO4	Understand the basic principles, concepts and global applications of data warehousing using Multi Dimensional Data, Model and draw the functional block diagram of 3 Tier Architecture are key term of skill development.
CO5	Designs data warehouse with dimensional modeling and apply OLAP operations provide a prospect of employment.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	1	1	1
CO2	1	1	1
CO3	1	2	1
CO4	3	1	1
CO5	1	3	1

SUGGESTED READINGS:

- M.H.Dunham, "Data Mining: Introductory and Advanced Topics" Pearson Education
- Jiawei Han, Micheline Kamber, "Data Mining Concepts & Techniques" Elsevier
- Sam Anahory, Dennis Murray, "Data Warehousing in the Real World : A Practical Guide for Building Decision Support Systems, Pearson Education
- Mallach, "Data Warehousing System". McGraw -Hill
- Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction to Data Mining". Pearson education.

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in

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Department of Computer Science & Engineering

Programme	Bachelor of Technology (B.Tech)			Branch	Computer Science & Engineering (CSE)				
Semester	7			Version					
Effective from Academic Year		2021-2022			Effective for the Batch Admitted in			2021	
Subject Code		ECS704 (1)			Subject Name	INTRODUCTION TO BIOINFORMATICS			
Teaching Scheme					Examination Scheme(Marks)				
Per Week	Lecture	Practical(Lab)		Total		TS/PS	TE/PE	Total	
	L	T	P	TW					
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-
COURSE OBJECTIVE									
The primary goal of bioinformatics is to increase the understanding of biological processes. What sets it apart from other approaches, however, is its focus on developing and applying computationally intensive techniques to achieve the employability or improve the skills.									
Syllabus									
UNIT -I									
Introduction: Bioinformatics objectives and overviews. Interdisciplinary nature of Bioinformatics. Data integration. Data analysis. Major Bioinformatics databases and tools. Metadata: Summary 40 & reference systems. finding new type of data online. Molecular Biology and Bioinformatics: Systems approach in biology, Central dogma of molecular biology, problems in molecular approach and the bioinformatics approach, overview of the bioinformatics applications useful for skill improvement.									
UNIT -II									
DNA: Basic chemistry of nucleic acids, Structure of DNA, Structure of RNA, DNA Replication, Transcription, -Translation, Genes- the functional elements in DNA, Analysing DNA, DNA sequencing are helping in skill development. Proteins: Amino acids. Protein structure. Secondary. Tertiary and Quaternary structure, Protein folding and function, Nucleic acid-Protein interaction									
UNIT -III									
Applications for bioinformatics: Perl Basics, Perl applications for bioinformatics- Bioperl, Linux Operating System, mounting/ unmounting files. tar, gzip / gunzip, telnet, ftp, developing applications on Linux OS, Understanding and Using Biological Databases, Overview of Java, CORBA, XML, Web deployment concepts for skill development.									
UNIT -IV									
Biological data storage techniques: Genome. Genomic sequencing, expressed sequence tags. gene expression. transcription factor binding sites and single nucleotide polymorphism. Computational representations of molecular biological data storage techniques (flat, relational and object oriented), and controlled vocabularies. general data retrieval techniques helps in skill development: indices. Boolean search. fuzzy search and neighboring, application to biological data warehouses.									
UNIT -V									
Representation of patterns and relationships in bioinformatics: Macromolecular structures, chemical compounds, generic variability and its connection to clinical data. Representation of patterns and relationships: sequence alignment algorithms, regular expressions, hierarchies and graphical models useful for employability, Phylogenetic BLAST.									
COURSE OUTCOME (CO)									
					DESCRIPTION				
CO1	Extract information from different types of bioinformatics data (gene, protein, disease, etc.), including their biological characteristics and relationships for skill development.								

Note: Adhere to the latest editions of the Suggested Readings

CO2	Employ different data representation models and global formats used for bioinformatics data representation, including markup languages such as SBML and CellML, and ontologies such as GO ontology helps in skill development.
CO3	Apply the different approaches used for data integration and data management, including data warehouse and wrapper approaches for skill development.
CO4	Analyze processed data with the support of analytical and visualization tool for development.
CO5	Interact with non-bioinformatics professionals, such as biologists and biomedical researchers, to better understand their bioinformatics needs for improved support and service delivery helpful for employability.

PO-CO Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	2	1	1
CO2	3	1	1
CO3	3	1	1
CO4	3	1	1
CO5	2	3	1

TEXT BOOKS

- Fundamental concepts of Bioinformatics – D E Krane and M L Raymer. Pearson Education.
- Bioinformatics Methods & applications, Genomics, Proteomics & Drug Discovery – Rastogi, Mendiratta and Rastogi, PHI, New Delhi.

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in


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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)	Branch	Computer Science & Engineering (CSE)					
Semester	7	Version						
Effective from Academic Year		2021-2022	Effective for the Batch Admitted in		2021			
Subject Code		ECS704(2)	Subject Name		ADVANCE WEB APPLICATIONS			
Teaching Scheme			Examination Scheme(Marks)					
Per Week	Lecture	Practical(L ab)	Total	TS/PS	TE/PE	Total		
	L	T	P	TW				
Credit	3	1	0	-	4	Theory 30	70	100
Hours	3	1	0	-	4	Practical -	--	-

COURSE OBJECTIVE

The aim of this course is to teach the students the concepts, technologies and techniques for creating large-scale distributed software system using service oriented computing and cloud applications for helping skill development.

Syllabus

UNIT 1

Introducing PHP : History, General Language Features, PHP Basics, Embedding PHP Code in Your Web Pages, Commenting Your Code, Outputting Data to the Browser, PHP's Supported Data Types Identifiers, Variables Constants, Expressions, String Interpolation, Control Structures for helping skill development.

UNIT 2

Functions: Invoking a Function, Creating a Function: Passing Arguments by Value, Passing Arguments by Reference, Default Argument Values, Using Type Hinting, Returning Values from a Function, Recursive Functions, Function Libraries for helping skill development.

Arrays: What Is an Array? Creating an Array, Outputting an Array, Adding and Removing Array Elements, Locating Array Elements, Determining Array Size and, Sorting an Array Merging, Slicing, Splicing, and Dissecting Arrays

UNIT 3

Error and Exception Handling: Configuration Directives, Error Logging, Exception Handling for helping skill development.

Strings and Regular Expressions: Regular Expressions: Regular Expression Syntax (POSIX) PHP's Regular Expression Functions (POSIX Extended), Regular Expression Syntax (Perl). Other String-Specific Functions: Determining the Length of a String, Comparing Two Strings, Manipulating String Case, Converting Strings to and from HTML

UNIT 4

Working with HTML Forms: PHP and Web Forms, Validating Form Data: File Deletion, Cross-Site Scripting, Sanitizing User Input, Validating and Sanitizing Data with the Filter Extension, Working with Multivalued Form Components for helping skill development as well as employability.

Authenticating Your Users: HTTP Authentication Concept, Authenticating your user with PHP: PHP's Authentication Variables, Useful Functions, Hard-Coded Authentication, File-Based Authentication, Database-Based Authentication.

UNIT 5

Handling File Uploads: Uploading Files via HTTP, Uploading Files with PHP, PHP's File Upload/Resource Directives, The \$_FILES Array, PHP's File-Upload Functions, Upload Error Messages, A Simple Example for helping skill development as well as entrepreneurship.

Session Handlers: What Is Session Handling, Configuration Directives, Working with Sessions.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	For helping skill development understand how server-side programming works on the web.
CO2	PHP Basic syntax for variable types and calculations for helping skill development.
CO3	Acquire knowledge of Creating conditional structures for skill development.
CO4	Working with HTML form provides an opportunity of employability.
CO5	Using PHP built-in functions and creating custom function for creating global web

Note: Adhere to the latest editions of the Suggested Readings


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51

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pages to make student employability and entrepreneur.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	1	1	1
CO2	1	1	1
CO3	3	1	1
CO4	1	3	1
CO5	1	2	3

SUGGESTED READINGS

- PHP and MySQL By Dreamtech Publications
- PHP Concepts Unleashed For Novice – Vol I - By Poornima Naik, Kavita Oza, Evincepub Publishing
- PHP A Beginner's Guide – Vikram Vaswami
- PHP 5.1 for Beginners – By Ivan Bayross and Sharanam Shah(Shroff Publishers &Distributors)
- Beginning PHP
- Apache, MySQL Web Development- By Timothy Boronczyk, ElizabethNarmore, Jason Gerner, Yann Le Scouarnec, Jeremy Stolz, Michael K. Glass

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in

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Department of Computer Science & Engineering

Programme		Bachelor of Technology(B.Tech)			Branch		Computer Science & Engineering (CSE)			
Semester		7			Version					
Effective from Academic Year		2021-2022			Effective for the Batch Admitted in		2021			
Subject Code		ECS704 (3)			Subject Name		ADVANCED JAVA AND J2EE			
Teaching Scheme					Examination Scheme(Marks)					
Per Week		Lecture		Practical(Lab)		Total				
	L	T	P	TW			TS/PS	TE/PE	Total	
Credit	3	1	0	-		4	Theory	30	70	100
Hours	3	1	0	-		4	Practical	-	--	-

COURSE OBJECTIVE

This module aims to introduce the students to some concepts of advanced programming and practice on reusing components for web development which helpful for skill development and employability.

Syllabus

UNIT-1

Enumerations, Autoboxing and Annotations(metadata): Enumerations, Enumeration fundamentals, the values() and valueOf() Methods, java enumerations are class types, enumerations Inherits Enum, example, type wrappers, Autoboxing, Autoboxing and Methods, Autoboxing/Unboxing occurs in Expressions, Autoboxing/Unboxing, Boolean and character values, Autoboxing/Unboxing helps prevent errors, A word of Warning. Annotations, Annotation basics, specifying retention policy, Obtaining Annotations at run time by use of reflection, Annotated element Interface for skill development, Using Default values, Marker Annotations, Single Member annotations, Built-In annotations.

UNIT-II

The collections and Framework: Collections Overview, Recent Changes to Collections. The Collection Interfaces. The Collection Classes. Accessing a collection Via an Iterator, Storing User Defined Classes in Collections. The Random Access Interface for skill development . Working With Maps, Comparators, The Collection Algorithms, Why Generic Collections?, The legacy Classes and Interfaces. Parting Thoughts on Collections.

UNIT-III

String Handling :The String Constructors, String Length, Special String Operations for skill development, String Literals, String Concatenation, String Concatenation with Other Data Types, String Conversion and toString() Character Extraction, charAt(), getChars(), getBytes() toCharArray(), String Comparison, equals() and equalsIgnoreCase(), regionMatches() startsWith() and endsWith(), equals() Versus == . compareTo() Searching Strings, Modifying a String, substring(), concat(), replace(), trim(). Data Conversion Using valueOf(). Changing the Case of Characters Within a String, Additional String Methods, StringBuffer . StringBuffer Constructors. length() and capacity(). ensureCapacity(), setLength(), charAt() and setCharAt(), getChars(),append(), insert(), reverse(), delete() and deleteCharAt(), replace(), substring(), Additional StringBuffer Methods, StringBuilde.

UNIT-IV

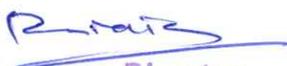
Background; The Life Cycle of a Servlet; Using Tomcat for Servlet Development; A simple Servlet; The Servlet API; The Javax.servlet Package; Reading Servlet Parameter; The Javax.servlet.http package; Handling HTTP, Requests and Responses; Using Cookies; Session Tracking. Java Server Pages (JSP): JSP, JSP Tags, Tomcat, Request String, User Sessions, Cookies, Session Objects for skill development.

UNIT-V

The Concept of JDBC; JDBC Driver Types; JDBC Packages; A Brief Overview of the JDBC process: Database Connection: Associating the JDBC/ODBC Bridge with the Database; Statement Objects; ResultSet; Transaction Processing for skill development: Metadata, Data types: Exceptions.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Understand OOPs concepts, Java programming constructs and JVM and byte codes for skill development.
CO2	Able to write Simple java programs using Classes, local/ global variables, Inheritance, Exception handling and applets for skill development


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Note: Adhere to the latest editions of the Suggested Readings

53

CO3	Develop programs using thread concepts and swings for skill development
CO4	Develop simple Java applications with JDBC connectivity for skill development
CO5	Demonstrate the advanced J2EE concepts using Servlets, Java RMI and EJB for skill development.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	3	1	1
CO2	2	1	1
CO3	3	1	1
CO4	2	1	1
CO5	2	1	1

SUGGESTED READINGS:

- Herbert Schildt: JAVA the Complete Reference, 7th/9th Edition, Tata McGraw Hill, 2007.
- Jim Keogh: J2EE-TheCompleteReference, McGraw Hill, 2007.
- Y. Daniel Liang: Introduction to JAVA Programming, 7th Edition, Pearson Education, 2007.
- Stephanie Bodoff et al: The J2EE Tutorial, 2nd Edition, Pearson Education, 2004.
- Uttam K Roy, Advanced JAVA programming, Oxford University press, 2015

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in


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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)			Branch	Computer Science & Engineering (CSE)				
Semester	7			Version					
Effective from Academic Year	2021-2022			Effective for the Batch Admitted in	2021				
Subject Code	ECS704 (4)			Subject Name	INTRODUCTION TO SOFTWARE TESTING				
Teaching Scheme				Examination Scheme(Marks)					
Per Week	Lecture		Practical(Lab)		Total	TS/PS	TE/PE	Total	
	L	T	P	TW					
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-

COURSE OBJECTIVE

Syllabus

UNIT-I

Basics of Software Testing: Basic definitions, Software Quality , Requirements, Behaviour and Correctness, Correctness versus Reliability, Testing and Debugging, Test cases, Insights from a Venn diagram, Identifying test cases, Test-generation Strategies, Test Metrics, Error and fault taxonomies , Levels of testing for skill development, Testing and Verification, Static Testing.

UNIT-II

Problem Statements: Generalized pseudo code, the triangle problem, the NextDate function, the commission problem, the SATM (Simple Automatic Teller Machine) problem, the currency converter, Saturn windshield wiper **Functional Testing:** Boundary value analysis, Robustness testing, Worst-case testing, Robust Worst testing for triangle problem, NextDate problem and commission problem, Equivalence classes, Equivalence test cases for the triangle problem, NextDate function, and the commission problem, Guidelines and observations, Decision tables, Test cases for the triangle problem helping in skill development, NextDate function, and the commission problem, Guidelines and observations.

UNIT-III

Fault Based Testing: Overview, Assumptions in fault based testing, Mutation analysis, Fault-based adequacy criteria, Variations on mutation analysis for skill development. **Structural Testing:** Overview, Statement testing, Branch testing, Condition testing, Path testing: DD paths. Test coverage metrics, Basis path testing, guidelines and observations, Data –Flow testing: Definition-Use testing, Slice- based testing. Guidelines and observations.

UNIT-IV

Test Execution: Overview of test execution, from test case specification to test cases. Scaffolding. Generic versus specific scaffolding. Test oracles. Self-checks as oracles, Capture and replay **Process Framework** :Basic principles: Sensitivity, redundancy, restriction, partition, visibility, Feedback, the quality process, Planning and monitoring, Quality goals, Dependability properties, Analysis Testing, Improving the process, Organizational factors for employability.

Planning and Monitoring the Process: Quality and process, Test and analysis strategies and plans, Risk planning, monitoring the process, Improving the process, the quality team.

UNIT-V

Integration and Component-Based Software Testing: Overview, Integration testing strategies, Testing components and assemblies, System Acceptance and Regression Testing: Overview, System testing, Acceptance testing, Usability, Regression testing, Regression test selection techniques, Test case prioritization and selective execution. **Levels of Testing, Integration Testing:** Traditional view of testing levels, Alternative life-cycle models useful for skill development, The SATM system, Separating integration and system testing, A closer look at the SATM system, Decomposition-based, call graph-based, Path-based integrations.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	List a range of different software testing techniques and strategies and be able to apply specific(automated) unit testing method to the projects for skill development.
CO2	Distinguish characteristics of structural testing methods for skill development.
CO3	Demonstrate the integration testing which aims to uncover interaction and compatibility problems helps skill development..

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Note: Adhere to the latest editions of the Suggested Readings

55

CO4	Discuss about the global functional and system testing methods useful for employability.
CO5	Demonstrate various issues for object oriented testing for skill development.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	3	1	1
CO2	2	1	1
CO3	3	1	1
CO4	2	3	1
CO5	2	1	1

SUGGESTED READINGS:

- Paul C. Jorgensen: Software Testing, A Craftsman's Approach, 3rd Edition. Auerbach Publications, 2008.
- Mauro Pezze, Michal Young: Software Testing and Analysis – Process, Principles and Techniques, Wiley India, 2009.
- Aditya P Mathur: Foundations of Software Testing, Pearson Education, 2008.

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in


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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)				Branch	Computer Science & Engineering (CSE)			
Semester	7				Version				
Effective from Academic Year	2021-2022				Effective for the Batch Admitted in	2021			
Subject Code	ECS 704(5)				Subject Name	MOBILE APPLICATION DEVELOPMENT			
Teaching Scheme					Examination Scheme(Marks)				
Per Week	Lecture	Practical(Lab)		Total		TS/PS	TE/PE	Total	
	L	T	P	TW					
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-

COURSE OBJECTIVE

Syllabus

UNIT-I

Get started, Build your first app. Activities, Testing, debugging and using support libraries for skill development

UNIT-II

User Interaction helping in for skill development. Delightful user experience, Testing your UI

UNIT-III

Background Tasks, Triggering, scheduling and optimizing background tasks for skill development.

UNIT-IV

All about data, Preferences and Settings, Storing data using SQLite, Sharing data with content providers, Loading data using Loaders helpful for skill development.

UNIT-V

Permissions, Performance and Security for employability, Firebase and AdMob, Publish.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Student understands the working of Android OS Practically for skill development.
CO2	Student will be able to develop Android user interfaces for skill development
CO3	Student will be able to develop, deploy and maintain the Android Applications for skill development.
CO4	Discuss about the function of loader for loading data for skill development.
CO5	Demonstrate various global issues related with security which helps in employability and skill development.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

Note: Adhere to the latest editions of the Suggested Readings

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	3	1	1
CO2	2	1	1
CO3	3	1	1
CO4	2	1	1
CO5	2	2	1

SUGGESTED READINGS:

- Google Developer Training, "Android Developer Fundamentals Course – Concept Reference". Google Developer Training Team, 2021.
- Erik Hellman, "Android Programming – Pushing the Limits", 1st Edition, Wiley India Pvt Ltd, 2014.
- Dawn Griffiths and David Griffiths, "Head First Android Development", 1st Edition, O'Reilly SPD Publishers, 2015.
- J F DiMarzio, "Beginning Android Programming with Android Studio", 4th Edition, Wiley India Pvt Ltd, 2016, ISBN-13: 978-8126565580
- AnubhavPradhan, Anil V Deshpande, "Composing Mobile Apps" using Android, Wiley 2014, ISBN: 978-81-265-4660-2

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- swayam.gov.in
- onlinecourses.nptel.ac.in


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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)	Branch	Computer Science & Engineering (CSE)						
Semester	7	Version							
Effective from Academic Year		2021-2022		Effective for the Batch Admitted in					
				2021					
Subject Code		ECS-705		Subject Name					
				CRYPTOGRAPHY AND NETWORK SECURITY					
Teaching Scheme									
Examination Scheme(Marks)									
Per Week	Lecture		Practical(Lab)		Total	TS/PS	TE/PE	Total	
	L	T	P	TW					
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-

COURSE OBJECTIVE

1. To provide introduction to the concept of Network Security Model and Cryptography systems.
2. To give the knowledge of Digital Signature and other Security Measures available.
3. To familiarize with the security of messages and measures to secure the messages.
4. To showcase IP Security Architecture & Transport Layer Security to identify the vulnerability of the Internet systems and recognize the mechanisms of the attackshelpful for skill development.
5. Identify and classify computer and security threats and develop a security model to prevent, detect and recover from attacks

Syllabus

UNIT-I

Introduction to cryptography, Introduction to security attacks, services and mechanism.. Classical encryption techniques substitution Ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers Conventional Encryption: Conventional encryption model, classical encryption techniques substitution ciphers and transposition ciphers, cryptanalysis, stereography, stream and block ciphers. Modern Block Ciphers: Block ciphers principals, Shannon's theory of confusion and diffusion, data encryption standard(DES), strength of DES, differential and linear crypt analysis of DES, block cipher modes of operations, triple DES, IDEA encryption and decryption, strength of IDEA, confidentiality using conventional encryption, traffic confidentiality, key distribution, random number generation helpful for skill development.

UNIT-II

Introduction to graph, ring and field, prime and relative prime numbers, modular arithmetic, Fermat's and Euler's theorem, Euclid's Algorithm, Extended Euclidean Algorithm, Advanced Encryption Standard (AES) , Chinese Remainder theorem, discrete logarithms. Principals of public key crypto systems helpful for skill development., RSA algorithm, security of RSA, key management, Diffie-Hellman key exchange algorithm, introductory idea of Elliptic curve cryptography, Elganel encryption.

UNIT-III

Message Authentication and Hash Function: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions and MACS, MD5 message digest algorithm, Secure hash algorithm(SHA). Digital Signatures: Digital Signatures, authentication protocols, digital signature standards (DSS), proof of digital signature algorithm helpful for skill development..

UNIT-IV

Key Management and distribution: Symmetric key distribution, Diffie-Hellman Key Exchange, Public key distribution, X.509 Certificates, Public key Infrastructure, Authentication Applications: Kerberos and X.509, directory authentication service, electronic mail security-pretty good privacy (PGP)helpful for skill development. S/MIME.

UNIT-V

IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management. Web Security: Secure socket layer and transport layer security, secure electronic transaction (SET)helpful for skill development as well as employability. System Security: Intruders, Viruses and related threads, firewall design principals, trusted systems.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Helpful for skill development understand cryptographic and network security concepts and Principles

Note: Adhere to the latest editions of the Suggested Readings

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CO2	Basic knowledge of Algebraic structure helpful for skill development.
CO3	To learn message digest algorithm helpful for skill development.
CO4	Learn Key Management and distribution techniques for skill development.
CO5	Learn IP Security Architecture and security protocol to safeguard from global threats for skill development as well as employability.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	2	1	1
CO2	2	1	1
CO3	3	1	1
CO4	3	1	1
CO5	2	3	1

SUGGESTED READINGS:

- William Stallings, "Cryptography and Network Security: Principles and Practice", Pearson Education.
- Behrouz A. Frouzan: Cryptography and Network Security, TMH
- Bruce Schneier, "Applied Cryptography". John Wiley & Sons
- Bernard Menezes, "Network Security and Cryptography". Cengage Learning.
- Atul Kahate, "Cryptography and Network Security". TMH

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in


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Elective -V

Department of Computer Science & Engineering

Programme		Bachelor of Technology(B.Tech)			Branch		Computer Science & Engineering (CSE)		
Semester		8			Version				
Effective from Academic Year				2021-2022		Effective for the Batch Admitted in 2021			
Subject Code		ECS801 (1)			Subject Name		BASIC OF RESEARCH & DEVELOPMENT		
Teaching Scheme					Examination Scheme(Marks)				
Per Week		Lecture		Practical(Lab)		Total			
	L	T	P	TW		TS/PS	TE/PE	Total	
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-

COURSE OBJECTIVE

The aim of research and development refers to the method of investing in knowledge to identify new products or to improve skills as existing ones. The research and development process has many steps and a careful strategy is needed for the business to be successful. Learning the rewards and risks of research and development is an important step in understanding how a business continues to meet its customer's needs.

Syllabus

UNIT-I

Basic Concept of Research Problem: Rationale of research, Identification of research problem, Research objective and Types of research-fundamental/ applied/ action/ quantitative/ qualitative for skill development.

UNIT-II

Review of literatures: Primary source, Secondary source, Searching e- resources, using search engines, Searching data base and writing literature review helping in skill development.

UNIT-III

Methods of Research: Concept and formulation of hypothesis, Survey method, Experimental method (variable, designs), Historical methods and Content analysis for skill development.

UNIT-IV

Sampling of Data: Concept of sampling, Probability sampling techniques useful for skill development, Non probability sampling techniques and sampling error.

UNIT-V

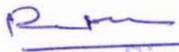
Collection of Data: Primary data generation, Secondary data collection, Methods of data generation/ collection – by experiments helping in skill development, questionnaire, interview schedule, focus groups etc.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Understand basic concept of research methods, including key terms, classifications and systematic applications to the research data and design of a research project for skill development.
CO2	Analyze past literature for in-depth understanding on how the identified problem could be addressed, what are the different theories, design, methods have been followed and developed skills on a conceptual framework in the existing literature.
CO3	Generate ideas and identify core problem and distil into a research based on the scope and objectives of the study, and/or relate the problem with major theory, concepts for skill development.
CO4	Evident, analyze, and support the association of variables attributed in the conceptual model with theory and outcomes of the relevant published articles in

Note: Adhere to the latest editions of the Suggested Readings

51


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	national/ international journal, and evaluate with primary tools and other approaches that may be employed to interpret the results of the current study will helpful in skill development.
CO5	To develop an understanding of various research designs and techniques for skill development.

PO-CO Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	2	1	1
CO2	3	1	1
CO3	3	1	1
CO4	3	1	1
CO5	3	1	1

SUGGESTED READINGS:

- Business Research Methods – Donald Cooper & Pamela Schindler, TMGH, 9th edition
- Business Research Methods – Alan Bryman & Emma Bell, Oxford University Press.
- Research Methodology – C.R.Kothari
- Select references from the Internet

WEBSITE RESOURCES:

- <http://www.odi.org.uk/publications/220-bridgingresearch-policy-rapid-approach>
- <http://www.rdg.ac.uk/ssc/publications/publications.html>
- <http://www.stats.gla.ac.uk/steps/glossary/alphabet.html>
- <http://www.socialresearchmethods.net/>

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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)	Branch	Computer Science & Engineering (CSE)			
Semester	8	Version				
Effective from Academic Year	2021-2022	Effective for the Batch Admitted in	2021			
Subject Code	ECS801 (2)	Subject Name	PARALLEL COMPUTIN			
Teaching Scheme			Examination Scheme(Marks)			
Per Week	Lecture	Practical(Lab)	Total	TS/PS	TE/PE	Total
	L T	P TW				
Credit	3 1	0 -	4	Theory	30	70
Hours	3 1	0 -	4	Practical	-	--

COURSE OBJECTIVE

1. System be proficient at programming multiple parallel machines in more than one special programming language or programming
2. Detailed knowledge of computing models & Parallelism approaches for skill development..
3. To understand lanes governing performance measurement & Metrics
4. To develop understanding of Parallel Processor & Processor organization.
5. Recall the history of parallel systems, principles of parallel algorithms and describe the developments in the field of parallel computing.

Syllabus

- UNIT I**
Introduction of parallel computing, Model of parallel computing: Synchronous - vector/array, SIMD, Systolic; Asynchronous - MIMD, reduction model are helpful in for skill development.
Flynn's classifications, Handler's classifications, Kung's taxonomy, SPMD.
- UNIT II**
Abstract parallel computing models: Combinational circuits, Sorting network, PRAM models, Interconnection RAMs. Parallelism approaches - data parallelism, control parallelism for skill development.
- UNIT III**
Performance Measurement: Laws governing performance measurements. For skill development study of : Metrics - speedups, efficiency, utilization, communication overheads, single/multiple program performances, bench marks.
- UNIT IV**
Parallel Processors: Taxonomy and topology - shared memory multiprocessors, distributed memory networks.Processor organization - Static and dynamic interconnections. Embeddings and simulations for skill improvement
- UNIT V**
Parallel Programming: Shared memory programming, distributed memory programming, object oriented programming, data parallel programming, functional and dataflow programming for skill escalation and get employability
Scheduling and Parallelization: Parallel programs scheduling, Loop scheduling, Parallelization of sequential programs, Supporting environments for parallel computing.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	To introduce the major concepts and ideas in parallel computing and its applications in global environment for skill development.
CO2	To discuss various models of parallelism (e.g., shared versus distributed memory models) and their strengths and limitations for student's skill development.
CO3	To give descriptive idea of performance Measurement for skill improvement.
CO4	To make understand Parallel Processors & Processor organization for skill

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	development.
CO5	Provide basic knowledge of Parallel Programming, Scheduling and Parallelization for skill escalation and get employability in this field.

PO-CO Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	1	1	1
CO2	3	1	1
CO3	2	1	1
CO4	1	1	1
CO5	3	2	1

SUGGESTED READINGS:

- M. J. Quinn.Parallel Computing: Theory and Practice, McGraw Hill.
- T. G. Lewis and H. El-Rewini. Introduction to Parallel Computing, Prentice Hall.
- Vipin Kumar, Ananth Grama, Anshul Gupta, George Karpis "Introduction to Parallel Computing: Design and Analysis of Parallel Algorithms", IEEE Distributed System

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in
- <https://www.geeksforgeeks.org/>


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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)			Branch	Computer Science & Engineering (CSE)				
Semester	8			Version					
Effective from Academic Year	2021-2022			Effective for the Batch Admitted in	2021				
Subject Code	ECS801 (3)			Subject Name	MANAGEMENT AND ENTREPRENEURSHIP FOR IT INDUSTRY				
Teaching Scheme				Examination Scheme(Marks)					
Per Week	Lecture		Practical(Lab)		Total	TS/PS	TE/PE	Total	
	L	T	P	TW					
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-

COURSE OBJECTIVE

Explain the principles of management, organization and entrepreneur. Discuss on planning, staffing, ERP and their importance for skill development. Infer the importance of intellectual property rights and relate the institutional support for employability.

Syllabus

- UNIT-I**
Introduction - Meaning, nature and characteristics of management, scope and Functional areas of management, goals of management, levels of management, brief overview of evolution of management theories.. Planning- Nature, importance, types of plans, steps in planning helping in skill development, Organizing- nature and purpose, types of Organization, Staffing- meaning, process of recruitment and selection
- UNIT-II**
Directing and controlling- meaning and nature of directing, leadership styles, motivation Theories, Communication- Meaning and importance, Coordination- meaning and importance, Controlling- meaning, steps in controlling, methods of establishing control useful for in skill development.
- UNIT-III**
Entrepreneur – meaning of entrepreneur, characteristics of entrepreneurs, classification and types of entrepreneurs, various stages in entrepreneurial process, role of entrepreneurs in economic development, entrepreneurship in India and barriers to entrepreneurship helps to aware about entrepreneurship. Identification of business opportunities, market feasibility study, technical feasibility study, financial feasibility study and social feasibility study.
- UNIT-IV**
Preparation of project and ERP - meaning of project, project identification, project selection, project report, need and significance of project report, contents, formulation, guidelines by planning commission for project report. **Enterprise Resource Planning: Meaning and Importance**- ERP and Functional areas of Management – Marketing / Sales- Supply Chain Management – Finance and Accounting – Human Resources – Types of reports and methods of report generation useful for employability.
- UNIT-V**
Micro and Small Enterprises: Definition of micro and small enterprises, characteristics and advantages of micro and small enterprises, steps in establishing micro and small enterprises, Government of India industrial policy 2007 on micro and small enterprises, case study (Microsoft), Case study(Captain G R Gopinath),case study (N R Narayana Murthy & Infosys) benefited for in skill development, **Institutional support:** MSME-DI, NSIC, SIDBI, KIADB, KSSIDC, TECSOK, KSFC, DIC and District level single window agency, **Introduction to IPR.**

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Define management, organization, entrepreneur, planning, staffing, ERP for skill development.
CO2	Outline their importance in entrepreneurship in national interest for skill development.
CO3	Utilize the resources available effectively through ERP for entrepreneurship development.
CO4	Make use of IPRs and institutional support in entrepreneurship and employability.

CO5	Define many case studies for skill development.
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PO-CO Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	2	1	1
CO2	3	1	1
CO3	2	1	2
CO4	1	2	2
CO5	3	1	1

SUGGESTED READINGS:

- Principles of Management -P. C. Tripathi, P. N. Reddy: Tata McGraw Hill, 4th / 6th Edition, 2010.
- Dynamics of Entrepreneurial Development & Management -Vasant Desai Himalaya Publishing House.
- Entrepreneurship Development -Small Business Enterprises -Poornima M Charantimath Pearson Education – 2006.
- Management and Entrepreneurship - Kanishka Bedi- Oxford University Press-2021

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in
- <https://www.geeksforgeeks.org/>

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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)			Branch	Computer Science & Engineering (CSE)		
Semester	8			Version			
Effective from Academic Year	2021-2022			Effective for the Batch Admitted in	2021		
Subject Code	ECS801 (4)			Subject Name	SOFTWARE ARCHITECTURE AND DESIGN PATTERNS		
Teaching Scheme				Examination Scheme(Marks)			
Per Week	Lecture		Practical(Lab)				Total
	L	T	P	TW		TS/PS	TE/PE
Credit	3	1	0	-	4	Theory	30
Hours	3	1	0	-	4	Practical	70
						-	--
							100
							-

COURSE OBJECTIVE

The primary goal of the software architecture is to identify requirements that affect the structure of the application which is helpful for employability as well as entrepreneurship development. A well-laid architecture reduces the business risks associated with building a technical solution and builds a bridge between business and technical requirements.

Syllabus

- UNIT I**
Introduction: what is a design pattern? Describing design patterns, the catalog of design pattern, organizing the catalog, how design patterns solve design problems, how to select a design pattern, how to use a design pattern. What is object-oriented development? . key concepts of object oriented design other related concepts, benefits and drawbacks of the paradigm for skill development.
- UNIT II**
Analysis a System: overview of the analysis phase, stage 1: gathering the requirements functional requirements specification, defining conceptual classes and relationships, using the knowledge of the domain. Design and Implementation, discussions and further reading for skill development.
- UNIT III**
Design Pattern Catalog: Structural patterns, Adapter, bridge, composite, decorator, facade, flyweight, proxy helping in skill development.
- UNIT IV**
Interactive systems and the MVC architecture: Introduction . The MVC architectural pattern, analyzing a simple drawing program . designing the system, designing of the subsystems, getting into implementation . implementing undo operation . drawing incomplete items, adding a new feature , pattern based Solutions useful in entrepreneurship development.
- UNIT V**
Designing with Distributed Objects: Client server system, java remote method invocation, implementing an object oriented system on the web (discussions and further reading) a note on input and output, selection statements, loops arrays for skill development.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Design and implement codes with higher performance and lower complexity for skill development.
CO2	Demonstrate global coding standards needed to keep code flexible which helpful for skill development
CO3	Illustrate design principles and be able to assess the quality of a design with respect to these principle for skill development
CO4	Explain principles in the design of object oriented systems helping in entrepreneurship development.
CO5	Understand a range of design patterns for skill development and employability.

PO-CO Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)



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

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	3	1	1
CO2	3	1	1
CO3	2	1	1
CO4	2	1	2
CO5	2	2	1

SUGGESTED READINGS:

- Object-oriented analysis, design and implementation, brahma dathan, sarnathrammath, universities press.2013
- Design patterns, erich gamma, Richard helan, Ralph johman , john vlissides, PEARSON Publication.2013.
- Frank Bachmann, Regine Meunier, Hans Rohnert "Pattern Oriented Software Architecture" –Volume 1, 1996.
- William J Brown et al., "Anti-Patterns: Refactoring Software, Architectures and Projects in Crisis", John Wiley, 1998.

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in

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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)			Branch	Computer Science & Engineering (CSE)			
Semester	8			Version				
Effective from Academic Year	2021-2022			Effective for the Batch Admitted in	2021			
Subject Code	ECS801 (5)			Subject Name	INTERNET OF THINGS TECHNOLOGY			
Teaching Scheme				Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total	TS/PS	TE/PE	Total
	L	T	P	TW				
Credit	3	1	0	-	4	Theory	30	70
Hours	3	1	0	-	4	Practical	-	--

COURSE OBJECTIVE

The goal behind the Internet of things is to have devices that self report in real-time, improving efficiency and bringing important information to the surface more quickly than a system depending on human intervention for skill development as well as employability.

Syllabus

UNIT I

What is IoT, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack, are helping in skill development.

UNIT II

Smart Objects: The "Things" in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies useful for skill development.

UNIT III

IP as the IoT Network Layer, The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT Application Transport Methods for skill development..

UNIT IV

Data and Analytics for IoT, An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of OT Security, Common Challenges in OT Security, How II and OI Security Practices and Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment for entrepreneurship development and employability.

UNIT V

IoT Physical Devices and Endpoints - Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming, IoT Physical Devices and Endpoints - RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Using Pi, DS18B20 Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from DS18B20 sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture, Smart City Security Architecture, Smart City Use-Case Examples helping in employability.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Interpret the impact and challenges posed by IoT networks leading to new architectural models for skill development.
CO2	Compare and contrast the deployment of smart objects and the technologies to connect them to global network for skill development.
CO3	Appraise the role of IoT protocols for efficient network communication for entrepreneurship development and employability
CO4	Elaborate the need for Data Analytics and Security in IoT for entrepreneurship development and employability.

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CO5	Illustrate different sensor technologies for sensing real world entities and identify them which is helpful for employability.
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PO-CO Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

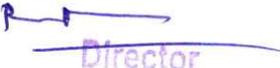
	Skill Development	Employability	Entrepreneurship Development
CO1	2	1	1
CO2	3	1	1
CO3	2	1	1
CO4	1	1	2
CO5	3	2	1

SUGGESTED READINGS:

- Integrated Electronics: Analog and Digital Circuits and Systems, 2/e. Jacob Millman, Christos Halkias and Chethan D. Parikh. Tata McGraw-Hill Education, India, 2010.
- Digital Design, 5/e, Morris Mano and Michael D. Cilette, Pearson, 2011.
- Electronic Devices and Circuits, Jimmy J Cathey, Schaum's outline series, 1988.
- Digital Principles, 3/e, Roger L. Tokheim, Schaum's outline series, 1994

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in


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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)			Branch	Computer Science & Engineering (CSE)			
Semester	8			Version				
Effective from Academic Year	2021-2022			Effective for the Batch Admitted in	2021			
Subject Code	ECS802 (1)			Subject Name	WIRELESS & SENSOR NETWORKS			
Teaching Scheme				Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total	TS/PS	TE/PE	Total
	L	T	P	TW				
Credit	3	1	0	-	4	Theory	30	70
Hours	3	1	0	-	4	Practical	-	--

COURSE OBJECTIVE

1. Impart the trends in emerging field of wireless ad hoc and sensor networking.
2. Focus on layered communication modeling, such as the media access control and network layer.
3. Learn the need of energy management systems for skill improvement.
4. Address quality of service issues and network reliability for transmission of real-time information.
5. Learn the various routing protocols of ad hoc and sensor networks for skill development.

Syllabus

UNIT 1

Understanding wireless network principles: Wireless channel, propagation, multiple access and modulation, Wireless technologies and architectures. Significance of sensor networks in the wide subject of wireless networking for skill development: Introducing sensor node: Hardware and software components of a node, Limitations of a sensor node, Characteristics of a sensor node, Example sensor nodes

UNIT 2

Sensor network architecture and design principles: Sensor network scenarios, Optimization goals and figures of merit, Designing sensor Networks. Service interfaces and gateway concept; WSN Programming and Medium access control (MAC): WSN Programming Demo, Fundamentals of MAC protocols. Different types of MAC protocols for skill development.

UNIT 3

Link Layer protocols and Addressing: Fundamentals of Link Layer, Error Control, Framing & Link Management, Addressing and naming in sensor networks; Time synchronization and topology control: Time synchronization, Topology Control for skill improvement.

UNIT 4

ID-Centric Routing protocols and WSN Simulation, Gossiping and energy efficient Unicast, Broadcast, Multicast and Geographic routing. Sensor Network Simulation Tutorial; Data Centric and Content-based networking: Introduction and data-centric routing, improves skills Data aggregation.

UNIT 5

Transport layer and quality of service: Reliable Delivery, Coverage and Deployment, Congestion and rate control, QoS; Sensor network security: Network security basics, Wireless network security, Security for sensor networks : Advanced topics and potential research areas about sensor networks.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Understand and explain global wireless sensor node architectures for skill improvement.
CO2	Be able to carry out simple analysis and planning of WSNs which is helping in skill development.
CO3	Student improves skills by express awareness of MAC protocols developed for WSN.


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61


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CO4	Student improves skills by study of routing protocols developed for WSN.
CO5	Understand and explain mobile data-centric networking principles for employability.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	2	1	1
CO2	3	1	1
CO3	2	1	1
CO4	2	1	1
CO5	1	2	1

SUGGESTED READINGS:

- Handbook of Sensor Networks: Algorithms and Architectures, I. Stojmenovic, John Wiley & Sons, 2005.
- Ad Hoc & Sensor Networks: Theory and Applications, C. De Moraes Condeiro and D. Agrawal, World Scientific Pub. 2006.
- Networking Wireless Sensors, B. Krishnamachari, Cambridge University Press, 2006.
- Algorithms for Sensor and Ad Hoc Networks, Ed. Wagner, D., Wattenhofer, R., Springer Verlag, 2007.
- Wireless Sensor Networks: An Information Processing Approach, Feng Zhao and Leonidas Guibas, Morgan Kaufman, 2004.
- Mobile, Wireless, and Sensor Networks: Technology, Applications and Future Directions, Rajeev Shorey, A. Ananda, Mun Choon Chan, and Wei Tsang Ooi (Eds), IEEE Press, 2006.
- Handbook of Sensor Networks: Compact Wireless and Wired Sensing Systems, Mohammad Ilyas, Imad Mahgoub, CRC Press, 2004.
- Protocols and Architectures for Wireless Sensor Networks, by Holger Karl and Andreas Willig Publisher: John Wiley & Sons (May 31, 2005) ISBN: 0470095105

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in
- <https://www.geeksforgeeks.org/>

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Note: Adhere to the latest editions of the Suggested Readings

Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)	Branch	Computer Science & Engineering (CSE)						
Semester	8	Version							
Effective from Academic Year	2021-2022	Effective for the Batch Admitted in	2021						
Subject Code	ECS802 (2)	Subject Name	HUMAN COMPUTER INTERACTION						
Teaching Scheme				Examination Scheme(Marks)					
Per Week	Lecture	Practical(La b)	Total	TS/PS	TE/PE	Total			
	L	T	P	TW					
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-

COURSE OBJECTIVE

1. Students will learn the basic physiological, perceptual, and cognitive components of human learning and memory.
2. Students will gain theoretical knowledge of and practical experience in the fundamental aspects of designing and implementing user interfaces.
3. Students will learn to analyze interaction problems from a technical, cognitive, and functional perspective for skill development.
4. Students will develop an awareness of the range of general human-computer interaction issues that must be considered when designing information systems for skill development.

Syllabus

- UNIT I**
Introduction : Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design. The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system helping in skill development. Characteristics. Web user – Interface popularity, characteristics- Principles of user interface
- UNIT II**
Design process: Human interaction with computers for skill improvement, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions. III Screen Designing : Design goals – Scr
- UNIT III**
Screen Designing : Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design useful for employability
- UNIT IV**
Windows : New and Navigation schemes selection of window, selection of devices based and screen based controls. Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors are benefited in skill development.
- UNIT V**
Software tools : Specification methods, interface – Building Tools. Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers helping in skill development and employability.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Understand fundamental design and evaluation methodologies of human computer interaction for skill development.

Note: Adhere to the latest editions of the Suggested Readings

CO2	Demonstrate knowledge of human computer interaction design concepts and related methodologies used for skill development.
CO3	Apply global theories and concepts associated with effective work design to real-world application helps in employability.
CO4	Achieve adequate perspectives of windows applications for skill development.
CO5	Student can grow up their skills for employability through the recent research trends related to speech recognition digitization and generation – image and video displays etc.

PO-CO Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	1	1	1
CO2	2	1	1
CO3	2	2	1
CO4	3	1	1
CO5	2	3	1

SUGGESTED READINGS:

- Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale Human Computer Interaction. 3rd Edition Prentice Hall, 2004
- Jonathan Lazar Jinjuan Heidi Feng, Harry Hochheiser, Research Methods in HumanComputer Interaction, Wiley, 2010.
- Ben Shneiderman and Catherine Plaisant Designing the User Interface: Strategies for Effective Human-Computer Interaction (5th Edition, pp. 672, ISBN 0- 321-53735-1, March 2009), Reading, MA: Addison-Wesley Publishing Co.

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in
- <https://www.geeksforgeeks.org/>



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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)	Branch	Computer Science & Engineering (CSE)			
Semester	8	Version				
Effective from Academic Year		2021-2022	Effective for the Batch Admitted in 2021			
Subject Code		ECS802 (3)	Subject Name	CLOUD COMPUTING AND ITS APPLICATIONS		
Teaching Scheme			Examination Scheme(Marks)			
Per Week	Lecture	Practical(Lab)	Total	TS/PS	TE/PE	Total
	L	T	P	TW		
Credit	3	1	0	-	4	Theory 30 70 100
Hours	3	1	0	-	4	Practical - -- -

COURSE OBJECTIVE

Upon successful completion of this course, you will be able to:

1. Understand what cloud computing is and why it is important.
2. Get a picture of the economics of cloud computing.
3. Describe Big Data and the challenges of working with it for skill development.
4. Learn about many fundamental technologies that enable cloud computing, such as software defined architectures, virtualization, and containers for employability.

Syllabus

UNIT I:
Introduction ,Cloud Computing at a Glance. The Vision of Cloud Computing. Defining a Cloud. A Closer Look. Cloud Computing Reference Model, Characteristics and Benefits. Challenges Ahead. Historical Developments. Distributed Systems. Virtualization. Web 2.0. Service-Oriented Computing. Utility-Oriented Computing. Building Cloud Computing Environments. Application Development Infrastructure and System Development. Computing Platforms and Technologies. Amazon Web Services (AWS). Google App Engine. Microsoft Azure. Hadoop. Force.com and Salesforce.com, Manjrasoft Aneka for skill development
Virtualization, Introduction, Characteristics of Virtualized, Environments Taxonomy of Virtualization Techniques. Execution Virtualization. Other Types of Virtualization, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples Xen: Paravirtualization. VMware: Full Virtualization, Microsoft Hyper-V

UNIT II:
Cloud Computing Architecture, Introduction, Cloud Reference Model. Architecture. Infrastructure / Hardware as a Service. Platform as a Service. Software as a Service, Types of Clouds. Public Clouds. Private Clouds. Hybrid Clouds. Community Clouds. Economics of the Cloud. Open Challenges, Cloud Definition, Cloud Interoperability and Standards Scalability and Fault Tolerance Security. Trust. and Privacy Organizational Aspects for skill development.
Aneka: Cloud Application Platform, Framework Overview, Anatomy of the Aneka Container, From the Ground Up: Platform Abstraction Layer. Fabric Services, foundation Services, Application Services, Building Aneka Clouds, Infrastructure Organization, Logical Organization, Private Cloud Deployment Mode, Public Cloud Deployment Mode, Hybrid Cloud Deployment Mode, Cloud Programming and Management, Aneka SDK, Management Tools

UNIT III:
Concurrent Computing: Thread Programming. Introducing Parallelism for Single Machine Computation. Programming Applications with Threads. What is a Thread?, Thread APIs, Techniques for Parallel Computation with Threads. Multithreading with Aneka. Introducing the Thread Programming Model, Aneka Thread vs. Common Threads, Programming Applications with Aneka Threads. Aneka Threads Application Model for skill development, Domain Decomposition: Matrix Multiplication, Functional Decomposition: Sine, Cosine, and Tangent.
High-Throughput Computing: Task Programming, Task Computing, Characterizing a Task, Computing Categories, Frameworks for Task Computing, Task-based Application Models, Embarrassingly Parallel Applications, Parameter Sweep Applications, MPI Applications, Workflow Applications with Task Dependencies, Aneka Task-Based Programming, Task Programming Model. Developing Applications with the Task Model, Developing Parameter Sweep Application, Managing Workflows.

UNIT IV:
Data Intensive Computing: Map-Reduce Programming. What is Data-Intensive Computing?. Characterizing Data-Intensive Computations. Challenges Ahead, Historical Perspective, Technologies for Data-Intensive Computing. Storage Systems, Programming Platforms, Aneka MapReduce Programming, Introducing the MapReduce Programming Model for skill development. Example Application

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UNIT V:

Cloud Platforms in Industry, Amazon Web Services, Compute Services, Storage Services, Communication Services, Additional Services, Google AppEngine, Architecture and Core Concepts, Application Life-Cycle, Cost Model, Observations, Microsoft Azure, Azure Core Concepts, SQL Azure, Windows Azure Platform Appliance.

Cloud Applications Scientific Applications, Healthcare: ECG Analysis in the Cloud, Biology: Protein Structure Prediction, Biology: Gene Expression Data Analysis for Cancer Diagnosis, Geoscience: Satellite Image Processing, Business and Consumer Applications for employability, CRM and ERP, Productivity, Social Networking, Media Applications, Multiplayer Online Gaming.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Understand basic concept of cloud computing for skill development.
CO2	Design flexible architecture and scalable infrastructures which helps in skill improvement as well as in employability.
CO3	Increased availability of high-performance global applications to small/ medium-sized businesses to improve skills
CO4	Demonstrate various Intensive computing methods for skill development
CO5	Understand market based services and applications which is helpful for student to enhance skills of cloud computing.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	3	1	1
CO2	2	2	1
CO3	2	1	1
CO4	3	1	1
CO5	3	1	1

SUGGESTED READINGS:

- Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi Mastering Cloud. Computing McGraw Hill Education
- Dan C. Marinescu, Cloud Computing Theory and Practice, Morgan Kaufmann, Elsevier 2013

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in
- <https://www.geeksforgeeks.org/>


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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)				Branch	Computer Science & Engineering (CSE)				
Semester	8				Version					
Effective from Academic Year				2021-2022		Effective for the Batch Admitted in			2021	
Subject Code				ECS802 (4)		Subject Name	MULTI-CORE ARCHITECTURE AND PROGRAMMING			
Teaching Scheme						Examination Scheme(Marks)				
Per Week	Lecture		Practical(Lab)		Total		TS/PS	TE/PE	Total	
	L	T	P	TW						
Credit	3	1	0	-	4	Theory	30	70	100	
Hours	3	1	0	-	4	Practical	-	--	-	

COURSE OBJECTIVE

1. To understand the need for multi-core processors, and their architecture.
2. To understand the challenges in parallel and multi-threaded programming for skill development.
3. To learn about the various parallel programming paradigms useful for skill development.
4. To develop multi-core programs and design parallel solutions.

Syllabus

UNIT I

Introduction to Multi-core Architecture Motivation for Concurrency in software, Parallel Computing Platforms. Parallel Computing in Microprocessors, Differentiating Multi-core Architectures from Hyper- Threading Technology, Multi-threading on Single-Core versus Multi-Core Platforms Understanding Performance, Amdahl's Law, Growing Returns: Gustafson's Law. **System Overview of Threading** : Defining Threads, System View of Threads, Threading above the Operating System for skill development, Threads inside the OS, Threads inside the Hardware, What Happens When a Thread Is Created, Application Programming Models and Threading, Virtual Environment: VMs and Platforms, Runtime Virtualization, System Virtualization.

UNIT II

Fundamental Concepts of Parallel Programming :Designing for Threads, Task Decomposition, Data Decomposition, Data Flow Decomposition, Implications of Different Decompositions, Challenges You'll Face, Parallel Programming Patterns, A Motivating Problem: Error Diffusion, Analysis of the Error Diffusion Algorithm, An Alternate Approach: Parallel Error Diffusion, Other Alternatives. **Threading and Parallel Programming Constructs**: Synchronization, Critical Sections, Deadlock, Synchronization Primitives, Semaphores, Locks, Condition Variables, Messages useful for skill development, Flow Control- based Concepts, Fence, Barrier, Implementation-dependent Threading Features

UNIT III

Threading APIs :Threading APIs for Microsoft Windows, Win32/MFC Thread APIs, Threading APIs for Microsoft .NET Framework, Creating Threads, Managing Threads, Thread Pools, Thread Synchronization, POSIX Threads, Creating Threads, Managing Threads, Thread Synchronization, Signaling, helping in skill development and employability, Compilation and Linking.

UNIT IV

OpenMP: A Portable Solution for Threading : Challenges in Threading a Loop, Loop-carried Dependence, Data-race Conditions, Managing Shared and Private Data, Loop Scheduling and Portioning, Effective Use of Reductions, Minimizing Threading Overhead, Work-sharing Sections, Performance-oriented Programming, Using Barrier and No wait, Interleaving Single-thread and Multi- thread Execution, Data Copy-in and Copy-out, Protecting Updates of Shared Variables, Intel Task queuing Extension to OpenMP, OpenMP Library Functions helps in skill development, OpenMP Environment Variables, Compilation, Debugging, performance.

UNIT V

Solutions to Common Parallel Programming Problems : Too Many Threads, Data Races, Deadlocks, and Live Locks, Deadlock, Heavily Contended Locks, Priority Inversion, Solutions for Heavily Contended Locks, Non-blocking Algorithms, ABA Problem, Cache Line Ping-ponging, Memory Reclamation Problem, Recommendations, Thread-safe Functions and Libraries, Memory Issues, Bandwidth, Working in the Cache, Memory Contention, Cache-related Issues, False Sharing, Memory Consistency, Current IA-32 Architecture helps for employability, Itanium Architecture, High-level Languages, Avoiding Pipeline Stalls on IA-32,Data Organization for High Performance.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Explain the concepts of high-performance computer architecture and the impact of

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	concepts on expected performance for skill development.
CO2	Analyze a problem to define the requirements to target high-performance computer in parallel programming for skill development.
CO3	Develop and evaluate techniques for the creation of efficient multi-core CPU and GPU programs by applying high performance programming principles which is helpful for employability and improve technical skills.
CO4	Evaluate the performance and identify strengths and weaknesses of potential solutions targeting high-performance architecture for skill development.
CO5	Understand some global problem related to parallel programming which is helpful for student to enhance skills.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	1	1	1
CO2	2	1	1
CO3	3	2	1
CO4	3	1	1
CO5	2	1	1

SUGGESTED READINGS:

- Multicore Programming , Increased Performance through Software Multi-threading by Shameem Akhter and Jason Roberts . Intel Press . 2006

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- onlinecourses.nptel.ac.in


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Department of Computer Science & Engineering

Programme	Bachelor of Technology(B.Tech)	Branch	Computer Science & Engineering (CSE)		
Semester	8	Version			
Effective from Academic Year		2021-2022	Effective for the Batch Admitted in		2021
Subject Code		ECS802(5)	Subject Name	COMPUTER VISION AND ROBOTICS	
Teaching Scheme			Examination Scheme(Marks)		
Per Week	Lecture	Practical(Lab)		Total	
	L	T	P	TW	
Credit	3	1	0	-	4
Hours	3	1	0	-	4
					Theory
					Practical
					30
					70
					100
					-
					--
					-

COURSE OBJECTIVE

The goal of Computer Vision and Robotics to provide computers with human-like perception capabilities so that: – they can sense the environment – understand the sensed data – take appropriate actions, and – learn from this experience in order to enhance future performance which is helpful for employment as well as in skill development of the student.

Syllabus

UNIT I:
CAMERAS: Pinhole Cameras, **Radiometry – Measuring Light:** Light in Space, Light Surfaces, Important Special Cases, **Sources, Shadows, And Shading:** Qualitative Radiometry, Sources and Their Effects, Local Shading Models, Application: Photometric Stereo, Interreflections, Global Shading Models, **Color:** The Physics of Color, Human Color Perception, Representing Color, A Model for Image Color, Surface Color from Image Color helping in skill development.

UNIT II
Linear Filters: Linear Filters and Convolution, Shift Invariant Linear Systems, Spatial Frequency and Fourier Transforms, Sampling and Aliasing, Filters as Templates, **Edge Detection:** Noise, Estimating Derivatives, Detecting Edges, **Texture:** Representing Texture, Analysis (and Synthesis) Using Oriented Pyramids, Application: Synthesis by Sampling Local Models, Shape from Texture, helping in skill development.

UNIT III
The Geometry of Multiple Views: Two Views, **Stereopsis:** Reconstruction, Human Stereopsis, Binocular Fusion, Using More Cameras, **Segmentation by Clustering:** What Is Segmentation?, Human Vision: Grouping and Gestalt, Applications: Shot Boundary Detection and Background Subtraction, Image Segmentation by Clustering Pixels, Segmentation by Graph-Theoretic Clustering, for skill development.

UNIT IV
Segmentation by Fitting a Model: The Hough Transform, Fitting Lines, Fitting Curves, Fitting as a Probabilistic Inference Problem, Robustness, **Segmentation and Fitting Using Probabilistic Methods:** Missing Data Problems, Fitting, and Segmentation, The EM Algorithm in Practice, **Tracking With Linear Dynamic Models:** Tracking as an Abstract Inference Problem, Linear Dynamic Models, Kalman Filtering, Data Association, Applications and Examples helps in employability.

UNIT V
Geometric Camera Models: Elements of Analytical Euclidean Geometry, Camera Parameters and the Perspective Projection, Affine Cameras and Affine Projection Equations, **Geometric Camera Calibration:** Least-Squares Parameter Estimation, A Linear Approach to Camera Calibration, Taking Radial Distortion into Account, Analytical Photogrammetry, An Application: Mobile Robot Localization, **Model- Based Vision:** Initial Assumptions, Obtaining Hypotheses by Pose Consistency, Obtaining Hypotheses by pose Clustering, Obtaining Hypotheses Using Invariants, Verification, Application: Registration In Medical Imaging Systems, Curved Surfaces and Alignment useful for employability.

COURSE OUTCOME (CO)

	DESCRIPTION
CO1	Implement global image processing techniques required for computer vision for skill development
CO2	Understand and perform shape analysis for skill development.
CO3	Implement boundary tracking techniques for Segmentation by Clustering to improve skills.


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CO4	Apply chain codes and other region descriptors helps in employability .
CO5	Apply Hough Transform for line, circle, and ellipse detections will help in employment.

PO-CO Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping (Please write 3, 2, 1 wherever required)
 (Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	3	1	1
CO2	2	1	1
CO3	3	1	1
CO4	2	3	1
CO5	2	2	1

SUGGESTED READINGS:

- David A. Forsyth and Jean Ponce: Computer Vision – A Modern Approach, PHI Learning (Indian Edition), 2009.
- E. R. Davies: Computer and Machine Vision – Theory, Algorithms and Practicalities, Elsevier (Academic Press), 4th edition, 2013

WEBSITE RESOURCES

- swayam.gov.in
- onlinecourses.nptel.ac.in
- <https://www.geeksforgeeks.org/>



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Department of Computer Science & Engineering

Programme		Bachelor of Technology(B.Tech)			Branch	Computer Science & Engineering (CSE)			
Semester		8			Version				
Effective from Academic Year				2021-2022		Effective for the Batch Admitted in			2021
Subject Code			ECS-804			Subject Name	BIG DATA AND ANALYTICS		
Teaching Scheme					Examination Scheme(Marks)				
Per Week		Lecture		Practical(Lab)		Total			
	L	T	P	TW		TS/PS	TE/PE	Total	
Credit	3	1	0	-	4	Theory	30	70	100
Hours	3	1	0	-	4	Practical	-	--	-
COURSE OBJECTIVE									
<ol style="list-style-type: none"> 1. To provide an overview of an exciting growing field of big data analytics. 2. To introduce the tools required to manage and analyze big data like Hadoop, NoSql. Map Reduce for helping skill development. 3. To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability. 4. To enable students to have skills that will help them to solve complex real-world problems in for decision support. 									
Syllabus									
UNIT I:									
Types of Digital Data: Structured, Sources of structured data. Ease with Structured data. Semi-Structured, sources of semi-structured data. Unstructured, sources of unstructured data, Issues with terminology, Dealing with unstructured data. Place me in the basket									
Big data: Introduction to big data, need of big data, characteristics of big data, Challenges with big data, Big data stack for helping skill development.									
UNIT II:									
Big Data Analytics: Analytics 1.0, Analytics 2.0, Analytics 3.0, Traditional BI vs. Big Data Environment.									
Big Data technology Landscape: NoSQL Databases, NoSQL Vs. RDBMS, NewSQL, Hadoop, Hadoop 1.0 vs. Hadoop 2.0, Introduction to Data Science is multi-disciplinary and Data Scientist for helping skill development..									
UNIT III:									
Hadoop: Why not RDBMS, Distributed Computing Challenges, A Brief History of Hadoop, Hadoop Overview, Hadoop Components, High Level Architecture of Hadoop for helping skill development.									
Hadoop Distributed File System: HDFS Architecture, Daemons Related to HDFS, Working with HDFS Command, Special Features of Hadoop									
UNIT IV									
Processing Data With Hadoop: Introduction, How Map Reduce Works, Map Reduce Example, Word Count Example using Java									
NoSQL: Recap of NoSQL databases, MongoDB - CRUD, MongoDB- Arrays, Java Scripts for helping skill development and employability, Cursors, Map Reduce Programming, Aggregations									
Cassandra: CQLSH - CRUD, Counter, List, Set, Map, Tracing									
UNIT V									
Hive: Introduction to Hive, History of Hive and Recent Releases of Hive, Hive Features, Hive Integration and Work Flow, Hive Data UNITS, Hive Architecture, Hive Primitive Data Types and Collection Types, Hive File Formats									
Hive Query Language for helping skill development and employability. - Statements: DDL, DML, Hive Partitions, Bucketing, Views, Sub Query, Joins, Hive User Defined Function, Aggregations in Hive, Group by and Having, Serialization and Deserialization, Hive Analytic Functions.									
COURSE OUTCOME (CO)									
		DESCRIPTION							
CO1		Student must be Able to understand the building blocks of Big Data							

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CO2	For skill development student must be able to articulate the programming aspects of cloud computing(map Reduce etc)
CO3	Interpret business models and scientific computing paradigms, and apply software tools for big data analytics for helping skill development.
CO4	Achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc and have a trending way of employability.
CO5	Student can grow up their skills for employability through the recent global research trends related to Hadoop File System, Hive, MapReduce and Google File System etc.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped)

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

CO-Curriculum Enrichment Mapping

(Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapping and 1 for low mapped).

	Skill Development	Employability	Entrepreneurship Development
CO1	1	1	1
CO2	1	1	1
CO3	1	1	1
CO4	3	2	1
CO5	3	3	1

Suggested Readings

- Seema Acharya, Subhashini Chellapan, "Big Data and Analytics". Wiley
- Judith Hurwitz, Alan Nugent, Fern Halper, Marcia Kaufman, "Big data for dummies". Wiley
- Tom White, "Hadoop: The Definitive Guide". Orielly
- Chuck Lam, "Hadoop in action", Manning Publications
- Kirk Deroos, Paul C. Zikopoulos, Roman B. Melnyk, Bruce Brown, "Hadoop for dummies". Wiley

WEBSITE RESOURCES

- swayam.gov.in
- onlinecourses.nptel.ac.in
- <https://www.geeksforgeeks.org/>

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Note: Adhere to the latest editions of the Suggested Readings