UNIVERSITY OF JAMMU

NOTIFICATION
(23/Sept/Adp/ 82)

It is hereby notified for the information of all concerned that the Vice-Chancellor, in anticipation of the approval of the Competent Bodies, has been pleased to authorize the adoption of the revised Syllabi and Courses of Studies in **Bachelor of Technology (B.Tech.) in Computer Engineering/Computer Science & Engineering** for Semester III & IV under the **Credit Based System** as per the new **AICTE** Model Curriculum **(as given in the Annexure)** for the candidates of **Govt./Pvt. Engineering Colleges affiliated with the University of Jammu** for the Examinations to be held in the years indicated against each Semester as under:-

Branch	Semester	For the Examination to be held in the years
Computer/Computer	Semester-III	December 2023, 2024, 2025 and 2026
Science & Engineering	Semester-IV	May, 2024, 2025, 2026 and 2027

The Syllabi of the course are available on the University Website: www.jammuuniversity.ac.in.

Sd/-
DEAN ACADEMIC AFFAIRS

No. F.Acd/III/23/ 10012 —10021
Dated: 13/09/2023
Copy for information & necessary action to:-
1. Dean Faculty of Engineering
2. Principal, GCET/MBSCET/BCET/YCET/UIET
3. C.A to the Controller of Examinations
4. Joint/Assistant Registrar (Exams Prof./Eval Prof. Confidential)
5. Incharge University Website

Assistant Registrar (Academic)

B. Tech. Computer Engineering/Computer Science & Engineering
Examination to be held in the Year December 2023, 2024, 2025, 2026

B. Tech. 3rd Semester Computer Engineering/Computer Science & Engineering   **Contact Hours: 28**

Course Code	Course Type	Course Name	Load Allocation			Marks Distribution		Total	Credits	% Change
			L	T	P	Internal	External			
BST8302	Basic Science Course	Engineering Mathematics-III	2	1	0	50	100	150	3	100%
CST3301	Professional Core Course	Object Oriented Programming using C++	2	1	0	50	100	150	3	15%
CST3302	Professional Core Course	Digital System Design	2	1	0	50	100	150	3	100%
CST3303	Professional Core Course	Web Technology	2	1	0	50	100	150	3	100%
CST3304	Professional Core Course	Computer Organization and Architecture	2	1	0	50	100	150	3	100%
HMT7301	Humanities & Social Science Course	Entrepreneurship and Business Strategies	2	1	0	50	100	150	3	15%
CSP3311	Professional Core Course	Object Oriented Programming using C++ Lab	0	0	2	50	-	50	1	0%
CSP3312	Professional Core Course	Digital System Design Lab	0	0	2	50	-	50	1	100%
CSP3313	Professional Core Course	Web Technology Lab	0	0	2	50	-	50	1	100%
MOC3311	Massive Open Online Course	MooC	0	0	2	50	-	50	1	100%
NCC3301	Non-Credit Course	Cyber Ethics & Laws	2	0	0	Satisfactory/ Un-Satisfactory			Non-Credit	0%
TOTAL			14	6	8	500	600	1100	22	

B. Tech. Computer Engineering/Computer Science & Engineering
Examination to be held in the Year December 2023, 2024, 2025, 2026

BRANCH: COMPUTER ENGINEERING/COMPUTER SCIENCE & ENGINEERING
SEMESTER: 3rd
COURSE TITLE– ENGINEERING MATHEMATICS-III   CREDITS-3
COURSE CODE: BST8302
DURATION OF EXAM: 3 HOURS

L	T	P	MARKS	
			External	Internal
2	1	0	100	50

COURSE OUTCOMES:	
On completion of the course the students will be able to:	
CO1	Understand the concept of random variables.
CO2	To learn about the different distributions and their properties.
CO3	Understand the basic concepts of vector spaces
CO4	Learn linear transformations, rank-nullity theorem and method to find matrix associated with LTs

Detailed Syllabus

SECTION A
Unit-I INTRODUCTION TO PROBABILITY
Random variable and its types, probability mass function and probability density function, distribution function, Bernoulli distribution, Expectation and moment generating function of Discrete Random variables.
(12 hrs)

Unit-II: BINOMIAL AND POISSON DISTRIBUTION
Binomial distribution, its mean, variance and moment generating function, mode of Binomial Distribution, Poisson distribution, its mean, variance and moment generating function, Poisson distribution as a limiting case of Binomial distribution.
(11 hrs)

SECTION B

Unit-III: VECTOR SPACES
Vector Space, subspaces, linear independence and dependence of vectors, linear span, basis, dimension of a vector space
(12 hrs)

Unit-IV LINEAR TRANSFORMATIONS
Linear transformations, range and kernel of a linear map, rank and nullity, Inverse of a linear transformation, rank-nullity theorem, Matrix associated with a linear map
(11 hrs)

BOOKS RECOMMENDED:
1. J. L. Devore, "Probability and Statistics for Engineering & Sciences", Thomson and Duxbury, 6th Edition, Boston, 2004
2. S.C. Gupta and V.K. Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand and Sons, 11th Edition, Reprint, New Delhi, 2019
3. S. Lang, Introduction to linear Algebra, 2nd Edition, Springer 2005.
4. SS. Kumaresan, Linear Algebra- A Geometric Approach, Prentice Hall of India, 1999.

NOTE: There will be eight questions of 20 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.

B. Tech. Computer Engineering/Computer Science & Engineering
Examination to be held in the Year December 2023, 2024, 2025, 2026

BRANCH: COMPUTER ENGINEERING/COMPUTER SCIENCE & ENGINEERING/ I.T
SEMESTER: 3rd
COURSE NO: CST3301
COURSE TITLE: OBJECT ORIENTED PROGRAMMINGUSING C++
DURATION OF EXAM: 3 HOURS

CREDITS: 3

L	T	P	MARKS	
			External	Internal
2	1	0	100	50

COURSE OUTCOMES	
At the end of the course the student will be able to: -	
CO1	Understand the difference between Structured Programming approach and Object Oriented Programming approach.
CO2	Acquire knowledge in developing object oriented solutions to problems by learning the usage of Data Abstraction, Encapsulation, and Inheritance.
CO3	Design and Implement programs using Classes and Objects.
CO4	Understand the concept of Inheritance, Polymorphism, Operator Overloading and Function Overloading.
CO5	Apply the concepts of Object Oriented Programming in Templates & Exception Handling, File related operations and in real-time application development.

Detailed Syllabus
Section- A
Review of Pointers: Passing parameters, Array of Pointers, Character Pointers. **(2 hrs)**
Programming Techniques: Unstructured, Procedural, Modular Programming. Introduction to Objects,Object and Cohesion **(3 hrs)**
Overview of C++: Object Oriented programming, Encapsulation, Polymorphism, Inheritance, Console I/O, C++ Comments. **(3 hrs)**
Classes and Objects: Metaclass, Abstract class, Public and Private variables, Constructor and Destructor Functions, Constructors taking parameters, Object Pointers, In-Line Functions, Automatic Inlining, Friend Functions, This Pointer, New & Delete, Array of Objects. **(12 hrs)**
Section- B
Overloading: Function Overloading, Overloading Constructor Functions, Operator overloading, Overloading Binary and Unary Operators, Overloading Relational & Logical Operators. **(8 hrs)**
Inheritance: Using Protected Members, Multiple Inheritance, Virtual Base Classes, Introduction to Virtual Functions. **(6 hrs)**
Templates & Exception Handling: Use of Templates, Function Templates, Class Templates, Handling Exception.**(4 hrs)**
File Handling: I/O Basics, Ifstream, Ofstream, Fstream, Open(), Close(), EOF(), Binary I/O, Get(), Put(), Read(), Write(), Random Access, Seekg(), Seekp(), Tellg(), Tellp(). **(4 hrs)**

BOOKS RECOMMENDED:
1. Programming in C++   Balaguruswamy
2. C++ the Complete Reference   Herbert Schildt.
3. Mastering C++   K.R. Venugopal& T. Ravishankar& Raj Kumar.
4. Turbo ++   Robert Lafore.

NOTE: There will be eight questions of 20 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.

BRANCH: COMPUTER ENGINEERING/COMPUTER SCIENCE & ENGINEERING/IT
SEMESTER: 3rd CREDITS: 3
COURSE NO: CST3302
COURSE TITLE: DIGITAL SYSTEM DESIGN
DURATION OF EXAM: 3 HOURS

L	T	P	MARKS	
			External	Internal
2	1	0	100	50

COURSE OUTCOMES	
At the end of the course the student will be able to: -	
CO1	Examine the structure of number systems and perform the conversion among different number systems.
CO2	Illustrate reduction of logical expressions using boolean algebra, k-map and tabulation method and implement the functions using logic gates.
CO3	Realize combinational circuits for given application and also able to implement combinational logic circuits using programmable logic devices.
CO4	Design and analyze the synchronous and asynchronous sequential circuits using flip-flops.

Detailed Syllabus
Section-A

Introduction: Difference between Analog and Digital systems, Advantages and Disadvantages of digital system.   **(2 hrs)**

Number Systems: Introduction, Number systems: Decimal, Binary, Octal, Hexadecimal; Conversions; Representation of Signed Numbers, Sign magnitude, 1's complement, 2's complement, r's complement; Binary Arithmetic – addition, subtraction, multiplication and division, Binary codes: BCD, Excess-3 code, Gray code, Hamming code, Alphanumeric codes.   **(10 hrs)**

Minimization Techniques: Introduction, Boolean Algebra: Laws and Theorems, Demorgan's Theorem, Simplification of Boolean functions by Boolean algebra, K-map method and QuineMcClusky method in SOP and POS forms.   **(5 hrs)**

Logic gates : Introduction, Logic Gates: Basic gates, Universal gates, Derivation of other gates from universal gates, Half adder, Full adder, BCD adder, Half and Full subtractor, Binary multiplier, Dividers, ALU.   **(6 hrs)**

Section-B

Combinational Circuits: Code converters, Magnitude comparators, Parity Generators/checkers, Encoders, Priority encoder, Decoders, Multiplexers, Demultiplexer. Programmed logic devices–Read only memory, Programmable Read only Memories (PROM) and Programmable Logic Arrays (PLA), Programmable Array Logic (PAL).   **(10 hrs)**

Sequential Circuits: Introduction, Latches, Flip-flops: Types, their conversions and applications, Shift Registers: Serial/Parallel in/out, Bi-directional, Universal shift register, Counters: Synchronous, Asynchronous, Decade, Binary, Modulo-n, Shift register counters; Design of Synchronous sequential circuits, State Reduction and Assignment.   **(10 hrs)**

BOOKS RECOMMENDED:

1 Digital Design	Morris Mano
2 Digital Electronics	R.P Jain
3 Digital Logic Design	J.P. Hayes
4 Digital Electronics & Circuits Design	Thomas Mac calla
5 Digital Electronics	R.K Gour

NOTE: There will be eight questions of 20 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.

B. Tech. Computer Engineering/Computer Science & Engineering
Examination to be held in the Year December 2023, 2024, 2025, 2026

BRANCH: COMPUTER ENGINEERING/COMPUTER SCIENCE & ENGINEERING
SEMESTER: 3ʳᵈ   **CREDITS: 3**
COURSE NO: CST3303
COURSE TITLE: WEB TECHNOLOGY
DURATION OF EXAM: 3 HOURS

L	T	P	MARKS	
			External	**Internal**
2	1	0	100	50

COURSE OUTCOMES	
At the end of the course the student will be able to:-	
CO1	Describe the fundamentals of Web.
CO2	Adapt HTML and CSS syntax and semantics to build web pages.
CO3	Construct and visually format tables and forms using HTML and CSS.
CO4	Develop Client-Side Scripts using Java Script and Server-Side Scripts using PHP to generate and display the contents dynamically.
CO5	Appraise the principles of object-oriented development using PHP.

Detailed Syllabus
Section–A

Introduction to Web: Internet, WWW, Web Browsers and Web Servers, URLs, MIME, Websites, Web pages and Web applications, Website Design Principles, Web Programmers Toolbox.   **(4 hrs)**

HTML: What is HTML and where did it come from? HTML Syntax, Semantic Markup, Structure of HTML Documents, Quick Tour of HTML Elements, HTML5 Semantic Structure Elements, HTML Tables and Forms, Introducing Tables, Styling Tables, Introducing Forms, Form Control Elements, Table and Form Accessibility.   **(8 hrs)**

CSS: What is CSS, CSS Syntax using CSS, CSS Selectors, The Cascade: How Styles Interact, The Box Model, CSS Text Styling, CSS Layout, Positioning Elements, Floating Elements, Constructing Multicolumn Layouts, Approaches to CSS Layout.   **(8 hrs)**

Section–B

Client-Side Scripting: Client-Side Scripting, what is JavaScript and What can it do? JavaScript Design Principles, JavaScriptSyntax, variables, functions, conditions, loops and repetition, JavaScriptObjects, TheDocument Object Model(DOM), JavaScript Events, Forms and Validations,   **(10 hrs)**

Server-Side Scripting: What is Server-Side Development? A web Server's responsibilities, Introduction to Server-Side Development with PHP, Quick Tour of PHP, Program Control, Arrays, Functions and Forms. Classes and Objects in PHP, Object Oriented Design, Error Handling and Validation.   **(10 hrs)**

BOOKS RECOMMENDED:
1. "Fundamentals of Web Development", Randy Connolly, RicardoHoar, Pearson Education India
2. "Programming the World Wide Web", Robert Wsebesta, Pearson Education.

NOTE: There will be eight questions of 20 marks each, four from each section. Students are required to attempt five questions selecting atleast two questions from each section.

B. Tech. Computer Engineering/Computer Science & Engineering
Examination to be held in the Year December 2023, 2024, 2025, 2026

BRANCH: COMPUTER ENGINEERING/COMPUTER SCIENCE & ENGINEERING/I.T
SEMESTER: 3rd   CREDITS: 3
COURSE NO: CST3304
COURSE TITLE: COMPUTER ORGANIZATION AND ARCHITECTURE
DURATION OF EXAM: 3 HOURS

L	T	P	MARKS	
			External	Internal
2	1	0	100	50

COURSE OUTCOMES	
At the end of the course the student will be able to: -	
CO1	Understand the basic architecture and operational concepts in designing CPU.
CO2	Analyze various component units (ALU& CU) and Organization of CPU.
CO3	Analyze various memories management techniques like Virtual Memory and Cache Memory.
CO4	Apply the concepts of Parallel Processing in designing high performance processors
CO5	Analyze the working of different types of Processors

Detailed Syllabus
Section-A

Introduction: - Basic structure of Computers, stored programme concept, Basic Operational concepts, Functional Units, Machine language, concept of memory locations, addresses, addressing modes. **(6 hrs)**

Processing and execution: - Processing unit, execution of instructions, control step sequence, different types of instruction, ALU Design, Arithmetic Processes, Control Unit Design, Hardwired & Micro programmed Control Unit.   **(6 hrs)**

CPU:-General Register Organization, Stack Organization, Instruction format, RISC, CISC.   **(4 hrs)**

Input output organization: - Introduction to I/O Devices, I/O Systems–Programmed Control, Interrupt controlled & DMA Data Transfer Schemes, I/O Processors and their Architecture(IOP).   **(6 hrs)**

Section-B

Memory Management: - Memory organization, Characteristics of memory size, Access time, Read/write cycle time, Sequential and Random-access semiconductor memories, Virtual memory and its implementation, Cache memory and its types- Split and Unified, levels of Caches.   **(6 hrs)**

Parallel processing – Basic Concepts of Parallel Processing, Architectural Classification Schemes, Levels of Parallelism, Parallelism in Uniprocessor System, Introduction to Multiprocessor Systems, Its Classification, Multiprocessor vs Multicomputer Systems, Introduction to Pipelining, Classification of Pipelined processors, Pipelined Structures, Principles of Designing Pipelining Processors, Pipeline Hazards & Conflicts.   **(8 hrs)**

Vector and SIMD Array Processing –Introduction to Vector Processors, Array Processors, Their Architectural Classification and Characteristics, Multicore processors.   **(6 hrs)**

BOOKS RECOMMENDED:
1. Computer Architecture & Organization -   John P. Hayes (McGraw Hill)
2. Computer System Architecture -   Morris Mano
3. Computer System Architecture -   V.K. Jain 3.   Computer Organization   Carl V. Hamacher.
4. Digital Electronic -   Malvino Brown.

NOTE: There will be eight questions of 20 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.

BRANCH: E&C/ COMPUTER ENGINEERING/COMPUTER SCIENCE & ENGINEERING
SEMESTER: 3rd   **CREDITS: 3**
COURSE NO: HMT7301
COURSE TITLE: ENTREPRENEURSHIP & BUSINESS
STRATERGIES
DURATION OF EXAM: 3 HOURS

L	T	P	MARKS	
			External	Internal
2	1	0	100	50

Detailed Syllabus

COURSE OUTCOMES	
At the end of the course the student will be able to: -	
CO1	Understand in detail entrepreneurial skills and hence may opt entrepreneurship as a career option.
CO2	Understand women/social entrepreneur & legal forms of industrial ownership.
CO3	Apply proper knowledge about lean startups, business pitching, business strategy, project initiation, execution and implementation
CO4	Start their own SSI unit with adequate knowledge of schemes and policies for entrepreneurship development.

Section-A

Entrepreneurship: Definition and Types of entrepreneurs; Qualities of an entrepreneur; factors affecting entrepreneurship; Role of an entrepreneur in economic development; Difference between entrepreneur and manager; Barriers to entrepreneurship. **(7 hrs)**

New Generations of Entrepreneurship: Women Entrepreneur: Classification of Women Entrepreneur in India, Problems of Women Entrepreneur, steps for promoting women entrepreneurship; Social Entrepreneur: Problems and step for promoting social entrepreneurship. **(8 hrs)**

Legal Forms of Industrial Ownership: Sole Proprietorship, Partnership, Joint Stock Company (Features,Merits and Demerits); Introduction to business models **(6 hrs)**

Section-B

Lean Startups: Introduction to lean startups and Business pitching, Concept, nature and importance of Business Strategy, Five Generic competitive strategy. **(6hrs)**

Starting a New Project/ Venture: Scanning the environment, product development and selection, project report preparation, project resourcing, project planning and scheduling using networking techniques of PERT/CPM (concepts only). **(8 hrs)**

Small Scale Industries and policies for entrepreneurship development: Definition of small scale industries; objectives, Role of SSI in economic Development of India, SSI registration process; Schemes and Policies for entrepreneurship development. **(7 hrs)**

RECOMMENDED BOOKS:
1.Fundamentals of Entrepreneurship, H.Nandan.
2.Osterwalder, Alex and pigneur, Yves, Business model generation.
3. Small scale industries and Entrepreneurship, Vasant Desai.
4.Management of small scale Industries, Himalaya publishing house, Vasant Desai.
5.EntrepreneuralDevelopment,SS Khanka
6.Entrepreneur Revolution: How to Develop your Entrepreneurial Mindset and Start a Business that works, Daniel Priestley
7.Business Policy and Strategic Management, AzharKazmi

NOTE: There shall be total eight questions, four from each section. Each question carries 20 marks. Five questions will have to be attempted, selecting at least two from each section

BRANCH: COMPUTER ENGINEERING/COMPUTER SCIENCE & ENGINEERING/I.T
SEMESTER: 3rd CREDIT: 1

COURSE NO: CSP3311
COURSE TITLE: OBJECT ORIENTED PROGRAMMING
USING C++ LAB

L	T	P	Practical Marks
-	-	2	50

COURSE OUTCOMES	
After Completion of this course the student will be able to: -	
CO1	Develop solutions for a range of problems using Objects and Classes.
CO2	Implement the concepts of Constructors, Destructors and Operator Overloading.
CO3	Apply fundamental algorithmic problems including Type Casting, Inheritance.
CO4	Implement the concepts of Run Time Polymorphism using Virtual Functions
CO5	Implement the concepts of Generic Programming, Templates, File Handling using C++.

Lab Practicals:

Practical 1   Design and implement programs using Pointers.
Practical 2   Design and implement programs using Classes and Objects.
Practical 3   Design and implement programs using Constructors and Destructors.
Practical 4   Design and implement programs using the concepts of Inheritance.
Practical 5   Design and implement programs using Friend Function.
Practical 6   Design and implement programs using New and Delete operator.
Practical 7   Design and implement programs using the concepts of Overloading.
Practical 8   Design and implement programs using the concepts of files.

NOTE: Additional Lab experiments/practicals will be performed based on the course contents requirements.

BRANCH: COMPUTER ENGINEERING/COMPUTER SCIENCE & ENGINEERING/I.T
SEMESTER: 3rd
COURSE NO: CSP3312
COURSE TITLE: DIGITAL SYSTEM DESIGN LAB

CREDIT: 1

L	T	P	Practical Marks
-	-	2	50

COURSE OUTCOMES	
After Completion of this course the student will be able to: -	
CO1	Implement logic gates and realization of OR, AND, NOT AND XOR Functions using universal gates.
CO2	Design and implement combinational circuits like half adder/full adder, half subtractor/full subtraction, code converters, comparators, MUX/DEMUX
CO3	Design and implement sequential circuits like flip-flops, counters and shift registers

LIST OF EXPERIMENTS:-

Experiment 1.   Verification of truth tables of Logical Gates AND / OR / NOT, NAND, NOR, EXOR, EXNORGates.

Experiment 2.   Implementation of Boolean expression using AND, OR, NOT, NAND, & NOR logic.

Experiment 3.   Implementation of Decoder, Encoder , Code Converter using IC's & Gates.

Experiment 4.   To implement Half Adder, Half Subtractor, Full Adder, Full Subtractor using different IC's & Gates.

Experiment 5.   Implementation of multiplexer, demultiplexer using IC's & gates.

Experiment 6. Design of BCD to 7 segment display using logical gates & IC's.

Experiment 7. To design & verify truth table of Flip Flops.

Experiment 8.   To design various asynchronous counters using flip flops, gates & IC's.

Experiment 9.   To design various synchronous counters using flip flops, gates & IC's.

Experiment 10.   To design & verify truth tables of shift Registers.

NOTE: Additional Lab experiments/practical will be performed based on the course contents requirements.

BRANCH: COMPUTER ENGINEERING/COMPUTER SCIENCE & ENGINEERING
SEMESTER: 3rd   CREDIT: 1
COURSE NO: CSP3313
COURSE TITLE: WEB TECHNOLOGY LAB

L	T	P	Practical Marks
-	-	2	50

COURSEOUTCOMES	
At the end of the course the student will be able to:-	
CO1	Develop Web Pages using HTML and CSS.
CO2	Develop Client-Side Scripts using JavaScript.
CO3	Develop Server-Side scripts using PHP.

Lab Practicals:

Practical 1   Write a program to create an HTML page which has properly aligned paragraphs with image.

Practical 2   Write a program to create in HTML to create Student feedback form(use textbox,textarea checkbox, radio button, select box etc.)

Practical 3   Create a web page using frame.Divide the page into two parts with Navigation links on left hand side of page(width=20%) and content page on right hand side of page(width=80%).On clicking the navigation Links corresponding content must be shown on the right-hand side.

Practical 4   Create your class timetable using table tag. Use External CSS to format it.

Practical 5   Create your resume using HTML tags and then use inline CSS for the formatting.

Practical 6   Develop a Java Script to display today's date.

Practical 7   Develop simple calculator for addition, subtraction, multiplication and division operation using JavaScript.

Practical 8   Write a JavaScript that calculates the squares and cubes of the numbers from 0 to10 and outputs HTML text that displays the resulting values in an HTML table format.

Practical 9   Write a JavaScript code that displays text "TEXT-GROWING" with increasing font size in the interval of 100m sin RED COLOR, when the font size reaches 50pt it displays "TEXT SHRINKING "in BLUE color.Then the font size decreases to 5pt.

Practical 10   Write a PHP program to keep track of the number of visitors visiting the webpage and to display this count of visitors, with proper headings.

Practical 11   Write a php program to display today's date in dd- mm-yyyy format.

Practical 12   Write a php program to check if number is prime or not.

Practical 13   Create HTML page that contain textbox,submit/reset button. Write php program to display this information and also store into text file.

NOTE: Additional Lab Experiments/Practical will be performed based on the course content requirements.

BRANCH: COMPUTER ENGINEERING/COMPUTER SCIENCE & ENGINEERING
SEMESTER: 3rd
COURSE NO: MOC3311
COURSE TITLE: MooC

CREDIT: 1

L	T	P	Marks
-	-	2	50

McoC: A massive open online course (MooC) is a model for delivering learning content to any person who wants to take a course by means of the web. It has been incorporated in the 3rd semester.
The following scheme shall be used to evaluate a MooC course:

Breakup of Marks:

- **Attendance- 10 marks**
  Students will have to visit the lab/Computer Centre as per the time table and pursue their respective online course.
- **Report file-15 marks**
  A detailed report of about 20-25 pages has to be submitted to the department at the end of the semester. It should contain details about the course that was undertaken by the student. A copy of the assignments with solutions that have been uploaded on the MooC platform should also be included in the final report. A copy of the certificate if awarded should also be appended to the report.
- **Presentation- 15 marks.**
  The presentation should be given to the peers/students focusing on the key points of the course with an aim to share the knowledge.
- **Certification- 10 marks**
  The students awarded with the certificate will be given 10 marks. (Copy to be attached in the report)

The students can opt for MooC from the list provided here under. The choice of course opted is not restricted to the list, provided the opted course is approved by the department.
1. C#
2. C Sharp
3. Web Development
4. Python
5. PHP
6. Mobile Computing
7. Android
8. Programming using MATLAB
9. JavaScript Basics
10. Client Server Communication
11. Web Security Fundamentals
12. SQL

BRANCH: ELECTRICAL/COMPUTER ENGINEERING/COMPUTER SCIENCE & ENGINEERING
SEMESTER: 3rd   **CREDIT: 0**
COURSE NO: NCC3301
COURSE TITLE: CYBER ETHICS & LAWS

L	T	P	Marks
2	-	-	Satisfactory/ Un-satisfactory

COURSE OUTCOMES	
At the end of the course the student will be able to: -	
CO1	Understand the basic concepts of Cyber Ethics &Laws.
CO2	Understand about the constitutional and Human Rights Issues in Cyber space
CO3	Understand Cyber Crimes and Legal Framework
CO4	Understand about the limitations and current issues in the area.

Detailed Syllabus
Section –A

Ethics in Cyber Space, Core Values and Virtues, Dimensions of Cyber Ethics in Cyber Society, Cyber Ethics by Norms, Laws and Relations, Principle & Significance of Cyber Ethics, Ethics in Information Society.

Computer and its impact in Society, Overview of Computer and Web Technology, what are Cyber Laws, Need for Cyber Laws, Cyber Jurisprudence at International and Indian Level.

Section B

Objectives, Importance of Cyber Laws, Right to Access Cyberspace-Access to internet, Right to privacy, Right to data protection, Advantages and Disadvantages

Cyber Crime against Individual, Institution and State, Types of Cyber Crimes, Cyber Crimes and Legal Framework

Limitations and Current Issues relating Cyber Ethics & Cyber Laws in the Society

BOOKS RECOMMENDED:
1.   Cyber Laws   Justice Yatindra Singh
2.   Cyber Laws and Crimes Simplified   Adv. Prasant Mali
3.   Cyber Ethics 4.0   ChristophStuckelberger and PavanDuggal

NOTE: This is a Mandatory Non-Credit Course. Two objective papers will be conducted internally by the department. The students are required to score at least 40% or above in totality to be considered qualified in the course.

B. Tech. Computer Engineering/Computer Science & Engineering
Examination to be held in the Year MAY 2024, 2025, 2026, 2027

B. Tech.4ᵗʰSemester Computer Engineering/ Computer Science &Engineering   Contact Hrs. 28

COURSE CODE	COURSE TYPE	COURSE TITLE	LOAD ALLOCATION			MARKS DISTRIBUTION		TOTAL	Credits	% Change
			L	T	P	Internal	External			
BST8401	Basic Science Course	Discrete Mathematics	2	1	0	50	100	150	3	10%
CST3401	Professional Core Course	Data Structures	2	1	0	50	100	150	3	05%
CST3402	Professional Core Course	RDBMS	2	1	0	50	100	150	3	15%
CST3403	Professional Core Course	Java Programming	2	1	0	50	100	150	3	15%
CST3404	Professional Core Course	Fundamentals of Machine Learning	2	1	0	50	100	150	3	100%
MOC3401	Massive Open Online Course	SWAYAM / NPTEL	3	0	0	100	-	100	3	100%
CSP3411	Professional Core Course	Data Structures Lab	0	0	3	75	-	75	1.5	0%
CSP3412	Professional Core Course	RDBMS Lab	0	0	2	50	-	50	1	0%
CSP3413	Professional Core Course	Java Programming Lab	0	0	2	50	-	50	1	0%
CSP3414	Professional Core Course	Fundamentals of Machine Learning Lab	0	0	2	50	-	50	1	100%
TOTAL			13	5	10	575	500	1075	22.5	

BRANCH: COMPUTER ENGINEERING/COMPUTER SCIENCE & ENGINEERING
SEMESTER: 4ᵗʰ
COURSE NO: BST8401
COURSE TITLE: DISCRETE MATHEMATICS
DURATION OF EXAM: 3 HOURS

CREDITS: 3

L	T	P	MARKS	
			External	Internal
2	1	0	100	50

COURSE OUTCOMES	
At the end of the course the student will be able to: -	
CO1	Understand basic principles of sets and operations in sets, relations and functions
CO2	Evaluate the basics concepts of groups, its examples and related results
CO3	Create graphs using different transversal methods.
CO4	To learn about spanning trees.

Detailed Syllabus

SECTION - A

Sets, Relations and Functions:
Operations and Laws of Sets, Countable and uncountable sets, Cartesian Products, Relations and functions Principle of Mathematical induction, Principle of inclusion and exclusion, pigeon-hole principle.
Algebraic Structure: Groups and sub groups, related theorems, Cosets, Normal subgroups and Group homomorphism. Rings, Integral domains and fields: examples and related results   **(23 hrs)**

SECTION - B

Graphs and Trees
Basic terminology, multi graphs and weighted graphs, connectivity, walk and path, circuits and cycles, shortest path in weighted graphs, Algorithm of shortest path. Hamiltonian and Eulerian paths and circuits, Eulerian graphs, Hamiltonian graphs, Konigsberg bridge problem, Chinese postman problem, Travelling salesperson problem, Planar graph and Euler's formula.
Trees and cut sets: Trees, rooted trees, path lengths in rooted trees, spanning trees and cut sets. **(22 hrs)**

BOOKS RECOMMENDED:
1. Kenneth H. Rosen, "Discrete Mathematics and Its Applications", Tata McGraw – Hill, 8th Edition, 2019
2. Susanna S. Epp, "Discrete Mathematics with Applications", Wadsworth Publishing Co. Inc., 4th edition, 2010
3. C L Liu and D P Mohapatra, "Elements of Discrete Mathematics A Computer Oriented Approach", Tata McGraw – Hill, 3rd Edition, 2008
4. NarsinghDeo, "Graph theory with applications to Engineering and Computer Science" Prentice Hall India, 1974.

NOTE: There will be eight questions of 20 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.

R.kumar

BRANCH: COMPUTER ENGINEERING/COMPUTER SCIENCE & ENGINEERING/I.T
SEMESTER: 4ᵗʰ
CREDITS: 3
COURSE NO: CST3401
COURSE TITLE: DATA STRUCTURES
DURATION OF EXAM: 3 HOURS

L	T	P	MARKS	
			External	Internal
2	1	0	100	50

COURSE OUTCOMES	
At the end of the course the student will be able to: -	
CO1	Understand and analyze the time Space Complexity of programs and data structures.
CO2	Knowledge of various data structures ,their operations, applications and relative merits.
CO3	Ability to develop algorithmic solutions to various problems by using appropriate Data Structure and to analyze the solutions. .
CO4	Develop algorithms for various sorting and searching techniques and compare their performance in terms of Space and Time complexity

Detailed Syllabus
Section- A

Introduction to data structures: - Concepts of data and algorithm, Relation between Data Structure & Algorithm, Introduction to Time & Space complexity, Types of asymptotic notations and orders of growth, Algorithm efficiency -best case, worst case, average case, Representation of Arrays. **(02 hrs)**

Stacks and Queues: - Concept of Stacks, Operation on Stacks, Application of stacks: Expression evaluation, conversion of Infix, Postfix, Prefix expressions , Recursion, Tower of Hanoi .
Concept of Queues, Operation on Queues, Types of queues - Priority Queues, Circular Queues, Double ended Queues. **(10 hrs)**

Linked Lists: - Insertion, Deletion and Traversal on Linear Linked Lists, Doubly Linked List, Circular Linked List, Header nodes, Implementation of Stacks & Queues using linked list, Application-Polynomial manipulation ,Dynamic memory management, Garbage Collection **(10 hrs)**

Section-B

Trees: -Binary trees and its representation using Linked list, Operations on Binary Trees, Traversal Algorithms, Applications, Binary Search Trees -insertion, deletion , finding min and max , Threaded Binary Trees and its Traversal algorithms, Optimum Search Trees,AVLtrees -basic operations (rotation , insertion and deletion) **(10 hrs)**

Graphs: -Representation of Graphs, Traversal methods, Applications , Undirected Graphs, Directed Graph & their Traversal, Depth first, Breadth First, Shortest Path algorithm -Dijkstra , Minimum Cost Spanning tree (Prim and Kruskal). **(08 hrs)**

Sorting &Searching:-Exchange Sort (Bubble, Quick sort) , Selection & Tree Sorting , Insertion sort, Shell Sort, Address Calculation Sort , Merge & Radix Sort. Analysis of sorting algorithms Sequential Searching, searching an Ordered Table, Index sequential search, Binary search, Tree searching. **(05 hrs)**

BOOKS RECOMMENDED:

1	Data Structure using C	Tenenbaum, Langsam, Augenstein
2	Fundamentals of data structures	Horowiz E. and Sahni S.
3	Data structures and Program Design	Robert L. Kruse.
4	Data Structures & Algorithm	Aho, Hopcraft and Ullman.
5	Data Structure with Applications	Sorenson.
6	Expert Data Structures with C	R B Patel 4ᵗʰ Edition

NOTE: There will be eight questions of 20 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.

B. Tech. Computer Engineering/Computer Science & Engineering
Examination to be held in the Year MAY 2024, 2025, 2026, 2027

BRANCH: COMPUTER ENGINEERING/COMPUTER SCIENCE & ENGINEERING
SEMESTER: 4th
COURSE NO: CST3402
COURSE TITLE: RDBMS
DURATION OF EXAM: 3 HOURS

CREDITS: 3

L	T	P	MARKS	
			External	Internal
2	1	0	100	50

COURSE OUTCOMES	
At the end of the course the student will be able to: -	
CO1	Understand DBMS architecture, Physical and Logical Database Designs, Database Modeling, Relational, Hierarchical and Network Models.
CO2	Identify basic database storage structures and access techniques such as file organizations, indexing methods.
CO3	Apply Structured query language (SQL) for database definition and database manipulation.
CO4	Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
CO5	Write application programs dealing with issues like concurrency control and database protection mechanisms.

Detailed Syllabus
Section A

Basic Concepts: - DB and DBMS, Database Systems versus File Systems, View of Data (Data Abstraction, Instances, Schemas, States), Data Models, Database Languages, Database User and Administrators, DBMS - Advantages and Disadvantages. **(4 hrs)**

Entity Relationship Model: - Basic concepts, constraints, design issues, Entity Relationship diagram, Weak Entity sets, Extended ER features, Design of ER database schema, Reduction of ER schema to tables.
(6 hrs)

Relational Model: - Attributes and domains, Tuples, Relations and Schemas, Relation representation, keys, Integrity Rules, Relational algebra, Relational Calculus, Data Manipulation using SQL. **(8 hrs)**

Relational Database Design: -Normalization using Functional Dependency, Normalization using Join Dependencies, Domain key normal form. **(6 hrs)**

Section B

Indexing: - Basic Concepts, Ordered Indices - Primary and Secondary, B+ Tree Index Files - Structure, Queries and Updates, B-Tree Index Files **(4 hrs)**

Transactions: - Transaction concept, transaction state, implementation of Atomicity and Durability, Concurrent executions, Serializability, Recoverability, implementation of isolation. **(8 hrs)**

Concurrency Control: - Lock based protocols, Timestamp based protocols, Validation based protocols, Multiple Granularity, Multiversion Schemes, Insert and Delete operations. **(6 hrs)**

Recovery Systems: - Failure classification, Storage Structure, Recovery and Atomicity, Log based recovery, Shadow Paging, Recovery with Concurrent Transitions, Buffer Management. **(4 hrs)**

BOOKS RECOMMENDED:
1. Database System Concepts - Korth, Silberchatz TMH
2. An introduction to Database Systems - Bipin C. Desai
3. Fundamentals of Data Base Management Systems – RamezElmasri, Shamkant B. Navathe, Pearson
4. PL/SQL : The Programming Language of Oracle - Ivan Bayross

NOTE: There will be eight questions of 20 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.

BRANCH: COMPUTER ENGINEERING/COMPUTER SCIENCE & ENGINEERING/I.T
SEMESTER: 4th
CREDITS: 3
COURSE NO: CST3403
COURSE TITLE: JAVA PROGRAMMING
DURATION OF EXAM: 3 HOURS

L	T	P	MARKS	
			External	Internal
2	1	0	100	50

COURSE OUTCOMES	
At the end of the course the student will be able to: -	
CO1	Understand the concepts of Object-Oriented Programming paradigm and platform portability in Java.
CO2	Apply concepts of Classes, Objects and Methods to tackle real world problems.
CO3	Analyze errors and exceptions by using Exception Handling mechanism.
CO4	Examine the Multithreading techniques by extending Thread class and develop interface, Applets and Web pages
CO5	Create Graphic User Interface using Abstract Window Toolkit

Detailed Syllabus
Section – A

Java Evolution, And Overview of Java Language: Java History–Features of java, how java different from C and C++, Java and World Wide Web, Web Browser. Java Environment: Java Development kit (JDK), Application Programming Interface (API). Java Programming Structure, Java Tokens, Constants, Variables, Expressions, Decision Making Statements and Looping, Java Statements, Overview of Arrays and Strings, Machine Neutral, Java Virtual Machine (JVM), Command Line Arguments. **(6 hrs)**

Arrays and Strings: Arrays, One-Dimensional arrays, Creating an Array, declaration of arrays, initialization of arrays, Two-Dimensional arrays, String arrays, String methods, String Buffer class, Vectors, Wrapper classes. **(4 hrs)**

Classes, Objects and Methods: Introduction, defining a class, creating objects, accessing class members, constructors, methods overloading, static members. **(4 hrs)**

Inheritance: Defining a sub class, sub class constructor, multilevel variables, Final classes, and Finalize methods, Abstract methods and classes, visibility control. **(4 hrs)**

Managing Errors and Exceptions: Introduction, Types of Errors-Compile time and Run time errors, Exceptions, Types of Exceptions, Syntax of Exception handling code, Multiple catch statements, using finally statement, Throwing our own exceptions. **(4 hrs)**

Section- B

Multithreaded Programming: Introduction to threads, Creating Threads, Extending the Thread Class, Implementing the Runnable interface, life cycle of a thread, priority of a thread, synchronization, Deadlock. **(6 hrs)**
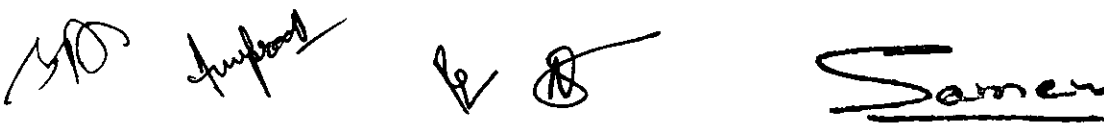
Interfaces and Applet Programming: Introduction, defining interfaces, extending interfaces, implementing interfaces. Introduction, how applet differ from applications, building applet code, applet life cycle, About HTML, designing a web page, passing parameters to applets, getting input from the User. **(6 hrs)**

Graphics Programming: Introduction, the Abstract Windowing Toolkit (AWT), frames, event-driven programming, layout managers, panels, canvasses, drawing geometric figures. Creating User Interface: Introduction, describe various user interface Components: button, label, text field, text area, choice, list, check box check box group. **(8 hrs)**

BOOKS RECOMMENDED:
1 Programming with JAVA   Balagurusamy TMH
2 An Introduction to JAVA Programming   Y.DanielLiangTMH
3 The Complete Reference JAVA 2   Herbert Schield TMH

NOTE: There will be eight questions of 20 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.

BRANCH: COMPUTER ENGINEERING/COMPUTER SCIENCE & ENGINEERING
SEMESTER: 4ᵗʰ
CREDITS: 3
COURSE NO: CST3404
COURSE TITLE: FUNDAMENTALS OF MACHINE LEARNING
DURATION OF EXAM: 3 HOURS

L	T	P	MARKS	
			External	Internal
2	1	0	100	50

COURSE OUTCOMES	
At the end of the course the student will be able to: -	
CO1	To understand basics of python language
CO2	To understand basics of python libraries
CO3	To understand basics of machine learning Algorithms
CO4	To apply different machine learning models using various datasets

Detailed Syllabus
Section-A

Introduction to Python: Data Types, Operators, Expression, Indexing & Slicing, Strings, Conditionals, Functions, Control Flow, Nested loops, Sets & Dictionaries   **(6 hrs)**

Introduction to Machine Learning: Machine Learning Vs Statistical Modelling, Supervised vs Unsupervised Learning, Supervised Learning Classification, Unsupervised learning, Reinforcement Learning, Applications, Python libraries suitable for Machine Learning: Pandas, Numpy, Scikit-learn, visualization libraries: matplotlib etc.   **(8 hrs)**

Regression: Simple Linear Regression, Multiple Linear Regression, Non-linear Regression, Model Evaluation in Regression Models, Evaluation Metrics in Regression Models   **(6 hrs)**

Section- B

Classification: Introduction to Classification, K-Nearest Neighbor, Decision Trees, Logistic Regression, Support Vector Machines, Logistic regression vs Linear regression, Evaluation Metrics in Classification.
                                    (10 hrs)
Unsupervised Learning: Intro to Clustering, K-Means Clustering, Hierarchical Clustering, Density-Based Clustering, Content -based recommender systems, Collaborative Filtering   **(10hrs)**

BOOKS RECOMMENDED
1. E. Balaguruswamy, Python Programming
2. Mitchell M., T., Machine Learning, McGraw Hill (1997) 1ˢᵗEdition.
3. Alpaydin E., Introduction to Machine Learning, MIT Press (2014) 3ʳᵈEdition.

NOTE: There will be eight questions of 20 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of Calculator is allowed.

BRANCH: COMPUTER ENGINEERING/COMPUTER SCIENCE & ENGINEERING
SEMESTER: 4th

COURSE NO: MOC3401
COURSE TITLE: SWAYAM/NPTEL
DURATION OF EXAM: 3 HOURS

CREDITS: 3

L	T	P	MARKS	
			External	**Internal**
3	-	-	100	-

The students shall register for a 12 week SWAYAM/NPTEL course offered by IIT Madras, out of the list of courses floated by SWAYAM around the time of commencement of the semester. However, the selected NPTEL course should not be similar to the regular courses offered as a part of the department curriculum. The choice of course needs to be duly endorsed by the Department Academic Committee.

The overall monitoring of the NPTEL course will be under the supervision of the teacher incharge of the department.

The NPTEL/SWAYAM certification course comprises of Assignments (25%) and Proctor Examination (Online examination MCQ's based =75%) conducted at the end of the semester by IIT Madras as per the schedule.

The marks obtained by the students in the NPTEL/SWAYAM certification course will be tabulated by the concerned department.

NOTE: - *In case the student does not pass the certification exam or remains absent in the proctored examination, no certificate will be given to the candidate by NPTEL and the student will be deemed to have failed in that course. The student will have to register again for the next semester NPTEL course and pass the examination along with a certificate.*

B. Tech. Computer Engineering/Computer Science & Engineering
Examination to be held in the Year MAY 2024, 2025, 2026, 2027

BRANCH: COMPUTER ENGINEERING/COMPUTER SCIENCE & ENGINEERING/I.T
SEMESTER: 4th

COURSE NO: CSP3411
COURSE TITLE: DATA STRUCTURES LAB

CREDITS: 1.5

L	T	P	Marks
-	-	3	75

COURSE OUTCOMES	
After Completion of this course the student will be able to: -	
CO1	Implement basic operations on Stacks, Queues, Linked list, Trees and Graphs
CO2	Ability to use various Data Structures in Problem Solving.
CO3	Implement various sorting and searching techniques.

Lab Practicals:

Experiment 1 Write a program to check if expression is correctly parenthesized using Stacks
Experiment 2 Write a program to evaluate Postfix Expression using Stacks
Experiment 3 Write a program to convert Infix Expression to its corresponding Postfix and Prefix
Experiment 4 Write a program to convert Prefix Expression to Postfix
Experiment 5 Write a program to implement Circular Queue Operations
Experiment 6 Write a program to implement Priority Queue Operations
Experiment 7 Write a program to implement Ordered Linked List
Experiment 8 Write a program to add Polynomials using Single Linked List
Experiment 9 Write a program to implement operations on Doubly Linked List
Experiment 10 Write a program to find the duplicate numbers in a given list using Binary Tree
Experiment 11 Write a program to Sort a list of numbers using Binary Search Tree
Experiment 12 Write a program to implement operations on Threaded Binary Trees
Experiment 13 Write a program to implement Dijkstra'sShortest path algorithm
Experiment 14 Write a program to implement Prim's Minimum Cost Spanning Tree algorithm
Experiment 15 Write a program to implement Kruskal's Minimum Cost Spanning Tree algorithm
Experiment 16 Write a program to implement Quick Sort algorithm
Experiment 17 Write a program to implement Shell Sort algorithm
Experiment 18 Write a program to implement Merge Sort algorithm

NOTE: Additional Lab experiments/practical will be performed based on the course contents requirements.

BRANCH: COMPUTER ENGINEERING/COMPUTER SCIENCE & ENGINEERING
SEMESTER: 4ᵗʰ   **CREDIT: 1**
COURSE NO: CSP3412
COURSE TITLE: RDBMS LAB

L	T	P	Marks
-	-	2	50

COURSE OUTCOMES	
After Completion of this course the student will be able to: -	
CO1	Code and implement queries regarding basic DDL, DML and DCL commands.
CO2	Use group functions to summarize data.
CO3	Join multiple tables using different types of joins.
CO3	Analyze the PL/SQL architecture and write PL/SQL code for procedures, triggers, cursors, exception handling etc.

Lab Practicals:

Practical 1   To create , insert and show the basic structure of a table emp with following specifications:Attribute:- emp code (int), emp name(varchar(50)), desig(varchar), doj(date), basic_sal(int), dept_code(int).

Practical 2   To show all entries of emp name from table emp having and not having desig = admin and emp_code = 102.

Practical 3   To show all design entries from table emp that are unique.

Practical 4   To show all entries of emp_name from table emp having 'A' in them.

Practical 5   To show all entries of emp name, basic sal from table emp and show by computing pf = basic sal * 0.1, hra = basic sal * 0.1, da = basic_sal * 0.1 and gross = basic_sal + da + hra − pf for all values of basic_sal.

Practical 6   To display the count value of emp code and find average of basic sal for each dept code, count the value of emp_code for each dept_code and sorted by count emp_code.

Practical 7   To display the emp code, emp name, desig, basic_sal from emp having basic_sal<= 9000 and desig is admin.

Practical 8   To show all entries of emp name from table emp for mentioned employee codes and date of joining in specified range .

Practical 9   To calculate the average, maximum and minimum of all entries of basic_sal.

Practical 10   To add 200 to all values of basic_sal where desig is sales.

NOTE: Additional Lab experiments/practicals will be performed based on the course contents requirements.

BRANCH: COMPUTER ENGINEERING/COMPUTER SCIENCE & ENGINEERING/I.T
SEMESTER: 4th SEMESTER   **CREDIT: 1**
COURSE NO: CSP3413
COURSE TITLE: JAVA PROGRAMMING LAB

L	T	P	Marks
-	-	2	50

COURSE OUTCOMES	
After Completion of this course the student will be able to: -	
CO1	Understand various Java Tokens, Constants, Variables, Expressions, Decision Making and Looping Statements in java.
CO2	Implement the concepts for creating Arrays and Strings objects in java.
CO3	Implement the concept of constructor, Destructor, Static members method overloading and multithreading in java.
CO4	Manage Errors and Exceptions using Exception handling mechanism and code to implement interfaces and applets.
CO5	Design window frame using various GUI components like Buttons, Text fields, menu, check list and check boxes.

Lab Practicals:

Practical 1	WAP To use different arithmetic operation in java.
Practical 2	WAP To demonstrate wrapper class in java.
Practical 3	WAP to perform manipulation on strings in java.
Practical 4	WAP to demonstrate single inheritance in java.
Practical 5	WAP to demonstrate multiple inheritance using interface in java
Practical 6	WAP to demonstrate Exception handling in java
Practical 7	WAP to check whether the entered amount is is sufficient or not ,if not raise an exception in java
Practical 8	WAP to demonstrate threads in java.
Practical 9	WAP to demonstrate APPLET in java.
Practical 10	WAP to demonstrate event handling in java.

NOTE: Additional Lab experiments/practical will be performed based on the course contents requirements.

BRANCH: COMPUTER ENGINEERING/COMPUTER SCIENCE & ENGINEERIN   CREDIT: 1
SEMESTER: 4th
COURSE NO: CSP3414
COURSE TITLE: FUNDAMENTALS OF MACHINE LEARNING LAB

L	T	P	Marks
-	-	2	50

LABORATORY OUTCOMES	
After Completion of this course the student will be able to: -	
CO1	Install Python
CO2	Understand various Loops and Conditions
CO3	Understand the supervised and unsupervised approaches
CO4	Implement various classification and regression techniques
CO5	Understand various performance parameters for evaluating the machine learning models

Lab Practicals:

Practical 1	Implement basic operations of data types in python
Practical 2	Implement loops and conditional statements
Practical 3	Mathematical computing with Python packages like: numpy, MatplotLib, pandas, Tensor Flow, Keras.
Practical 4	Linear regression and Logistic regression
Practical 5	K nearest neighbor
Practical 6	K means clustering
Practical 6	Support Vector Machine
Practical 6	Naïve Bayes
Practical 7	Decision Tree

NOTE: Additional Lab experiments/practical will be performed based on the course contentsrequirements.