DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
3rd MINUTES OF THE MEETING OF BOARD OF STUDIES

Date: 14/10/2022

The 3nd Board of Studies meeting of Department of Computer Science & Engineering conducted in online mode on 14.10.2022 at CMR Engineering College, Kandlakoya(V), Medchal Road, Hyderabad - 501 401.

The following members attended the meeting:

S.No	Name of the Member	Designation & Address	Role	Sign
1	Dr. A. Srinivasula Reddy	Principal, CMREC	Special Invitee	
2	Dr. Sheo Kumar	HOD, Dept. of CSE, CMR Engineering College, Hyderabad	Chairman-BOS	
3	Dr.D.Vasumathi	Professor of CSE, JNTUH CEH	University Nominee (Nominated by the Vice Chancellor, JNTUH, Hyderabad	14/10/22
4	Dr. Raghu Kishore Neelisetti	Associate Professor, Dept. of Computer Science & Engineering Mahindra University, Hyderabad	Subject Expert Member(External) (Nominated by Academic Council)	14/10/22
5	Dr. Pradeep Kumar	Associate Professor, Dept. of CS & IT Maulana Azad National Urdu University, Hyderabad	Subject Expert Member(External) (Nominated by Academic Council)	14.X.2022
6	Mr.Adi Dashrath Reddy	Senior Professional Operations IBM India Pvt. Ltd., Hyderabad, T.S	Subject Expert Member(External) (Nominated by Academic Council)	
7	Mrs. M. Bhargavi	Software Engineer	P.G .Alumni, CMREC (Nominated by the Principal)	14/10/22
8	Dr.C.N.Ravi	Professor, Dept. of CSE, CMR Engg College, Hyd	In-Charge Chairman & Member(Internal)	
9	Dr. Raghunath Reddy	Asso.Professor, Dept. of CSE, CMR Engg College, Hyd	Member(Internal)	14/10
10	Dr.Gautam Kumar	Asso.Professor, Dept. of CSE, CMR Engg College, Hyd	Member(Internal)	Gautam Kumar

Dr. Sheo Kumar, Head of the Department & Chairman, Board of Studies welcomed all the members, presented a report on the new curriculum R-22 with Autonomous Status Academic Course structure for all four years along with detailed system of 1st & 2nd Years.

Pre requisites of some subject were asked to include and it was implemented in the syllabus. Professional and Open electives were discussed thoroughly.

For UG Program the following point were discussed

- As per JNTUH new regulations Real-time Research Project is included in II Year II Sem.
- Automata Theory & Complier Design is combined has CS205PC.
- As Suggested by Dr. N. Raghu Kishore Prof/Mahindra university, We include the Mobile application Development is SD508PC (Skill Development course).
- In R20 Mobile application Development is replaced with CS602PC Machine Learning with lab.
- The Data Analytic using R is replaced with Big Data Analytics in III-II as suggested by Dr. D.Vasumathi, HOD/CSE, JNUTH.
- In II-I we introduced Skill Development Course (Data Visualization-R Programming/Power Bi) in place of Employability Skills III.
- In II-II we introduced Skill Development Course (Node JS\React JS\Django) in place of Employability Skills IV.
- In IV-I Internet of Things CS702PC is kept in Place Data Analytics using R.
- The new credit distribution in R22 was discussed and accepted.

For PG Program the following point were discussed.
The new PG- CSE curriculum R-22 with Autonomous Status Academic Course structure for all four years along with detailed system of 1st & 2nd Years is revised.

- In M.Tech I Year I Semester , Dr. N. Raghu Kishore suggested to change Advanced Data Structures using Python subject to Advanced Data Structures and python language is replaced by C/C++, Dr. D.Vasumathi suggested to remove subjects already studied in B.Tech. Advanced Database Management System along with Lab is introduced as core subject in place of MFCS subject. MFCS subject is moved to Professional Elective I. Ethical Hacking subject is introduced in place of Web and Database Security in Professional Elective II.
- In M.Tech I Year II Semester, Advanced computer Architecture subject is moved to Professional Elective V in place of Deep Learning subject which is now introduced as a core subject with lab. Dr. Pradeep Kumar instructed to add Machine Learning Tools in 1 unit of ML theory(Open Elective)

The Committee discussed all the subject content in detail and all the members were satisfied and approved it unanimously.

14/10/22 14.X.2022 Gautam Kumar 14/10 14/10 14/10/22 14/10

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

I YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	MA101BS	Matrix Algebra and Differential Equations	3	1	0	4
2	CH102BS	Engineering Chemistry	3	1	0	4
3	CS103ES	Programming for Problem Solving	3	0	0	3
4	EN104HS	English for Skill Enhancement	2	0	0	2
5	ME105ES	Computer Aided Engineering Graphics Lab	0	0	3	1.5
6	CH106BS	Engineering Chemistry Lab	0	0	2	1
7	CS107ES	Programming for Problem Solving Lab	0	0	3	1.5
8	EN108HS	English Language and Communication Skills Lab	0	0	3	1.5
9	SD109BS	Skill Development Course-I (Aptitude and Logic Building)	0	0	2	1
		Induction Programme				
Total Credits			**11**	**2**	**13**	**19.5**

I YEAR II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	MA201BS	Vector Calculus and Transforms	3	1	0	4
2	AP202BS	Applied Physics	3	1	0	4
3	CS203ES	Data Structures	3	1	0	4
4	EE204ES	Basic Electrical Engineering	3	0	0	3
5	IT205ES	IT Workshop	0	0	3	1.5
6	AP206BS	Applied Physics Lab	0	0	2	1
7	CS207ES	Data Structures Lab	0	0	2	1
8	EE208ES	Basic Electrical Engineering Lab	0	0	2	1
9	SD209EN	Skill Development Course- II (Interchange-Business English)	0	0	2	1
Total Credits			**12**	**3**	**11**	**20.5**

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

II YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	CS301PC	Database Management Systems	3	0	0	3
2	CS302PC	Computer Organization and Architecture	3	0	0	3
3	CS303PC	Operating Systems	3	0	0	3
4	CS304PC	Object Oriented Programming through Java	3	0	0	3
5	CS305PC	Discrete Mathematics	3	0	0	3
6	CS306PC	Database Management Systems Lab	0	0	2	1
7	CS307PC	Operating Systems Lab	0	0	2	1
8	CS308PC	Java Programming Lab	0	0	2	1
9	SD309PC	Skill Development Course (Data Visualization-R Programming/Power Bi)	0	0	2	1
10	*MC310	Environmental Science	2	0	0	0
		Total Credits	17	0	8	**19**

II YEAR II SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1	SM401MS	Business Economics & Financial Analysis	3	0	0	3
2	MA402BS	Computer Oriented Statistical Methods	3	1	0	4
3	EC403ES	Analog & Digital Electronics	3	0	0	3
4	CS404PC	Python Programming	3	0	0	3
5	CS405PC	Software Engineering	3	0	0	3
6	EC406ES	Analog & Digital Electronics Lab	0	0	2	1
7	CS407PC	Python Programming Lab	0	0	2	1
8	CS408PC	Software Engineering Lab	0	0	2	1
9	CS409PC	Real Time Research Project/Societal Related Project	0	0	2	1
10	SD410PC	Skill Development Course (Node JS\React JS\Django)	0	0	2	1
11	*MC411	Gender Sensitization Lab	0	0	2	0
Total Credits			15	1	12	**21**

***MC – Satisfied/Unsatisfied**

14/10/22 14.10.2022 14/10/22

14/10 14/10

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

IV YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	CS701PC	Big Data Analytics	3	0	0	3
2	CS702PC	Internet of Things	3	0	0	3
3		Professional Elective - III	3	0	0	3
4		Professional Elective -IV	3	0	0	3
5		Open Elective-II / MOOCS	3	0	0	3
6	CS703PC	Data Analytics Lab	0	0	3	1.5
7	CS704PC	Internet of Things Lab	0	0	3	1.5
8	CS705PROJ	Project -I	0	0	6	3
9						
Total Credits			15	0	12	21

IV YEAR II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1		Professional Elective -V / MOOCS	3	0	0	3
2		Professional Elective -VI	3	0	0	3
3		Open Elective-III / MOOCS	3	0	0	3
4	CS801PROJ	Seminar	0	0	2	1
5	CS802PROJ	Project -II	0	0	18	9
Total Credits			9	0	18	19

14/10/22

14.10.2022

14/10/22

Gautam Kumar

14/10

14/10

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

III YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	CS501PC	Computer Networks	3	0	0	3
2	CS502PC	Automata Theory and Compiler Design	3	1	0	4
3	CS503PC	Artificial Intelligence	3	0	0	3
4	CS504PC	Data Mining	3	0	0	3
5		Professional Elective - I	3	0	0	3
6	CS505PC	Computer Networks Lab	0	0	2	1
7	CS506PC	Artificial Intelligence Lab	0	0	2	1
8	SD508PC	Skill Development (Mobile Application Development)	0	0	2	1
9	*MC509	Constitution of India	2	0	0	0
10	MC511	Cyber Security	2	0	0	0
		Total Credits	19	1	6	19

III YEAR II SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1.	CS601PC	Design and Analysis of Algorithms	3	1	0	4
2.	CS602PC	Machine Learning	3	0	0	3
3.	CS603PC	Web Technologies	3	0	0	3
4.		Professional Elective – II	3	0	0	3
5.		Open Elective-I	3	0	0	3
6.	CS604PC	Machine Learning Lab	0	0	2	1
7.	CS605PC	Web Technologies Lab	0	0	2	1
8.	EN606HS	Advanced Communication Skills Lab	0	0	2	1
9.	CS607PROJ	Industrial Oriented Mini Project	0	0	4	2
10	*MC608	Intellectual Property Rights	2	0	0	0
		Total Credits	17	1	12	**21**

***MC – Satisfied/Unsatisfied**

14/10/22 14.9.2022 14/10/22 14/10 14/10

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

Professional Elective – I

CS511PE	Cryptography & Network Security
CS512PE	Software Metrics and Measures
CS513PE	Image Processing
CS514PE	Computer Graphics

Professional Elective – II

CS621PE	Network Programming & Management
CS622PE	Natural Language Processing
CS623PE	Software Project Management
CS624PE	Information Retrieval System

Professional Elective – III

CS731PE	Information Security & Risk management
CS732PE	Deep Learning
CS733PE	Object Oriented Modeling and Design
CS734PE	Speech and Video Processing

Professional Elective – IV

CS741PE	Distributed Systems
CS742PE	Semantic web and Social Networks
CS743PE	Software Testing Methodologies
CS744PE	Pattern Recognition

Professional Elective – V / MOOCS

CS851PE	Blockchain Technology
CS852PE	Mobile Application Development
CS853PE	Design Patterns
CS854PE	Virtual Reality

Professional Elective - VI

CS861PE	Cyber Forensics
CS862PE	Robotics Process Automation
CS863PE	Cloud Computing
CS864PE	Computer Vision

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

Open Elective-I

CS611OE	Database Management Systems
CS612OE	Operating Systems
CS613OE	Software Engineering
CS614OE	Java Programming

Open Elective-II

CS721OE	Introduction to Data Analytics
CS722OE	Linux Programming
CS723OE	Software Project Management
CS724OE	Python Programming

Open Elective-III

CS831OE	R Programming
CS832OE	Block Chain Technology
CS833OE	Software Testing Methodologies
CS834OE	Web Programming

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

I YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	MA101BS	Matrix Algebra and Differential Equations	3	1	0	4
2	CH102BS	Engineering Chemistry	3	1	0	4
3	CS103ES	Programming for Problem Solving	3	0	0	3
4	EN104HS	English for Skill Enhancement	2	0	0	2
5	ME105ES	Computer Aided Engineering Graphics Lab	0	0	3	1.5
6	CH106BS	Engineering Chemistry Lab	0	0	2	1
7	CS107ES	Programming for Problem Solving Lab	0	0	3	1.5
8	EN108HS	English Language and Communication Skills Lab	0	0	3	1.5
9	SD109BS	Skill Development Course-I (Aptitude and Logic Building)	0	0	2	1
		Induction Programme				
Total Credits			**11**	**2**	**13**	**19.5**

I YEAR II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	MA201BS	Vector Calculus and Transforms	3	1	0	4
2	AP202BS	Applied Physics	3	1	0	4
3	CS203ES	Data Structures	3	1	0	4
4	EE204ES	Basic Electrical Engineering	3	0	0	3
5	IT205ES	IT Workshop	0	0	3	1.5
6	AP206BS	Applied Physics Lab	0	0	2	1
7	CS207ES	Data Structures Lab	0	0	2	1
8	EE208ES	Basic Electrical Engineering Lab	0	0	2	1
9	SD209EN	Skill Development Course- II (Interchange-Business English)	0	0	2	1
Total Credits			**12**	**3**	**11**	**20.5**

14.10.2022 14/10/22 Gautam Kumar 14/10/22 14/10

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

CS103ES PROGRAMMING FOR PROBLEM SOLVING

B.Tech. I Year I Sem. **(COMMON TO ALL DEPT.)**

L	T	P	C
3	0	0	3

Course Objectives:

- To learn the fundamentals of computers.
- To understand the various steps in program development.
- To learn the syntax and semantics of the C programming language.
- To learn the usage of structured programming approaches in solving problems.

Course Outcomes: The student will learn

- To write algorithms and to draw flowcharts for solving problems.
- To convert the algorithms/flowcharts to C programs.
- To code and test a given logic in the C programming language.
- To decompose a problem into functions and to develop modular reusable code.
- To use arrays, pointers, strings and structures to write C programs.
- Searching and sorting problems.

UNIT - I: Introduction to Programming

Compilers, compiling and executing a program.

Representation of Algorithm - Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number Flowchart/Pseudocode withexamples, Program design and structured programming

Introduction to C Programming Language: variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, The main method and command line arguments Bitwise operations: Bitwise AND, OR, XOR and NOT operators

Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do- while loops

I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr.Command line arguments

UNIT - II: Arrays, Strings, Structures and Pointers:

Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays

Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings

Structures: Defining structures, initializing structures, unions, Array of structures

Pointers: Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Use of Pointers in self- referential structures, usage of self referential structures in linked list (no implementation)

Enumerationdata type

UNIT - III: Preprocessor and File handling in C:

Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef

Files: Text and Binary files, Creating and Reading and writing text and binary files, Appending

data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell andrewind functions.

UNIT - IV: Function and Dynamic Memory Allocation:

Functions: Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries

Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays ofdifferent data types

UNIT - V: Searching and Sorting:

Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms), Basic concept of order of complexitythrough the example programs

TEXT BOOKS:

1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition,Pearson
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rdEdition)

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall ofIndia
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

B. Tech in COMPUTER SCIENCE AND ENGINEERING
CBCS & OUTCOME BASED COURSE STRUCTURE
COURSE STRUCTURE (R-22)
Applicable From 2022-23 Admitted Batch

CS107ES PROGRAMMING FOR PROBLEM SOLVING LAB
(COMMON TO ALL DEPT.)

B.Tech. I Year I Sem.

L	T	P	C
0	0	2	1

[Note:The programs may be executed using any available Open Source/ Freely available IDE
Some of the Tools available are:
CodeLite: https://codelite.org/
Code:Blocks:
http://www.codeblocks.org/
DevCpp :
http://www.bloodshed.net/devcpp.html
Eclipse: http://www.eclipse.org
This list is not exhaustive and is NOT in any order of preference]

Course Objectives: The students will learn the following:

- To work with an IDE to create, edit, compile, run and debug programs
- To analyze the various steps in program development.
- To develop programs to solve basic problems by understanding basic concepts in C likeoperators, control statements etc.
- To develop modular, reusable and readable C Programs using the concepts like functions,arrays etc.
- To Write programs using the Dynamic Memory Allocation concept.
- To create, read from and write to text and binary files

Course Outcomes: The candidate is expected to be able to:

- formulate the algorithms for simple problems
- translate given algorithms to a working and correct program
- correct syntax errors as reported by the compilers
- identify and correct logical errors encountered during execution
- represent and manipulate data with arrays, strings and structures
- use pointers of different types
- create, read and write to and from simple text and binary files
- modularize the code with functions so that they can be reused

Practice sessions:

a. Write a simple program that prints the results of all the operators available in C (including pre/ post increment , bitwise and/or/not , etc.). Read required operand values from standard input.
b. Write a simple program that converts one given data type to another using auto conversion andcasting. Take the values from standard input.

Simple numeric problems:

a. Write a program for finding the max and min from the three numbers.
b. Write the program for the simple, compound interest.
c. Write a program that declares Class awarded for a given percentage of marks, where mark <40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% =

Distinction.Read percentage from standard input.

d. Write a program that prints a multiplication table for a given number and the number of rows inthe table. For example, for a number 5 and rows = 3, the output should be:

e. 5 x 1 = 5

f. 5 x 2 = 10

g. 5 x 3 = 15

h. Write a program that shows the binary equivalent of a given positive number between 0 to 255.

Expression Evaluation:

a. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula s = ut+(1/2)at^2 where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec^2 (= 9.8 m/s^2)).

b. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

c. Write a program that finds if a given number is a prime number

d. Write a C program to find the sum of individual digits of a positive integer and test given numberis palindrome.

e. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Writea C program to generate the first n terms of the sequence.

f. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

g. Write a C program to find the roots of a Quadratic equation.

h. Write a C program to calculate the following, where x is a fractional value.i. 1-x/2 +x^2/4-x^3/6

j. Write a C program to read in two numbers, x and n, and then compute the sum of this geometricprogression: 1+x+x^2+x^3++x^n. For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

Arrays, Pointers and Functions:

a. Write a C program to find the minimum, maximum and average in an array of integers.

b. Write a function to compute mean, variance, Standard Deviation, sorting of n elements in asingle dimension array.

c. Write a C program that uses functions to perform the following:

d. Addition of Two Matrices

e. Multiplication of Two Matrices

f. Transpose of a matrix with memory dynamically allocated for the new matrix as row and columncounts may not be the same.

g. Write C programs that use both recursive and non-recursive functions

h. To find the factorial of a given integer.

i. To find the GCD (greatest common divisor) of two given integers.

j. To find x^n

k. Write a program for reading elements using a pointer into an array and display the values usingthe array.

l. Write a program for display values reverse order from an array using a pointer.

m. Write a program through a pointer variable to sum of n elements from an array.

Files:

a. Write a C program to display the contents of a file to standard output device.

b. Write a C program which copies one file to another, replacing all lowercase characters withtheir uppercase equivalents.

c. Write a C program to count the number of times a character occurs in a text file. The file nameand the character are supplied as command line arguments.

d. Write a C program that does the following:
It should first create a binary file and store 10 integers, where the file name and 10 values aregiven in the command line. (hint: convert the strings using atoi function)
Now the program asks for an index and a value from the user and the value at that index shouldbe changed to the new value in the file. (hint: use fseek function)
The program should then read all 10 values and print them back.

e. rite a C program to merge two files into a third file (i.e., the contents of the first file followedby those of the second are put in the third file).

Strings:

a. Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.

b. Write a C program that converts a number ranging from 1 to 50 to Roman equivalent

c. Write a C program that uses functions to perform the following operations:

d. To insert a sub-string into a given main string from a given position.

e. To delete n Characters from a given position in a given string.

f. Write a C program to determine if the given string is a palindrome or not (Spelled same in bothdirections with or without a meaning like madam, civic, noon, abcba, etc.)

g. Write a C program that displays the position of a character ch in the string S or – 1 if S doesn'tcontain ch.

h. Write a C program to count the lines, words and characters in a given text.

Miscellaneous:

a. Write a menu driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalidchoice is entered.

b. Write a C program to construct a pyramid of numbers as follows:

```
1          *          1          1          *
1 2        * *        2 3        2 2        * *
1 2 3      * * *      4 5 6      3 3 3      *   *
                                            *
                                4 4 4 4     * *
                                            *
```

Sorting and Searching:

a. Write a C program that uses non recursive function to search for a Key value in a given
b. list of integers using linear search method.
c. Write a C program that uses non recursive function to search for a Key value in a given
d. sorted list of integers using binary search method.
e. Write a C program that implements the Bubble sort method to sort a given list of
f. integers in ascending order.
g. Write a C program that sorts the given array of integers using selection sort in descending order
h. Write a C program that sorts the given array of integers using insertion sort in ascending order
i. Write a C program that sorts a given array of names

TEXT BOOKS:

1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rdEdition)

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, PHI
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

CS203ES DATA STRUCTURES

B.Tech. II Year I Sem. (COMMON TO CSE, IT, CSM, CSD, CSC DEPT..)

L	T	P	C
3	0	0	3

Prerequisites: Programming for Problem Solving

Course Objectives

- Exploring basic data structures such as stacks and queues.
- Introduces a variety of data structures such as hash tables, search trees, tries, heaps, graphs.
- Introduces sorting and pattern matching algorithms

Course Outcomes

- Ability to select the data structures that efficiently model the information in a problem.
- Ability to assess efficiency trade-offs among different data structure implementations or combinations.
- Implement and know the application of algorithms for sorting and pattern matching.
- Design programs using a variety of data structures, including hash tables, binary and generaltree structures, search trees, tries, heaps, graphs, and AVL-trees.

UNIT - I

Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks- Operations, array and linked representations of stacks, stack applications, Queues- operations, array and linked representations.

UNIT - II

Dictionaries: linear list representation, skip list representation, operations - insertion, deletion and searching.

Hash Table Representation: hash functions, collision resolution-separate chaining, open addressing- linear probing, quadratic probing, double hashing, rehashing, extendible hashing.

UNIT - III

Search Trees: Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion, B- Trees, B+ Trees, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching, Red –Black, Splay Trees.

UNIT - IV

Graphs: Graph Implementation Methods. Graph Traversal Methods.

Sorting: Quick Sort, Heap Sort, External Sorting- Model for external sorting, Merge Sort.

UNIT - V

Pattern Matching and Tries: Pattern matching algorithms-Brute force, the Boyer –Moore algorithm, theKnuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries.

TEXT BOOKS:

1. Fundamentals of Data Structures in C, 2 nd Edition, E. Horowitz, S. Sahni and Susan AndersonFreed, Universities Press.
2. Data Structures using C – A. S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/PearsonEducation.

REFERENCE BOOK:

1. Data Structures: A Pseudocode Approach with C, 2 nd Edition, R. F. Gilberg and B.A.Forouzan, Cengage Learning.

B. Tech in COMPUTER SCIENCE AND ENGINEERING
CBCS & OUTCOME BASED COURSE STRUCTURE
COURSE STRUCTURE (R-22)
Applicable From 2022-23 Admitted Batch

TEXT BOOKS:

1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan AndersonFreed, Universities Press.
2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M. J. Augenstein, PHI/PearsonEducation.

REFERENCE BOOK:

1. Data Structures: A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B. A. Forouzan,Cengage Learning.

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

CS207ES DATA STRUCTURES LAB

B.Tech. II Year I Sem. (COMMON TO CSE, IT, CSM, CSD, CSC DEPT.)

L	T	P	C
0	0	3	1.5

Prerequisites: A Course on "Programming for problem solving".

Course Objectives:

- It covers various concepts of C programming language
- It introduces searching and sorting algorithms
- It provides an understanding of data structures such as stacks and queues.

Course Outcomes:

- Ability to develop C programs for computing and real-life applications using basic elements likecontrol statements, arrays, functions, pointers and strings, and data structures like stacks, queues and linked lists.
- Ability to Implement searching and sorting algorithms

List of Experiments:

1. Write a program that uses functions to perform the following operations on singly linkedlist.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
2. Write a program that uses functions to perform the following operations on doubly linkedlist.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
3. Write a program that uses functions to perform the following operations on circular linkedlist.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
4. Write a program that implement stack (its operations) using
   i) Arrays ii) Pointers
5. Write a program that implement Queue (its operations) using
   i) Arrays ii) Pointers
6. Write a program that implements the following sorting methods to sort a given list of integersin ascending order
   i) Quick sort ii) Heap sort iii) Merge sort
7. Write a program to implement the tree traversal methods(Recursive and Non Recursive).
8. Write a program to implement
   i) Binary Search tree ii) B Trees iii) B+ Trees iv) AVLtrees v) Red - Black trees
9. Write a program to implement the graph traversal methods.
10. Implement a Pattern matching algorithms using Boyer- Moore, Knuth-Morris-Pratt

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

II YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	CS301PC	Database Management Systems	3	0	0	3
2	CS302PC	Computer Organization and Architecture	3	0	0	3
3	CS303PC	Operating Systems	3	0	0	3
4	CS304PC	Object Oriented Programming through Java	3	0	0	3
5	CS305PC	Discrete Mathematics	3	0	0	3
6	CS306PC	Database Management Systems Lab	0	0	2	1
7	CS307PC	Operating Systems Lab	0	0	2	1
8	CS308PC	Java Programming Lab	0	0	2	1
9	SD309PC	Skill Development Course (Data Visualization-R Programming/Power Bi)	0	0	2	1
10	*MC310	Environmental Science	2	0	0	0
		Total Credits	17	0	8	**19**

II YEAR II SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1	SM401MS	Business Economics & Financial Analysis	3	0	0	3
2	MA402BS	Computer Oriented Statistical Methods	3	1	0	4
3	EC403ES	Analog & Digital Electronics	3	0	0	3
4	CS404PC	Python Programming	3	0	0	3
5	CS405PC	Software Engineering	3	0	0	3
6	EC406ES	Analog & Digital Electronics Lab	0	0	2	1
7	CS407PC	Python Programming Lab	0	0	2	1
8	CS408PC	Software Engineering Lab	0	0	2	1
9	CS409PC	Real Time Research Project/Societal Related Project	0	0	2	1
10	SD410PC	Skill Development Course (Node JS\React JS\Django)	0	0	2	1
11	*MC411	Gender Sensitization Lab	0	0	2	0
Total Credits			15	1	12	**21**

***MC – Satisfied/Unsatisfied**

14.9.2022

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

III YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	CS501PC	Computer Networks	3	0	0	3
2	CS502PC	Automata Theory and Compiler Design	3	1	0	4
3	CS503PC	Artificial Intelligence	3	0	0	3
4	CS504PC	Big Data Analytics	3	0	0	3
5		Professional Elective - I	3	0	0	3
6	CS505PC	Computer Networks Lab	0	0	2	1
7	CS506PC	Artificial Intelligence Lab	0	0	2	1
8	SD508PC	Skill Development (Mobile Application Development)	0	0	2	1
9	*MC509	Constitution of India	2	0	0	0
10	MC511	Cyber Security	2	0	0	0
		Total Credits	19	1	6	19

III YEAR II SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1.	CS601PC	Design and Analysis of Algorithms	3	1	0	4
2.	CS602PC	Machine Learning	3	0	0	3
3.	CS603PC	Web Technologies	3	0	0	3
4.		Professional Elective – II	3	0	0	3
5.		Open Elective-I	3	0	0	3
6.	CS604PC	Machine Learning Lab	0	0	2	1
7.	CS605PC	Web Technologies Lab	0	0	2	1
8.	EN606HS	Advanced Communication Skills Lab	0	0	2	1
9.	CS607PROJ	Industrial Oriented Mini Project	0	0	4	2
10	*MC608	Intellectual Property Rights	2	0	0	0
		Total Credits	17	1	12	**21**

*MC – Satisfied/Unsatisfied

14.9.2022 14/10

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

IV YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	CS701PC	Data Mining	3	0	0	3
2	CS702PC	Internet of Things	3	0	0	3
3		Professional Elective - III	3	0	0	3
4		Professional Elective -IV	3	0	0	3
5		Open Elective-II / MOOCS	3	0	0	3
6	CS703PC	Data Mining Lab	0	0	3	1.5
7	CS704PC	Internet of Things Lab	0	0	3	1.5
8	CS705PROJ	Project -I	0	0	6	3
9						
Total Credits			15	0	12	21

IV YEAR II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1		Professional Elective -V / MOOCS	3	0	0	3
2		Professional Elective -VI	3	0	0	3
3		Open Elective-III / MOOCS	3	0	0	3
4	CS801PROJ	Seminar	0	0	2	1
5	CS802PROJ	Project -II	0	0	18	9
Total Credits			9	0	18	19

14.9.2022

17/10

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

Professional Elective – I

CS511PE	Cryptography & Network Security
CS512PE	Data Analytics using R
CS513PE	Principle of Programming Languages
CS514PE	Computer Graphics

Professional Elective – II

CS621PE	Network Programming & Management
CS622PE	Natural Language Processing
CS623PE	Software Project Management
CS624PE	Information Retrieval System

Professional Elective – III

CS731PE	Information Security & Risk management
CS732PE	Deep Learning
CS733PE	Object Oriented Modeling and Design
CS734PE	Image Processing

Professional Elective – IV

CS741PE	Distributed Systems
CS742PE	Semantic web and Social Networks
CS743PE	Software Testing Methodologies
CS744PE	Pattern Recognition

Professional Elective – V / MOOCS

CS851PE	Blockchain Technology
CS852PE	Mobile Application Development
CS853PE	Design Patterns
CS854PE	Virtual Reality

Professional Elective - VI

CS861PE	Cyber Forensics
CS862PE	Robotics Process Automation
CS863PE	Cloud Computing
CS864PE	Computer Vision

14-9-2022

19/10

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

Open Elective-I

CS611OE	Database Management Systems
CS612OE	Operating Systems
CS613OE	Software Engineering
CS614OE	Java Programming

Open Elective-II

CS721OE	Introduction to Data Analytics
CS722OE	Linux Programming
CS723OE	Software Project Management
CS724OE	Python Programming

Open Elective-III

CS831OE	R Programming
CS832OE	Block Chain Technology
CS833OE	Software Testing Methodologies
CS834OE	Web Programming

14.9.2022 14/10

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi, Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

II YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	CS301PC	Database Management Systems	3	0	0	3
2	CS302PC	Computer Organization and Architecture	3	1	0	4
3	CS303PC	Operating Systems	3	0	0	3
4	CS304PC	Object Oriented Programming through Java	3	0	0	3
5	CS305PC	Discrete Mathematics	3	0	0	3
6	CS306PC	Database Management Systems Lab	0	0	2	1
7	CS307PC	Operating Systems Lab	0	0	2	1
8	CS308PC	Java Programming Lab	0	0	2	1
9	SD309PC	Skill Development Course (Data Visualization-R Programming/Power Bi)	0	0	2	1
10	*MC310	Environmental Science	2	0	0	0
		Total Credits	17	1	8	**20**

II YEAR II SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1	SM401MS	Business Economics & Financial Analysis	3	0	0	3
2	MA402BS	Computer Oriented Statistical Methods	3	0	0	3
3	CS403ES	Analog & Digital Electronics	3	0	0	3
4	CS404PC	Python Programming	3	0	0	3
5	CS405PC	Software Engineering	3	0	0	3
6	CS406ES	Analog & Digital Electronics Lab	0	0	2	1
7	CS407PC	Python Programming Lab	0	0	2	1
8	CS408PC	Software Engineering Lab	0	0	2	1
9	CS409PC	Real Time Research Project/Societal Related Project	0	0	2	1
10	SD410PC	Skill Development Course (Node JS\React JS\Django)	0	0	2	1
11	*MC411	Gender Sensitization Lab	0	0	2	0
Total Credits			15	0	12	**20**

***MC – Satisfied/Unsatisfied**

14.9.2022

19/10

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi, Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

B.TECH II Year I Sem.

L	T	P	C
3	0	0	3

CS301PC: DATABASE MANAGEMENT SYSTEMS

Common to CSE, CSD and CSC

Prerequisites: A course on "Data Structures.

Course Objectives:

- To understand the basic concepts and the applications of database systems.
- To master the basics of SQL and construct queries using SQL.
- Topics include data models, database design, relational model, relational algebra, transaction control, concurrency control, storage structures and access techniques.

Course Outcomes:

- Gain knowledge of fundamentals of DBMS, database design and normal forms
- Master the basics of SQL for retrieval and management of data.
- Be acquainted with the basics of transaction processing and concurrency control.
- Familiarity with database storage structures and access techniques

UNIT - I

Database System Applications: A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design With the ER Model

UNIT - II

Introduction to the Relational Model: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base design, introduction to views, destroying/altering tables and views.

Relational Algebra, Tuple relational Calculus, Domain relational calculus.

UNIT - III

SQL: QUERIES, CONSTRAINTS, TRIGGERS: form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active data bases.

Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, multi-valued dependencies, FOURTH normal form, FIFTH normal form.

UNIT - IV

Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions.

UNIT - V

Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree base Indexing, Comparison of File Organizations, Indexes and Performance Tuning, Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

TEXT BOOKS:

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, *Tata Mc GrawHill* 3rd Edition

2. Database System Concepts, Silberschatz, Korth, *Mc Graw hill*, Vedition.

REFERENCES:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7thEdition.
2. Fundamentals of Database Systems, Elmasri Navrate, *Pearson Education*
3. Introduction to Database Systems, C. J. Date, *Pearson Education*
4. Oracle for Professionals, The X Team, S.Shah and V. Shah,*SPD.*
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL,Shah,*PHI.*
6. Fundamentals of Database Management Systems, M. L. Gillenson, *Wiley Studen t*Edition.

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

B.TECH II Year I Sem.

L	T	P	C
3	0	0	3

CS302PC: COMPUTER ORGANIZATION AND ARCHITECTURE

Common to CSE, IT, CSM and CSC

Pre-requisite: A Course on "Digital Logic Design and Microprocessors".

Course Objectives:

- The purpose of the course is to introduce principles of computer organization and the basic architectural concepts.
- It begins with basic organization, design, and programming of a simple digital computer and introduces simple register transfer language to specify various computer operations.
- Topics include computer arithmetic, instruction set design, micro programmed control unit, pipelining and vector processing, memory organization and I/O systems, and multiprocessors

Course Outcomes:

- Understand the basics of instructions sets and their impact on process or design.
- Demonstrate an understanding of the design of the functional units of a digital computer system.
- Evaluate cost performance and design trade-offs in designing and constructing a computer processor including memory.
- Design a pipeline for consistent execution of instructions with minimum hazards.
- Recognize and manipulate representations of numbers stored in digital computers

UNIT - I

Digital Computers: Introduction, Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture.

Register Transfer Language and Micro operations: Register Transfer language, Register Transfer, Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.

Basic Computer Organization and Design: Instruction codes, Computer Registers Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt.

UNIT - II

Microprogrammed Control: Control memory, Address sequencing, micro program example, design of control unit.

Central Processing Unit: General Register Organization, Instruction Formats, Addressing modes, Data Transfer and Manipulation, Program Control.

UNIT - III

Data Representation: Data types, Complements, Fixed Point Representation, Floating Point Representation.

Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

UNIT - IV

Input-Output Organization: Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt Direct memory Access.

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory.

UNIT - V

Reduced Instruction Set Computer: CISC Characteristics, RISC Characteristics.

B. Tech in COMPUTER SCIENCE AND ENGINEERING
CBCS & OUTCOME BASED COURSE STRUCTURE
COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processor.

Multi Processors: Characteristics of Multiprocessors, Interconnection Structures, Interprocessor arbitration, Interprocessor communication and synchronization, Cache Coherence.

TEXT BOOKS:

1. Computer System Architecture – M. Moris Mano, Third Edition, Pearson/PHI.

REFERENCES:

1. Computer Organization – Car Hamacher, Zvonks Vranesic, Safea Zaky, Vth Edition, McGraw Hill.
2. Computer Organization and Architecture – William Stallings Sixth Edition,Pearson/PHI.
3. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition,PHI/Pearson.

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

CMR ENGINEERING COLLEGE, HYDERABAD

B.TECH II Year I Sem.

L	T	P	C
3	0	0	3

CS303PC: OPERATING SYSTEMS

Common to CSE, IT, CSM, CSD and CSC

Prerequisites:

- A course on "Computer Programming and Data Structures".
- A course on "Computer Organization and Architecture".

Course Objectives:

- •Introduce operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection)
- Introduce the issues to be considered in the design and development of operating system
- Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix

Course Outcomes:

- Will be able to control access to a computer and the files that may be shared
- Demonstrate the knowledge of the components of computers and their respective roles in computing.
- Ability to recognize and resolve user problems with standard operating environments.
- Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively.

UNIT - I

Operating System - Introduction, Structures - Simple Batch, Multiprogrammed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls

Process - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads

UNIT - II

CPU Scheduling - Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling. System call interface for process management-fork, exit, wait, waitpid, exec

Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock

UNIT - III

Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors

Interprocess Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

UNIT - IV

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms.

UNIT - V

File System Interface and Operations -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management. Usage of open, create, read, write, close, lseek, stat, ioctl system calls.

TEXT BOOKS:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition,
2. John Wiley. Advanced programming in the UNIX environment, W.R. Stevens, Pearson education.

REFERENCE BOOKS:

1. Operating Systems- Internals and Design Principles, William Stallings, Fifth Edition–2005, Pearson Education/PHI
2. Operating System A Design Approach- Crowley, TMH.
3. Modern Operating Systems, Andrew S. Tanenbaum 2nd edition, Pearson/PHI
4. UNIX programming environment, Kernighan and Pike, PHI/ Pearson Education
5. UNIX Internals -The New Frontiers, U. Vahalia, Pearson Education.

14/10

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

B.TECH II Year I Sem.

L	T	P	C
3	0	0	3

CS304PC: OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Common to CSE, IT, CSM, CSD and CSC

Course Objectives

- To Understand the basic object-oriented programming concepts and apply them in problem solving.
- To Illustrate inheritance concepts for reusing the program.
- To Demonstrate multitasking by using multiple threads and event handling
- To Develop data-centric applications using JDBC.
- To Understand the basics of java console and GUI based programming

Course Outcomes

- Demonstrate the behavior of programs involving the basic programming constructs like control structures, constructors, string handling and garbage collection.
- Demonstrate the implementation of inheritance (multilevel, hierarchical and multiple) by using extend and implement keywords
- Use multithreading concepts to develop inter process communication.
- Understand the process of graphical user interface design and implementation using AWT or swings.
- Develop applets that interact abundantly with the client environment and deploy on the server.

UNIT - I

Object oriented thinking and Java Basics- Need for oop paradigm, summary of oop concepts, coping with complexity, abstraction mechanisms. A way of viewing world – Agents, responsibility, messages, methods, History of Java, Java buzzwords, data types, variables, scope and lifetime of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, method binding, inheritance, overriding and exceptions, parameter passing, recursion, nested and inner classes, exploring string class.

UNIT - II

Inheritance, Packages and Interfaces – Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism- method overriding, abstract classes, the Object class. Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces. Exploring java.io.

UNIT - III

Exception handling and Multithreading-- Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception subclasses. String handling, Exploring java.util. Differences between multithreading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, inter thread communication, thread groups, daemon threads. Enumerations, autoboxing, annotations, generics.

UNIT - IV

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes. The AWT class hierarchy, user interface components- labels, button, canvas, scrollbars, text components, check box, checkbox groups, choices, lists panels – scrollpane, dialogs, menubar, graphics, layout manager – layout manager types – border,grid, flow, card and grid bag.

UNIT - V

Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets. Swing – Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons – The JButton class, Check boxes, Radio buttons, Combo boxes,Tabbed Panes, Scroll Panes, Trees, and Tables.

TEXT BOOKS:

1. Java the complete reference, 7th edition, Herbert schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, Pearson education.

REFERENCE BOOKS:

1. An Introduction to programming and OO design using Java, J.Nino and F.A. Hosch, John wiley& sons.
2. An Introduction to OOP, third edition, T. Budd, Pearson education.
3. Introduction to Java programming, Y. Daniel Liang, Pearson education.
4. An introduction to Java programming and object-oriented application development, R.A. Johnson- Thomson.
5. Core Java 2, Vol 1, Fundamentals, Cay.S. Horstmann and Gary Cornell, eighth Edition,Pearson Education.
6. Core Java 2, Vol 2, Advanced Features, Cay.S. Horstmann and Gary Cornell, eighth Edition,Pearson Education
7. Object Oriented Programming with Java, R.Buyya, S.T.Selvi, X.Chu, TMH.

Java and Object Orientation, an introduction, John Hunt, second edition, Springer. 9. Maurach's Beginning Java2 JDK 5, SPD.

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

B.TECH II Year I Sem.

L	T	P	C
3	0	0	3

CS305PC: DISCRETE MATHEMATICS

Common to CSE, IT, CSM

Prerequisites: An understanding of Mathematics in general is sufficient.

Course Objectives:

- Introduces elementary discrete mathematics for computer science and engineering.
- Topics include formal logic notation, methods of proof, induction, sets, relations, algebraic structures, elementary graph theory, permutations and combinations, counting principles; recurrence relations and generating functions.

Course Outcomes:

- Understand and construct precise mathematical proofs
- Apply logic and set theory to formulate precise statements
- Analyze and solve counting problems on finite and discrete structures
- Describe and manipulate sequences
- Apply graph theory in solving computing problems

UNIT - I

Mathematical logic: Introduction, Statements and Notation, Connectives, Normal Forms, Theory of Inference for the Statement Calculus, The Predicate Calculus, Inference Theory of the Predicate Calculus.

UNIT - II

Set theory: Introduction, Basic Concepts of Set Theory, Representation of Discrete Structures, Relations and Ordering, Functions.

UNIT - III

Algebraic Structures: Introduction, Algebraic Systems, Semi groups and Monoids, Lattices as PartiallyOrdered Sets, Boolean Algebra.

UNIT - IV

Elementary Combinatorics: Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutation with Constrained Repetitions, Binomial Coefficient, The Binomial and Multinomial Theorems, The Principle of Exclusion.

UNIT - V

Graph Theory: Basic Concepts, Isomorphism and Subgraphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multi-graphs and Euler Circuits,Hamiltonian Graphs, Chromatic Numbers, The Four-Color Problem.

B. Tech in COMPUTER SCIENCE AND ENGINEERING
CBCS & OUTCOME BASED COURSE STRUCTURE
COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

TEXT BOOKS:

1. Discrete Mathematical Structures with Applications to Computer Science: J.P. Tremblay, R. Manohar, McGraw-Hill, 1st ed.
2. Discrete Mathematics for Computer Scientists & Mathematicians: Joe l. Mott, Abraham Kandel,Teodore P. Baker, Prentis Hall of India, 2nd ed.

REFERENCE BOOKS:

1. Discrete and Combinatorial Mathematics - an applied introduction: Ralph.P. Grimald, Pearsoneducation, 5th edition.
2. Discrete Mathematical Structures: Thomas Kosy, Tata McGraw Hill publishing co.

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

B.TECH II Year I Sem.

L	T	P	C
0	0	2	1

CS306PC: DATABASE MANAGEMENT SYSTEMS LAB

Common to CSE, CSD and CSC

Co-requisites:

- Co-requisite of course "Database Management Systems"

Course Objectives:

- Introduce ER data model, database design and normalization
- Learn SQL basics for data definition and data manipulation

Course Outcomes:

- Design database schema for a given application and apply normalization
- Acquire skills in using SQL commands for data definition and data manipulation.
- Develop solutions for database applications using procedures, cursors and triggers

LIST OF EXPERIMENTS:

1. Concept design with E-R Model
2. Relational Model
3. Normalization
4. Practicing DDL commands
5. Practicing DML commands
6. Querying (using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.)
7. Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.
8. Triggers (Creation of insert trigger, delete trigger, update trigger)
9. Procedures
10. Usage of Cursors

TEXT BOOKS:

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill, 3rdEdition
2. Database System Concepts, Silberschatz, Korth, McGraw Hill, Vedition.

REFERENCES BOOKS:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7thEdition.
2. Fundamentals of Database Systems, Elmasri Navrate, *Pearson Education*
3. Introduction to Database Systems, C.J. Date, *Pearson Education*
4. Oracle for Professionals, The X Team, S. Shah and V. Shah,*SPD.*
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah,*PHI.*
6. Fundamentals of Database Management Systems, M. L. Gillenson, *Wiley Student Edition.*

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

B.TECH II Year I Sem.

L	T	P	C
0	0	2	1

CS307PC: OPERATING SYSTEMS LAB (Using UNIX/LINUX)

Common to CSE, IT, CSM, CSD and CSC

Prerequisites: A course on "Programming for Problem Solving", A course on "Computer Organizationand Architecture".

Co-requisite: A course on "Operating Systems".

Course Objectives:

- To provide an understanding of the design aspects of operating system concepts throughsimulation
- Introduce basic Unix commands, system call interface for process management, interprocesscommunication and I/O in Unix

Course Outcomes:

- Simulate and implement operating system concepts such as scheduling, deadlock management, file management and memory management.
- Able to implement C programs using Unix system calls

List of Experiments:

1. Write C programs to simulate the following CPU Scheduling algorithms a) FCFS b) SJF c) RoundRobin d) priority
2. Write programs using the I/O system calls of UNIX/LINUX operating system (open, read, write, close,fcntl, seek, stat, opendir, readdir)
3. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance and Prevention.
4. Write a C program to implement the Producer – Consumer problem using semaphores usingUNIX/LINUX system calls.
5. Write C programs to illustrate the following IPC mechanisms a) Pipes b) FIFOs c) Message Queues d) Shared Memory
6. Write C programs to simulate the following memory management techniques a) Paging b) Segmentation
7. Write C programs to simulate Page replacement policies a) FCFS b) LRU c) Optimal

TEXT BOOKS:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition,John Wiley
2. Advanced programming in the Unix environment, W.R.Stevens, Pearson education.

REFERENCE BOOKS:

1. Operating Systems – Internals and Design Principles, William Stallings, Fifth Edition–2005,Pearson Education/PHI
2. Operating System - A Design Approach-Crowley, TMH.
3. Modern Operating Systems, Andrew S Tanenbaum, 2nd edition, Pearson/PHI
4. UNIX Programming Environment, Kernighan and Pike, PHI/Pearson Education
5. UNIX Internals: The New Frontiers, U. Vahalia, Pearson Education

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

B.TECH II Year I Sem

L T P C

0 0 2 1

CS308PC: JAVA PROGRAMMING LAB

Common to CSE, IT, CSM,CSD and CSC

Course Objectives:

- To write programs using abstract classes.
- To write programs for solving real world problems using the java collection framework.
- To write multithreaded programs.
- To write GUI programs using swing controls in Java.
- To introduce java compiler and eclipse platform.
- To impart hands-on experience with java programming.

Course Outcomes:

- Able to write programs for solving real world problems using the java collection framework.
- Able to write programs using abstract classes.
- Able to write multithreaded programs.
- Able to write GUI programs using swing controls in Java.

Note:

1. Use LINUX and MySQL for the Lab Experiments. Though not mandatory, encourage the useof the Eclipse platform.

2. The list suggests the minimum program set. Hence, the concerned staff is requested to add more problems to the list as needed.

List of Experiments:

1. Use Eclipse or Net bean platform and acquaint yourself with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop.

2. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero.

3. A) Develop an applet in Java that displays a simple message.
B) Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named "Compute" is clicked.

4. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num 2 is displayed in the

Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialog box.

5. Write a Java program that implements a multi-thread application that has three threads. First thread generates a random integer every 1 second and if the value is even, the second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of the cube of the number.

6. Write a Java program for the following:Create a doubly linked list of elements.
Delete a given element from the above list. Display the contents of the list after deletion.

7. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with "Stop" or "Ready" or "Go" should appear above the buttons in the selected color. Initially, there is no message shown.

8. Write a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the methodprint Area () that prints the area of the given shape.

9. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, andthe remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using Labels in Grid Layout.

10. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes).

11. Write a Java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab (\t). It takes a name or phone number as input and prints the corresponding other value from the hash table (hint:use hash tables).

12. Write a Java program that correctly implements the producer – consumer problem using theconcept of inter thread communication.

13. Write a Java program to list all the files in a directory including the files present in all itssubdirectories.

REFERENCE BOOKS:

1. Java for Programmers, P. J. Deitel and H. M. Deitel, 10th Edition Pearson education.
2. Thinking in Java, Bruce Eckel, Pearson Education.
3. Java Programming, D. S. Malik and P. S. Nair, Cengage Learning.
4. Core Java, Volume 1, 9th edition, Cay S. Horstmann and G Cornell, Pearson.

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

B.TECH II Year I Sem.

L	T	P	C
0	0	2	1

SD309PC: Skill Development Course (Data Visualization-R Programming/Power Bi)
Common to CSE, IT, CSD and CSC

Course Objectives:

- Effective use of Business Intelligence (BI) technology (Tableau) to apply data visualization
- To discern patterns and relationships in the data.
- To build Dashboard applications.
- To communicate the results clearly and concisely.
- To be able to work with different formats of data sets.

Course Outcomes: At the end of the course a student should be able to

- Understand How to import data into Tableau.
- Understand Tableau concepts of Dimensions and Measures.
- Develop Programs and understand how to map Visual Layouts and Graphical Properties.
- Create a Dashboard that links multiple visualizations.
- Use graphical.user interfaces to create Frames for providing solutions to real world problems.

Lab Problems:

1. Understanding Data, What is data, where to find data, Foundations for building Data Visualizations,Creating Your First visualization?

2. Getting started with Tableau Software using Data file formats, connecting your Data to Tableau,creating basic charts(line, bar charts, Tree maps),Using the Show me panel.

3. Tableau Calculations, Overview of SUM, AVR, and Aggregate features, Creating custom calculationsand fields.

4. Applying new data calculations to your visualizations, Formatting Visualizations, Formatting Toolsand Menus, Formatting specific parts of the view.

5. Editing and Formatting Axes, Manipulating Data in Tableau data, Pivoting Tableau data.

6. Structuring your data, Sorting and filtering Tableau data, Pivoting Tableau data.

7. Advanced Visualization Tools: Using Filters, Using the Detail panel, using the Size panels, customizing filters, Using and Customizing tooltips, Formatting your data with colors.

8. Creating Dashboards & Storytelling, creating your first dashboard and Story, Design for differentdisplays, adding interactivity to your Dashboard, Distributing & Publishing your Visualization.

9. Tableau file types, publishing to Tableau Online, Sharing your visualizations, printing, and Exporting.

10. Creating custom charts, cyclical data and circular area charts, Dual Axis charts.

REFERENCE BOOKS:

1. Microsoft Power BI cookbook, Brett Powell, 2nd edition.
2. R Programming for Data Science by Roger D. Peng (References)
3. The Art of R Programming by Norman Matloff Cengage Learning India.

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

B.TECH II Year I Sem.

L	T	P	C
2	0	0	0

*MC310:ENVIRONMENTAL SCIENCE
Common to CSE, IT and ECE

Course Objectives:

- S – skills (Acquire the skills for identifying and solving environmental problems)
- P – protection qualities(participate in improvement and protection of the environment)
- E – evaluation abilities(develop the ability to evaluate measures for the protection of environment)
- A – attitude (acquire an attitude of concern for the development)
- K – knowledge (gain knowledge about the environment and its allied problems)

Course Outcomes:

Based on this course, the Engineering graduate will

- **Define** basic definitions and can explain complex relationship between predators, prey and the plant community.
- **Categorize** resources in natural environment and its relationships with human activities as well as human impacts.
- **Demonstrate** an awareness, knowledge and appreciation of the intrinsic values of ecological processes and communities
- **Assess** different scientific research strategies, including collection, management, evaluation and interpretation of environmental data and role of information technology in environment
- **Examine** the transnational character of environmental problems, protection acts and ways of addressing them, including interactions across local to global scales

UNIT-I :

Ecosystems: Definition, Scope and Importance of ecosystem. Classification, structure and function of an ecosystem-Food chains, food webs and ecological pyramids. Flow of energy, biogeochemical cycles, bioaccumulation, biomagnifications, ecosystem value, services and carrying capacity.

UNIT-II:

Natural Resources: Classification of Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: forest resources, Energy resources: growing energy needs, renewable and non renewable energy sources.

UNIT-III:

Biodiversity and biotic resources: Introduction, definition, genetic, species and ecosystem diversity. Values of biodiversity- consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity.. Threats to biodiversity: habitat loss, poaching of wildlife, man- wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV:

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants, automobile and industrial pollution, Ambient air quality standards. Water pollution: Sources and types of pollution, drinking water quality standards. Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, composition and characteristics of e-waste and its management. Pollution control technologies: Wastewater treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. Global environmental problems and Global Efforts: Climate change and impacts on human environment. Ozone depletion and ozone depleting substances (ODS). International conventions / Protocols: Earth summit, Kyoto protocol and Montréal protocol.

UNIT-V:

Environmental Policy, Legislation & EIA: Environmental protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio- economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP).

Towards Sustainable future: Concept of sustainable development, population and its explosion, Crazy Consumerism, Environmental education, Urban sprawl, Human health, Environmental ethics, Concept of green building, Ecological foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental studies by Anubha Kaushik and C.P.Kaushik

REFERENCE BOOKS:

1. Environmental Studies –From crisis to cure by Dr. R. Rajagopaln
2. Text book for Environmental science and Technology by M. Anji Reddy
3. Environmental engineering and Disaster management by KR.Chandoke
4. Environmental engineering and science- Third edition by Gilbert M.Masters and Wendell P.Ella
5. Environmental studies by O.V.K.Reddy
6. Environmental Science and Engineering by Aloka Debi.

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

B.TECH II Year II Sem.

L	T	P	C
3	0	0	3

SM401MS: BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

Common to CSE, IT and CSD

Prerequisites: None

Course Objective: To learn the basic Business types, impact of the Economy on Business and Firms specifically. To analyze the Business from the Financial Perspective.

Course Outcome: The students will understand the various Forms of Business and the impact of economic variables on the Business. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt. The Students can study the firm's financial position by analyzing the Financial Statements of a Company.

UNIT – I

Introduction to Business and Economics:

Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance.

Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

UNIT - II

Demand and Supply Analysis:

Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.

Supply Analysis: Determinants of Supply, Supply Function & Law of Supply.

UNIT - III

Production, Cost, Market Structures & Pricing:

Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions.

Cost analysis: Types of Costs, Short run and Long run Cost Functions.

Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, Monopolistic Competition.

Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, Cost Volume Profit Analysis.

UNIT -IV

Financial Accounting: Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts.

UNIT - V

Financial Analysis through Ratios: Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems).
Introduction to Fund Flow and Cash Flow Analysis (simple problems).

TEXT BOOKS:

1. D.D. Chaturvedi, S.L. Gupta, Business Economics - Theory and Applications, International Book House Pvt. Ltd.2013.
2. Dhanesh K Khatri, Financial Accounting, Tata McGraw Hill,2011.
3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata McGraw Hill Education Pvt. Ltd.2012.

REFERENCES:

1. Paresh Shah, Financial Accounting for Management 2e, Oxford Press,2015.
2. S.N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e, Vikas Publications,2013.

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

B.TECH II Year II Sem.

L T P C
3 1 0 4

MA402BS: COMPUTER ORIENTED STATISTICAL METHODS

Common to CSE, IT

Pre-requisites: Mathematics courses of first year of study.

Course Objectives: To learn

- The theory of Probability, and probability distributions of single and multiple random variables
- The sampling theory and testing of hypothesis and making inferences
- Stochastic process and Markov chains.

Course Outcomes: After learning the contents of this paper the student must be able to

- Apply the concepts of probability and distributions to some case studies
- Correlate the material of one unit to the material in other units
- Resolve the potential misconceptions and hazards in each topic of study.

UNIT - I

Probability: Sample Space, Events, Counting Sample Points, Probability of an Event, Additive Rules, Conditional Probability, Independence, and the Product Rule, Bayes' Rule.

Random Variables and Probability Distributions: Concept of a Random Variable, Discrete Probability Distributions, Continuous Probability Distributions, Statistical Independence.

UNIT - II

Mathematical Expectation: Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables, Chebyshev's Theorem.

Discrete Probability Distributions: Introduction and Motivation, Binomial, Distribution, Geometric Distributions and Poisson distribution.

UNIT - III

Continuous Probability Distributions: Continuous Uniform Distribution, Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial, Gamma and Exponential Distributions.

Fundamental Sampling Distributions: Random Sampling, Some Important Statistics, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem, Sampling Distribution of S2, t –Distribution, F-Distribution.

UNIT - IV

Estimation & Tests of Hypotheses: Introduction, Statistical Inference, Classical Methods of Estimation.: Estimating the Mean, Standard Error of a Point Estimate, Prediction Intervals, Tolerance Limits, Estimating the Variance, Estimating a Proportion for single mean, Difference between Two Means, between Two Proportions for Two Samples and Maximum Likelihood Estimation.

Statistical Hypotheses: General Concepts, Testing a Statistical Hypothesis, Tests Concerning a Single Mean, Tests on Two Means, Test on a Single Proportion, Two Samples: Tests on Two Proportions.

UNIT - V

Stochastic Processes and Markov Chains: Introduction to Stochastic processes- Markov process. Transition Probability, Transition Probability Matrix, First order and Higher order Markov process, n- step transition probabilities, Markov chain, Steady state condition, Markov analysis.

TEXT BOOKS:

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statistics for Engineers & Scientists, 9th Ed. Pearson Publishers.
2. S C Gupta and V K Kapoor, Fundamentals of Mathematical statistics, Khanna publications.
3. S. D. Sharma, Operations Research, Kedarnath and Ramnath Publishers, Meerut, Delhi

REFERENCE BOOKS:

1. T.T. Soong, Fundamentals of Probability And Statistics For Engineers, John Wiley & Sons Ltd,2004.
2. Sheldon M Ross, Probability and statistics for Engineers and scientists, Academic Press.

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

B.TECH II Year II Sem.

L T P C

3 0 0 3

EC403ES: ANALOG AND DIGITAL ELECTRONICS

Common to CSE and CSC

Course Objectives:

- To introduce components such as diodes, BJTs and FETs.
- To know the applications of components.
- To give understanding of various types of amplifier circuits
- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
- To understand the concepts of combinational logic circuits and sequential circuits.

Course Outcomes: Upon completion of the Course, the students will be able to:

- Know the characteristics of various components.
- Understand the utilization of components.
- Design and analyze small signal amplifier circuits.
- Learn Postulates of Boolean algebra and to minimize combinational functions
- Design and analyze combinational and sequential circuits
- Know about the logic families and realization of logic gates.

UNIT - I

Diodes and Applications: Junction diode characteristics: Open circuited p-n junction, p-n junction as a rectifier, V-I characteristics, effect of temperature, diode resistance, diffusion capacitance, diode switching times, breakdown diodes, Tunnel diodes, photo diode, LED.

Diode Applications - clipping circuits, comparators, Half wave rectifier, Full wave rectifier, rectifier with capacitor filter.

UNIT - II

BJTs: Transistor characteristics: The junction transistor, transistor as an amplifier, CB, CE, CC configurations, comparison of transistor configurations, the operating point, self-bias or Emitter bias, bias compensation, thermal runaway and stability, transistor at low frequencies, CE amplifier response, gain bandwidth product, Emitter follower, RC coupled amplifier, two cascaded CE and multi stage CE amplifiers.

UNIT - III

FETs and Digital Circuits: FETs: JFET, V-I characteristics, MOSFET, low frequency CS and CD amplifiers, CS and CD amplifiers.

Digital Circuits: Digital (binary) operations of a system, OR gate, AND gate, NOT, EXCLUSIVE OR gate, De Morgan Laws, NAND and NOR DTL gates, modified DTL gates, HTL and TTL gates, output stages, RTL and DCTL, CMOS, Comparison of logic families.

UNIT - IV

Combinational Logic Circuits: Basic Theorems and Properties of Boolean Algebra, Canonical and Standard Forms, Digital Logic Gates, The Map Method, Product-of-Sums Simplification, Don't-Care Conditions, NAND and NOR Implementation, Exclusive-OR Function, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers.

UNIT - V

Sequential Logic Circuits: Sequential Circuits, Storage Elements: Latches and flip flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Shift Registers, Ripple Counters, Synchronous Counters, Random-Access Memory, Read-Only Memory.

TEXTBOOKS:

1. Integrated Electronics: Analog and Digital Circuits and Systems, 2/e, Jaccob Millman, Christos Halkias and Chethan D. Parikh, *Tata McGraw-Hill Education*, India,2010.
2. Digital Design, 5/e, Morris Mano and Michael D. Cilette, *Pearson*,2011.

REFERENCE BOOKS:

1. Electronic Devices and Circuits, Jimmy J Cathey, *Schaum's outline series*,1988.
2. Digital Principles, 3/e, Roger L. Tokheim, *Schaum's outline series*,1994.

19/10

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

B.TECH II Year II Sem.

L	T	P	C
3	0	0	3

CS404PC: PYTHON PROGRAMMING
Common to CSE, IT, CSM,CSD and CSC

Course Objectives: This course will enable students to

- Learn Syntax and Semantics and create Functions in Python.
- Handle Strings and Files in Python.
- Understand Lists, Dictionaries and Regular expressions in Python.
- Implement Object Oriented Programming concepts in Python.
- Build Web Services and introduction to Network and Database Programming inPython.

Course Outcomes: The students should be able to:

- Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
- Demonstrate proficiency in handling Strings and File Systems.
- Create, run and manipulate Python Programs using core data structures like Lists,Dictionaries and use Regular Expressions.
- Interpret the concepts of Object-Oriented Programming as used in Python.
- Implement exemplary applications related to Network Programming, Web Services and Databases in Python.

UNIT - I

Python Basics, Objects- Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types
Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules

Sequences - Strings, Lists, and Tuples, Mapping and Set Types

UNIT - II

FILES: File Objects, File Built-in Function [open()], File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, PersistentStorage Modules, Related Modules

Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management, *Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions,
*Creating Exceptions, Why Exceptions (Now)?, Why Exceptions at All?, Exceptions and the sys Module, Related Modules.

B. Tech in COMPUTER SCIENCE AND ENGINEERING
CBCS & OUTCOME BASED COURSE STRUCTURE
COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes,Module Built-in Functions, Packages, Other Features of Modules

UNIT - III

Regular Expressions: Introduction, Special Symbols and Characters, Res and Python Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules

UNIT - IV

GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs

WEB Programming: Introduction, Wed Surfing with Python, Creating Simple Web Clients, Advanced Web Clients, CGI-Helping Servers Process Client Data, Building CGI Application Advanced CGI, Web (HTTP) Servers

UNIT – V

Database Programming: Introduction, Python Database Application Programmer's Interface (DB-API), Object Relational Managers (ORMs), Related Modules

Textbook

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING
CBCS & OUTCOME BASED COURSE STRUCTURE
COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

B.Tech II Year II-Sem

L	T	P	C
3	0	0	3

CS405PC: SOFTWARE ENGINEERING
Common to CSE,IT,CSM,CSD and CSC

Course Objectives

- The aim of the course is to provide an understanding of the working knowledge of the techniques for estimation, design, testing and quality management of large software development projects.
- Topics include process models, software requirements, software design, software testing, software process/product metrics, risk management, quality management and UML diagrams

Course Outcomes

- Ability to translate end-user requirements into system and software requirements, using e.g. UML, and structure the requirements in a Software Requirements Document(SRD).
- Identifyandapplyappropriatesoftwarearchitecturesandpatternstocarryouthighleveldesign of a system and be able to critically compare alternative choices.
- Willhaveexperienceand/orawarenessoftestingproblemsandwillbeabletodevelopasimple testing report

UNIT - I

Introduction to Software Engineering: The evolving role of software, changing nature of software, software myths.
A Generic view of process: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI), process patterns, process assessment, personal and team process models.
Process models: The waterfall model, incremental process models, evolutionary process models, the unified process.

UNIT - II

Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document.
Requirements engineering process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.
System models: Context models, behavioral models, data models, object models, structured methods.

UNIT - III

Design Engineering: Design process and design quality, design concepts, the design model. **Creatinganarchitecturaldesign:**softwarearchitecture,datadesign,architecturalstylesandpatterns, architectural design, conceptual model of UML, basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.

UNIT - IV

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging.
Product metrics: Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.

UNIT - V

Metrics for Process and Products: Software measurement, metrics for software quality.
Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan.

B. Tech in COMPUTER SCIENCE AND ENGINEERING
CBCS & OUTCOME BASED COURSE STRUCTURE
COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

QualityManagement: Qualityconcepts,softwarequalityassurance,softwarereviews,formaltechnical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

TEXT BOOKS:

1. Software Engineering, A practitioner's Approach-Roger S. Pressman,6th edition, McGraw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.

REFERENCES:

1. SoftwareEngineering,anEngineeringapproach-JamesF.Peters,WitoldPedrycz,JohnWiley.
2. Software Engineering principles and practice- Waman S Jawadekar, The Mc Graw-Hill Companies.
3. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.
4. Software Engineering by K K Agarwal and Yogesh Singh 3rd Edition, New Age International.

19/10

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

B.TECH II Year II Sem.

L	T	P	C
0	0	2	1

EC406ES: ANALOG AND DIGITAL ELECTRONICS LAB

Common to CSE and CSC

Course Objectives

- To introduce components such as diodes, BJTs and FETs.
- To know the applications of components.
- To give understanding of various types of amplifier circuits
- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
- To understand the concepts of combinational logic circuits and sequential circuits.

Course Outcomes: Upon completion of the Course, the students will be able to:

- Know the characteristics of various components.
- Understand the utilization of components.
- Design and analyze small signal amplifier circuits.
- Postulates of Boolean algebra and to minimize combinational functions
- Design and analyze combinational and sequential circuits
- Known about the logic families and realization of logic gates.

LIST OF EXPERIMENTS

1. Full Wave Rectifier with & without filters
2. Common Emitter Amplifier Characteristics
3. Common Base Amplifier Characteristics
4. Common Source amplifier Characteristics
5. Measurement of h-parameters of transistor in CB, CE, CC configurations
6. Input and Output characteristics of FET in CS configuration
7. Realization of Boolean Expressions using Gates
8. Design and realization logic gates using universal ates
9. generation of clock using NAND / NOR gates
10. Design a 4 – bit Adder /Subtractor
11. Design and realization a Synchronous and Asynchronous counter using flip-flops
12. Realization of logic gates using DTL, TTL, ECL,etc.

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

B.TECH II Year II Sem/ I Year II Sem.

L	T	P	C
0	0	2	1

CS407PC/CS209ES:PYTHON PROGRAMMING LAB
Common to CSE, IT, CSM,CSD, ECE and CSC

Prerequisites: Students should install Python on Linux platform.

Course Objectives:

- To install and run the Python interpreter
- To learn control structures.
- To Understand Lists, Dictionaries in python
- To Handle Strings and Files in Python

Course Outcomes: After completion of the course, the student should be able to

- Develop the application specific codes using python.
- Understand Strings, Lists, Tuples and Dictionaries in Python
- Verify programs using modular approach, file I/O, Python standard library
- Implement Digital Systems using Python

Note: The lab experiments will be like the following experiment examples

Week -1:

1. i) Use a web browser to go to the Python website http://python.org. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation.
   ii) Start the Python interpreter and type help() to start the online help utility.
2. Start a Python interpreter and use it as a Calculator.3.
   i) Write a program to calculate compound interest when principal, rate and number of periods aregiven.
   ii) Given coordinates (x1, y1), (x2, y2) find the distance between two points
4. Read name, address, email and phone number of a person through keyboard and print the details.

Week - 2:

1. Print the below triangle using for loop.5
   4 4
   3 3 3
   2 2 2 2
   1 1 1 1 1
2. Write a program to check whether the given input is digit or lowercase character or uppercasecharacter or a special character (use 'if-else-if' ladder)
3. Python Program to Print the Fibonacci sequence using while loop
4. Python program to print all prime numbers in a given interval (use break)

B. Tech in COMPUTER SCIENCE AND ENGINEERING
CBCS & OUTCOME BASED COURSE STRUCTURE
COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

Week - 3:

1. i) Write a program to convert a list and tuple into arrays.
   ii) Write a program to find common values between two arrays.
2. Write a function called gcd that takes parameters a and b and returns their greatest common divisor.
3. Write a function called palindrome that takes a string argument and returnsTrue if it is a palindrome and False otherwise. Remember that you can use the built-in function len to check the length of a string.

Week - 4:

1. Write a function called is_sorted that takes a list as a parameter and returns True if the list is sortedin ascending order and False otherwise.
2. Write a function called has_duplicates that takes a list and returns True if there is any element thatappears more than once. It should not modify the original list.

   i). Write a function called remove_duplicates that takes a list and returns a new list with only theunique elements from the original. Hint: they don't have to be in the same order.

   ii). The wordlist I provided, words.txt, doesn't contain single letter words. So you might want to add"I", "a", and the empty string.

   iii). Write a python code to read dictionary values from the user. Construct a function to invert itscontent. i.e., keys should be values and values should be keys.
3. i) Add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e'
   ii) Remove the given word in all the places in a string?
   iii) Write a function that takes a sentence as an input parameter and replaces the first letter of every word with the corresponding upper case letter and the rest of the letters in the word by corresponding letters in lower case without using a built-in function?
4. Writes a recursive function that generates all binary strings of n-bit length

Week - 5:

1. i) Write a python program that defines a matrix and prints
   ii) Write a python program to perform addition of two square matrices
   iii) Write a python program to perform multiplication of two square matrices
2. How do you make a module? Give an example of construction of a module using different geometricalshapes and operations on them as its functions.
3. Use the structure of exception handling all general purpose exceptions.

Week-6:

1. a. Write a function called draw_rectangle that takes a Canvas and a Rectangle as arguments anddraws a representation of the Rectangle on the Canvas.

   b. Add an attribute named color to your Rectangle objects and modify draw_rectangle so that ituses the color attribute as the fill color.

c. Write a function called draw_point that takes a Canvas and a Point as arguments and draws arepresentation of the Point on the Canvas.

d. Define a new class called Circle with appropriate attributes and instantiate a few Circle objects.Write a function called draw_circle that draws circles on the canvas.

2. Write a Python program to demonstrate the usage of Method Resolution Order (MRO) in multiplelevels of Inheritances.
3. Write a python code to read a phone number and email-id from the user and validate it forcorrectness.

Week- 7

1. Write a Python code to merge two given file contents into a third file.
2. Write a Python code to open a given file and construct a function to check for given words present init and display on found.
3. Write a Python code to Read text from a text file, find the word with most number of occurrences
4. Write a function that reads a file *file1* and displays the number of words, number of vowels, blankspaces, lower case letters and uppercase letters.

Week - 8:

1. Import numpy, Plotpy and Scipy and explore their functionalities.
2. a) Install NumPy package with pip and explore it.
3. Write a program to implement Digital Logic Gates – AND, OR, NOT, EX-OR
4. Write a program to implement Half Adder, Full Adder, and Parallel Adder
5. Write a GUI program to create a window wizard having two text labels, two text fields and two buttonsas Submit and Reset.

TEXT BOOKS:

1. Supercharged Python: Take your code to the next level, Overland
2. Learning Python, Mark Lutz, O'reilly

REFERENCE BOOKS:

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
2. Python Programming A Modular Approach with Graphics, Database, Mobile, and Web Applications, Sheetal Taneja, Naveen Kumar, Pearson
3. Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition
4. Think Python, Allen Downey, Green Tea Press
5. Core Python Programming, W. Chun, Pearson
6. Introduction to Python, Kenneth A. Lambert, Cengage

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

B.Tech. II Year I-Sem

L	T	P	C
0	0	2	1

CS408PC: SOFTWARE ENGINEERING LAB
Common to CSE,IT,CSM,CSD and CSC

Prerequisites

- A course on "Programming for Problem Solving"
- A course on "Database Management Systems"

Co-requisite

- A Course on "Software Engineering"

Course Objectives

- To have hands on experience in developing a software project by using various software engineering principles and methods in each of the phases of software development.

Course Outcomes

- Ability to translate end-user requirements into system and software requirements
- Ability to generate a high-level design of the system from the software requirements
- Willhaveexperienceand/orawarenessoftestingproblemsandwillbeabletodevelopasimple testing report

List of Experiments

Dothefollowing8exercisesforanytwoprojectsgiveninthelistofsampleprojectsoranyother projects:

1) Development of problem statement.
2) PreparationofSoftwareRequirementSpecificationDocument,DesignDocumentsandTesting Phase related documents.
3) PreparationofSoftwareConfigurationManagementandRiskManagementrelateddocuments.
4) Study and usage of any Design phase CASE tool
5) Performing the Design by using any Design phase CASE tools.
6) Develop test cases for unit testing and integration testing
7) Develop test cases for various white box and black box testing techniques.

Sample Projects:

1. Passport automation System
2. Book Bank
3. Online Exam Registration
4. Stock Maintenance System
5. Online course reservation system
6. E-ticketing
7. Software Personnel Management System
8. Credit Card Processing
9. E-book management System.
10. Recruitment system

TEXT BOOKS:

1. SoftwareEngineering,Apractitioner'sApproach-RogerS.Pressman,6th edition,McGrawHill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

B.TECH II Year II Sem.

L	T	P	C
0	0	2	1

CS409PC: Real-time Research Project\Societal Related Project
Common to CSE, IT, CSM, CSD and CSC

Guidelines will be followed as per JNTUH

19/10

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

B. Tech in COMPUTER SCIENCE AND ENGINEERING

CBCS & OUTCOME BASED COURSE STRUCTURE

COURSE STRUCTURE (R-22)

Applicable From 2022-23 Admitted Batch

B.TECH II Year II Sem.

L	T	P	C
0	0	2	1

SD410PC: Skill Development Course (NODE JS/ REACT JS/ DJANGO)
Common to CSE, IT, CSD and CSC

Prerequisites: Object Oriented Programming through Java, HTML Basics

Course Objectives:

- To implement the static web pages using HTML and do client side validation using JavaScript.
- To design and work with databases using Java
- To develop an end to end application using java full stack.
- To introduce Node JS implementation for server side programming.
- To experiment with single page application development using React.

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

- Build a custom website with HTML, CSS, and Bootstrap and little JavaScript.
- Demonstrate Advanced features of JavaScript and learn about JDBC
- Develop Server – side implementation using Java technologies like
- Develop the server – side implementation using Node JS.
- Design a Single Page Application using React.

Exercises:

1. Build a responsive web application for shopping cart with registration, login, catalog and cart pages using CSS3 features, flex and grid.
2. Make the above web application responsive web application using Bootstrap framework.
3. Use JavaScript for doing client – side validation of the pages implemented in experiment 1 andexperiment 2.
4. Explore the features of ES6 like arrow functions, callbacks, promises, async/await. Implement an application for reading the weather information from openweathermap.org and display the information in the form of a graph on the web page.
5. Develop a java stand alone application that connects with the database (Oracle / mySql) and perform the CRUD operation on the database tables.
6. Create an xml for the bookstore. Validate the same using both DTD and XSD.
7. Design a controller with servlet that provides the interaction with application developed in experiment 1 and the database created in experiment 5.
8. Maintaining the transactional history of any user is very important. Explore the various sessiontracking mechanism (Cookies, HTTP Session)
9. Create a custom server using http module and explore the other modules of Node JS like OS,path, event.
10. Develop an express web application that can interact with REST API to perform CRUDoperations on student data. (Use Postman)
11. For the above application create authorized end points using JWT (JSON Web Token).

12. Create a react application for the student management system having registration, login, contact, about pages and implement routing to navigate through these pages.
13. Create a service in react that fetches the weather information from openweathermap.org and the display the current and historical weather information using graphical representation usingchart.js
14. Create a TODO application in react with necessary components and deploy it into github.

REFERENCE BOOKS:

1. Jon Duckett, Beginning HTML, XHTML, CSS, and JavaScript, Wrox Publications, 2010
2. Bryan Basham, Kathy Sierra and Bert Bates, Head First Servlets and JSP, O'Reilly Media, 2ndEdition, 2008.
3. Vasan Subramanian, Pro MERN Stack, Full Stack Web App Development with Mongo,Express, React, and Node, 2nd Edition, A Press.