SCHOOL OF ENGINEERING AND TECHNOLOGY
SCHOOL OF ENGINEERING AND TECHNOLOGY
Bachelor of Science (Computer Science)

Programme Code: SET0125
Duration- 1/2/3/4 Years Full Time

PROGRAM STRUCTURE
AND
CURRICULUM & SCHEME OF EXAMINATION
2021

1. Standard Structure of the Program at University Level

1.1 Vision, Mission and Core Values of the University

Vision of the University

To serve the society by being a global University of higher learning in pursuit of academic excellence, innovation and nurturing entrepreneurship.

Mission of the University

1. **Transformative educational experience**
2. **Enrichment by educational initiatives that encourage global outlook**
3. **Develop research, support disruptive innovations and accelerate entrepreneurship**
4. **Seeking beyond boundaries**

Core Values

- **Integrity**
- **Leadership**
- **Diversity**
- **Community**

Note: Detailed Mission Statements of University can be used for developing Mission Statements of Schools/ Departments.

Vision of the School

To become a globally acclaimed institution of higher learning in engineering and technology promoting excellence in research, innovation and entrepreneurship

Mission of the School

1. **To impart quality education with strong industry & academic connectivity in the expanding fields of Engineering and Technology in a conductive and enriching learning environment.**
2. **To product technocrats equipped with technical & soft skills and experiential learning required to stay current with the modern tools in emerging technologies to fulfill professional responsibilities and uphold ethical values.**
3. **To inculcate a culture of interdisciplinary research, innovation and entrepreneurship to provide sustainable solutions to meet the growing challenges and societal needs.**
4. **To foster collaborative learning and to play adaptive leadership role in professional career and pursuit of higher education through effective mentoring and counseling.**

Core Values

- **Industry & Academic Connectivity**
- **Experiential learning**
- **Interdisciplinary research**
- **Global**

1.2 Vision and Mission of the Department

Vision of the Department

To be recognized as the fountainhead of excellence in technical knowledge and research in computer science and engineering to attract students and scholars across the globe

Mission of the Department

1. **To strengthen core competency of students to be successful, ethical, effective problem solver in Computer Science & Engineering through analytical learning.**
2. **To promote interdisciplinary research & innovation-based activities in emerging areas of technology globally**
3. **To facilitate and foster the industry-academia collaboration to enhance entrepreneurship skills and acquaintance with corporate culture.**
4. **To inculcate in them a higher degree of social consciousness and moral values towards solving interdisciplinary societal problems using industry-academia collaboration**

Core Values

- **Competency**
- **Global**
- **Entrepreneurship Skills**
- **Interdisciplinary research**

1.3 Programme Educational Objectives (PEO)

1.3.1 Writing Programme Educational Objectives (PEO)

Program educational objectives are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve.

The Program Educational Objectives (PEOs) of UG Program in Computer Science & Engineering are:

PEO-1 The graduates will establish themselves as professionals by solving real-life problems using exploratory and analytical skills acquired in the field of Computer Science and Engineering.

PEO-2 The graduates will provide sustainable solutions to ever changing interdisciplinary global problems through their Research & Innovation capabilities.

PEO-3 The graduates will become employable, successful entrepreneur as an outcome of Industry-Academia collaboration.

PEO-4 The graduates will embrace professional code of ethics while providing solution to multidisciplinary social problems in industrial, entrepreneurial and research environment to demonstrate leadership qualities

Methods of Forming PEO's

STEP 1 : The needs of the Nation and society are identified through scientific publications, industry interaction and media.

STEP 2. Taking the above into consideration, the PEOs are established by the Coordination Committee of the department.

STEP 3. The PEOs are communicated to the alumni and their suggestions are obtained.

STEP 4. The PEOs are communicated to all the faculty members of the department and their feedback is obtained.

STEP 5. The PEOs are then put to the Board of Studies of the department for final approval.

[Note: Prepare a file for the same, how you arrive for PEO's]

1.3.2 Map PEOs with Mission Statements:

DEPARTMENT PEOs / DEPT OF CSE MISSION STATEMENTS	1. The graduates will establish themselves as professionals by solving real-life problems using exploratory and analytical skills acquired in the field of Computer Science and Engineering.	2. The graduates will be able to provide sustainable solutions to ever changing interdisciplinary global problems through their Research & Innovation capabilities.	3. The graduates will become employable, successful entrepreneur and innovator as an outcome of Industry-Academia collaboration.	4. The graduates will be able to embrace professional code of ethics while providing solution to multidisciplinary social problems in industrial, entrepreneurial and research environment to demonstrate leadership qualities.	
1. To strengthen core competency of students to be successful, ethical, effective problem solver in Computer Science & Engineering through analytical learning.	3	3	2	2	10/12
2. To promote interdisciplinary research & innovation based activities in emerging areas of technology globally.	2	3	2	2	9/12
3. To facilitate and foster the industry-academia collaboration to enhance entrepreneurship skills and acquaintance with corporate culture.	2	2	3	3	10/12
4: To inculcate in them a higher degree of social consciousness and moral values towards solving interdisciplinary societal problems using industry-academia collaboration	2	2	2	3	9/12
	9/12	10/12	9/12	10/12	83%

Enter correlation levels 1, 2, or 3 as defined below:

1. Slight (Low) 2. Moderate (Medium) 3. Substantial (High)

If there is no correlation, put "-"

1.3.3 Program Outcomes (PO's)

PO1:	**Computing knowledge**:	Understand the basic principles and methods of computer science for solving complex computing problems.
PO2:	**Problem Analysis and Design of solutions:**	Analyze and formulate a problem, evaluate a computing-based solution to meet a given set of requirements using software development concepts.
PO3:	**Modern tool usage**:	Ability to select and apply current techniques and modern IT Tools for innovative software solutions.
PO4:	**Technical Skill Development**	To develop and sharpen programming, networking, and other computer science skills required in the field of study/ higher education.
PO5:	**Societal Concern:**	Utilize the role of computing for solving real life problems and to analyze its global impact on individuals, organizations, and society.
PO6:	**Environment and Sustainability** :	Actively involved with knowledge, skills and right attitude in environmental context for sustainable development.
PO7:	**Ethics:**	Recognize ethical principles and moral values for the computing profession in global economic environment.
PO8:	**Individual and team work**:	Ability to function effectively as an individual or a team member engaged in accomplishes a common goal.
PO9:	**Communication:**	Development of good communication skills in both written and verbal form to convey technical information effectively and accurately.
PO10 :	**Life-long learning:**	Ability to recognize the need of training and skills to engage in self-regulating and life-long learning.
PSO1 :	**Computer Science**	Provide effective and efficient solutions to real life problems using acquired knowledge in Data Mining, graph theory, advanced DBMS and other computer science concepts for continued professional development.
PSO2 :	**Information Technology**	Explore and provide software solutions of complex problems using information technology concepts like Enterprise Resource Planning, network security, IT infrastructure management.

1.3.4 Mapping of Program Outcome Vs Program Educational Objectives

Mapping	PEO1	PEO2	PEO3	PEO4
PO1:	3	3	2	1
PO2:	3	3	3	1
PO3:	2	2	3	2
PO4:	2	3	2	2
PO5:	1	2	2	3
PO6:	1	1	2	3
PO7:	1	1	2	3
PO8:	1	2	3	1
PO9:	1	1	3	2
PO10:	2	3	1	1
PSO1:	2	3	1	3
PSO2:	3	3	2	2

1. Slight (Low) ***2. Moderate (Medium)*** ***3. Substantial (High)***

1.3.5 Program Outcome Vs Courses Mapping Table[1]:

1. Slight (Low) ***2. Moderate (Medium)*** ***3. Substantial (High)***

[1] Cel value will contain the correlation value of respective course with PO.

1.3.5.2 COURSE ARTICULATION MATRIX[2]

1-Slight (Low)
2-Moderate (Medium)
3-Substantial (High)

[2] Each course outcome (Based on Blooms Taxanomy-CO1, CO2, CO3, CO4, CO5, and CO6) of the course needs to map with PO. This table evolves once faculty has mapped each course outcomes of their respective course with PO's.

Course Outcome

- **Course Outcomes**–What is it?
  - Course outcomes (COs) are clear statements of what a student should be able to demonstrate on completion of a course.
  - COs should be assessable and measurable knowledge, skills, abilities and attitudes that student attains by the end of the course.
  - It is generally good idea to identify between 4 and 7 outcomes.
  - All courses in a particular programme shall have their own PO.
  - Each CO is mapped to relevant PO.
  - The teaching learning process and assessment process are to be designed in a way to achieve the COs.

Beginning words for Course Outcome:

Active verbs developed based on Bloom's Taxonomy

Knowledge	Understand	Apply	Analyze	Evaluate	Create
define	explain	solve	analyze	reframe	design
identify	describe	apply	compare	criticize	compose
describe	interpret	illustrate	classify	evaluate	create
label	paraphrase	modify	contrast	order	plan
list	summarize	use	distinguish	appraise	combine
name	classify	calculate	infer	judge	formulate
state	compare	change	separate	support	invent
match	differentiate	choose	explain	compare	hypothesize
recognize	discuss	demonstrate	select	decide	substitute
select	distinguish	discover	categorize	discriminate	write
examine	extend	experiment	connect	recommend	compile
locate	predict	relate	differentiate	summarize	construct
memorize	associate	show	discriminate	assess	develop
quote	contrast	sketch	divide	choose	generalize
recall	convert	complete	order	convince	integrate
reproduce	demonstrate	construct	point out	defend	modify
tabulate	estimate	dramatize	prioritize	estimate	organize
tell	express	interpret	subdivide	find errors	prepare
copy	Identify	Manipulate	survey	grade	produce
discover	indicate	Paint	advertise	measure	rearrange
duplicate	Infer	Prepare	appraise	predict	rewrite
enumerate	relate	produce	Break down	rank	role-play

(Reference: Retrieved from http://www.teachthought.com/learning/249-blooms-taxonomy-verbs-for-critical-thinking/)

School of Engineering and Technology							
Department Of Computer Science & Engineering							
B.Sc in Computer Science							
Batch: 2021 Onwards						TERM: I	
S. No.	Course Code	Course	Teaching Load			Credits	Pre-Requisite/Co Requisite
			L	T	P		
THEORY SUBJECTS							
1		Problem solving using C Programming	4	0	0	4	
2		Discrete Structures and Data Structure	4	0	0	4	
3		Digital Electronics & Computer Organization	4	0	0	4	
4		Vocational Faculty-1	3	0	0	3	
5		Food and Nutrition	2	0	0	2	
Practical/Viva-Voce/Jury							
6	ARP101	Communicative English-1	1	0	2	2	
7		Problem solving using C Programming Lab	0	0	4	2	
8		Discrete Structures and Data Structure Lab	0	0	4	2	
9		Digital Electronics & Computer Organization Lab	0	0	4	2	
TOTAL CREDITS						25	

School of Engineering and Technology							
Department Of Computer Science & Engineering							
B.Sc in Computer Science							
Batch: 2021 Onwards						TERM: II	
S. No.	Course Code	Course	Teaching Load			Credits	Pre-Requisite/Co Requisite
			L	T	P		
THEORY SUBJECTS							
1		Principles of Data Base Management System	4	0	0	4	
2		Operating System and Unix Shell Programing	4	0	0	4	
3		Web Designing and Object Oriented Programming Using Java	4	0	0	4	
4		Vocational Faculty-2	3	0	0	3	
5		Health and Hygien	2	0	0	2	
Practical/Viva-Voce/Jury							
6	ARP102	Communicative English -2	1	0	2	2	
7		Principles of Data Base Management System Lab	0	0	4	2	
8		Operating System and Unix Shell Programing Lab	0	0	4	2	
9		Object Oriented Programming and Web Designing Using Java Lab	0	0	4	2	
TOTAL CREDITS						25	

School of Engineering and Technology							
Department Of Computer Science & Engineering							
B.Sc in Computer Science							
Batch: 2021 Onwards						TERM: III	
S. No.	Course Code	Course	Teaching Load			Credits	Pre-Requisite/Co Requisite
			L	T	P		
THEORY SUBJECTS							
1		Application based Programming in Python and Machine Learning	4	0	0	4	
2		Computer Networks and Data Communication	4	0	0	4	
3		Mathematics in Computer Applications	4	0	0	4	
4		Vocational Faculty-3	3	0	0	3	
5		Physical Education	2	0	0	2	
Practical/Viva-Voce/Jury							
6	ARP207	Logical Skills Building and Soft Skills	1	0	2	2	
7		Application based Programming in Python and Machine Learning Lab	0	0	4	2	
8		Computer Networks and Data Communication Lab	0	0	4	2	
9		Numerical Techniques Lab	0	0	2	1	
		Project Based Learning-1	0	0	2	1	
TOTAL CREDITS						25	

School of Engineering and Technology							
Department Of Computer Science & Engineering							
B.Sc in Computer Science							
Batch: 2021 Onwards						TERM: IV	
S. No.	Course Code	Course	Teaching Load			Credits	Pre-Requisite/Co Requisite
			L	T	P		
THEORY SUBJECTS							
1		Artificial Intelligence	4	0	0	4	
2		Design and Analysis of Algorithm	4	0	0	4	
3		Research Methodlogy	4	0	0	4	
4		Vocational Faculty-4	3	0	0	3	
5		Human values and Environrnent Studies	2	0	0	2	
Practical/Viva-Voce/Jury							
6	ARP208	Quantitative and Qualitative Aptitude Skill Building	1	0	2	2	
7		Artificial Intelligence Lab	0	0	4	2	
8		Design and Analysis of Algorithm Lab	0	0	4	2	
		Project Based Learning-2	0	0	4	2	
TOTAL CREDITS						25	

School of Engineering and Technology							
Department Of Computer Science & Engineering							
B.Sc in Computer Science							
Batch: 2021 Onwards						TERM: V	
S. No.	Course Code	Course	Teaching Load			Credits	Pre-Requisite/Co Requisite
			L	T	P		
THEORY SUBJECTS							
1		Digital Image Processing	4	0	0	4	
2		Information Security and Cyber Law	4	0	0	4	
3		Program Elective-1	4	0	0	4	
4		Program Elective-2	4	0	0	4	
Practical/Viva-Voce/Jury							
6		Analytical Ability and Digital Awareness	1	0	2	2	
7		Research Project-1				4	
		Industrial Training				3	
TOTAL CREDITS						25	

School of Engineering and Technology							
Department Of Computer Science & Engineering							
B.Sc in Computer Science							
Batch: 2021 Onwards						TERM: VI	
S. No.	Course Code	Course	Teaching Load			Credits	Pre-Requisite/Co Requisite
			L	T	P		
THEORY SUBJECTS							
1		SoftComputing	4	0	0	4	
2		Program Elective-3	4	0	0	4	
3		Program Elective-4	4	0	0	4	
Practical/Viva-Voce/Jury							
6		Communication Skills and Personality Development	1	0	2	2	
7		Research Project-1				6	
8		Simulation Lab Pract-1	0	0	2	1	
9		Technical Skill Enhancement Course-2	0	0	2	1	
		Community connect program				3	
TOTAL CREDITS						25	

School of Engineering and Technology								
Department Of Computer Science & Engineering								
B.Sc in Computer Science								
Batch: 2021 Onwards						TERM: VII		
S. No.	Course Code	Course	Teaching Load			Credits	Pre-Requisite/Co Requisite	
			L	T	P			
THEORY SUBJECTS								
1		Theory of Computation and Principal of Programming Language	4	0	0	4		
2		Program Elective-5	4	0	0	4		
3		Program Elective-6	4	0	0	4		
4		Program Elective-7	4	0	0	4		
5		Introduction of Entrepreneurship	2	0	0	2		SC
Practical/Viva-Voce/Jury								
6		Theory of Computation and Principal of Programming Language Lab	0	0	4	2		
7		Seminar-1	1	0	2	2		SC
8		Industrial Training				3		SC
9		Capstone - 1	-	-	-	3		SC
TOTAL CREDITS						28		

School of Engineering and Technology							
Department Of Computer Science & Engineering							
B.Sc in Computer Science							
Batch: 2021 Onwards						TERM: VIII	
S. No.	Course Code	Course	Teaching Load			Credits	Pre-Requisite/Co Requisite
			L	T	P		
THEORY SUBJECTS							
1		Pattern Recognition	4	0	0	4	
2		Program Elective-8	4	0	0	4	
3		Program Elective-9	4	0	0	4	
4		Program Elective-10	4	0	0	4	
5		Introduction of Entrepreneurship	2	0	0	2	
Practical/Viva-Voce/Jury							
6		Pattern Recognition Lab	0	0	4	2	
7		Seminar-2	1	0	2	2	
8		Capstone - 2				6	
TOTAL CREDITS						28	

C. Course Syllabuses

Syllabus: Database Management System Lab

School: SET		**Batch: 2021-2024**			
Program: B. Sc		**Current Academic Year: 2021-2022**			
Branch: CSE/IT		**Semester: II**			
1	Course Code				
2	Course Title	Database Management System Lab			
3	Credits	2			
4	Contact Hours (L-T-P)	0-0-4			
	Course Status	Compulsory			
5	Course Objective	• To Develop efficient SQL programs to access Oracle databases • Build database using Data Definition Language Statements • Perform operations using Data Manipulation Language statements like Insert, Update and Delete			
6	Course Outcomes	By the end of this course, the student will be able to: CO1: Understand the basic concept of SQL commands in DBMS. CO2: Demonstrate various DDL Commands used to create and alter a table. CO3: Experiment with operations using Data Manipulation Language statements like Insert, Update and Delete. CO4: Examine data to apply various grouping clauses and aggregate functions. CO5: Evaluate the queries using the concepts like sub-queries, JOINS, Views, Cursors, Triggers. CO6: Develop project based on various SQL commands.			
7	Course Description	An introduction to the design and creation of relational databases. Create database-level applications and tuning robust business applications. Lab sessions reinforce the learning objectives and provide participants the opportunity to gain practical hands-on experience.			
8	Outline syllabus				CO Mapping
	Unit 1	**Practical based Data types**			
		Classification SQL, Data types of SQL/Oracle			CO1, CO6
	Unit 2	**Practical based on DDL commands**			
		Create table, Alter table and Drop table			CO2, CO6
	Unit 3	**DML commands**			
		Introduction about the INSERT, SELECT, UPDATE & DELETE commands.			CO3, CO6
	Unit 4	**Practical based on Grouping Clauses GROUP BY, ORDER BY, HAVING & Aggregate Functions**			
		Briefly explain Group by, order by, having clauses with examples. Aggregate function: sum, avg, count, max, min			CO4, CO6
	Unit 5	**Practical based on Sub- queries, JOINS, Views**			
		Related example of Sub- queries, Joins and related examples, Views, Cursors, Trigger, PL/SQL			CO5, CO6
	Mode of examination	Jury/Practical/Viva			
	Weightage Distribution	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	1. Korth, Silberschatz & Sudarshan, Data base Concepts, Tata McGraw-Hill			
	Other References	1. Elmasri, Navathe, Fundamentals of Database Systems, Pearson Education Inc. 2. *Thomas Connolly, Carolyn Begg, Database Systems: A Practical Approach to design, Implementation and Management, Pearson Education, Latest Edition.*			

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	CO1: Understand the basic concept of SQL commands in DBMS.	PO1,PO3,PO4,PO8,PO9,PO10,PSO1
2.	CO2: Demonstrate various DDL Commands used to create and alter a table.	PO1,PO2,PO3,PO4,PO8,PO9,PO10
3.	CO3: Experiment with operations using Data Manipulation Language statements like Insert, Update and Delete.	PO1,PO2,PO3,PO4,PO8,PO9,PO10
4.	CO4: Examine data to apply various grouping clauses and aggregate functions.	PO1,PO2,PO3,PO4,PO8,PO9,PO10,PSO1
5	CO5: Evaluate the queries using the concepts like sub-queries, JOINS, Views, Cursors, Triggers.	PO1,PO2,PO3,PO4,PO8,PO9,PO10, PSO1
6	CO6: Develop project based on various SQL commands.	PO1,PO2,PO3,PO4,PO5, PO7, PO8, PO9, PO10, PSO1

PO and PSO mapping with level of strength for Course Name Database Management System lab (Course Code)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	-	3	2	-	-	-	2	2	2	1	-
CO2	3	3	3	2	-	-	-	3	2	2	-	-
CO3	3	3	3	2	-	-	-	3	2	2	-	-
CO4	3	3	3	3	-	-	-	3	2	2	2	-
CO5	3	3	3	2	-	-	-	3	2	2	2	-
CO6	3	3	3	2	2	-	2	3	2	2	3	-

Average of non-zeros entry in following table (should be auto calculated).

Course Code/ Name	PO 1	PO2	PO 3	PO 4	PO5	PO6	PO7	PO8	PO9	PO10	PSO 1	PSO 2
DBMS lab	3	3	3	2.2	2	-	2	2.8	2	2	2	-

Strength of Correlation

1. Addressed to ***Slight (Low=1) extent*** ***2.*** Addressed to ***Moderate (Medium=2) extent***
3. Addressed to ***Substantial (High=3) extent***

Syllabus: Database Management System

School: SET		**Batch: 2021**		
Program: BSc		**Current Academic Year: 2021-22**		
Branch: CSE		**Semester:4**		
1	Course Code		Course Name: B.Sc.	
2	Course Title	**Database Management Systems**		
3	Credits	4		
4	Contact Hours (L-T-P)	4-0-0		
	Course Status	Core		
5	Course Objective	**The objective of this course is to:** 1. To learn about basic concepts of databases, terms, **2.** Introduce students to build data base management systems **3.** Apply DBMS concepts to various examples and real life applications		
6	Course Outcomes	**At the end of the course student will be able to:** **CO1:** Explain the basics concepts of data base & design an ER model for a given example from real world description. **CO2:** Design & Solve the given problem using Relational Algebra, Relational Calculus, SQL and PL/SQL. **CO3:** Apply normalization techniques to reduce redundancy from the database. **CO4:** To appraise the basic issues of Transaction processing, Serializability & deadlock. **CO5:** Determine the roles of concurrency control techniques in database design. **CO6:** Design & develop database system for real life problems.		
7	Course Description	This course introduces basic aspects of data bases.		
8	Outline syllabus		**Proposed No. of Lectures**	**CO Mapping**
	Unit 1	**INTRODUCTION TO DATABASES & ENTITY–RELATIONSHIP (ER) MODEL**	**12**	
	A	Overview of DBMS, Database System vs File System, Data Independence Database languages: DDL, DML, Database Users, Database Administrator		CO1, CO6
	B	Data Models, Hierarchical, Network Data Modelling, Database System Architecture, Overall Database Structure, Relational data model concepts, ER Model Concepts, Notation for ER Diagram		CO1, CO6
	C	Keys, Concept of keys, Weak Entity Types, Generalization, Aggregation, Converting ER diagrams to relational tables.		CO1, CO6
	Unit 2	**RELATIONAL DATA MODEL & CONCEPTS OF SQL**	**13**	
	A	Relational Data Model Concepts, Integrity Constraints, Entity Integrity, Referential Integrity, Keys Constraints, Domain Constraints		CO1, CO2, CO6
	B	Relational Algebra, Relational Calculus, Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations: JOIN and DIVISION		CO1, CO2, CO6
	C	Introduction on SQL: Characteristics of SQL, Advantage of SQL, Views and Indexes. Queries and Sub Queries, Joins, Cursors, Triggers, Procedures in SQL/PL SQL		CO1, CO2, CO6
	Unit 3	**RELATIONAL DATABASE DESIGN & NORMALIZATION**	**13**	
	A	Functional Dependency, Different anomalies in designing a		CO3,

		Database, loss less join decompositions		CO6
	B	Normal Forms: First, Second, Third normal forms and Boyce Codd normal form (BCNF), Multi-valued dependencies, fourth normal forms		CO3, CO6
	C	Case Study based on Relational Database Design & Normalization		CO3, CO6
	Unit 4	**TRANSACTION PROCESSING CONCEPTS**	**12**	
	A	Introduction to Transaction processing; ACID property, Testing of Serializability, Serializability of Schedules,		CO4
	B	Conflict & View Serializable, Schedule, Recoverability, Recovery from Transaction Failures, Log Based Recovery, Checkpoints, Deadlock,		CO4
	C	Case Study based on Transaction Processing System		CO4
	Unit 5	**CONCURRENCY CONTROL TECHNIQUES**	**10**	
	A	Concurrency Control, Two-Phase Locking Techniques for Concurrency Control, Time Stamping Protocols for Concurrency Control,		CO5
	B	Validation Based Protocol, Multiple Granularity, Multi Version Schemes,		CO5
	C	Case Study based on Oracle		CO5
	Mode of examination	Theory		
	Weightage Distribution	CA: 30%	MTE: 20%	ETE: 50%
	Text book/s*	1. Korth , Silberschatz& Sudarshan, Data base Concepts, Tata McGraw-Hill 2. Elmasri, Navathe, Fundamentals of Database Systems, Pearson Education Inc.		
	Other References	1. Thomas Connolly, Carolyn Begg, Database Systems: A Practical Approach to design, Implementation and Management, Pearson Education, Latest Edition. 2. Jeffrey D. Ullman, Jennifer Windon, A first course in Database Systems, Pearson Education. 3. Date C.J., An Introduction to Database Systems, Addison Wesley. 4. Richard T. Watson, Data Management: databases and organization, Wiley.		

CO and PO Mapping

S. No.	Course Outcome (CO)	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	Explain the basics concepts of data base & design an ER model for a given example from real world description.	PO1, PO4, PO8, PO9, PO10
2.	Design & Solve the given problem using Relational Algebra, Relational Calculus, SQL and PL/SQL.	PO1, PO2, PO4, PO8, PO10
3.	Apply normalization techniques to reduce redundancy from the database.	PO1, PO2, PO3, PO4, PO8, PO10
4.	To appraise the basic issues of Transaction processing, Serializability & deadlock.	PO1, PO2, PO3, PO4, PO8
5	Determine the roles of concurrency control techniques in database design.	PO1, PO2, PO3, PO4, PO10
6	Design & develop database system for real life problems	PO1, PO2, PO3, PO4, PO5, PO6, PO9, PO10, PSO1, PSO2

PO and PSO mapping with level of strength for Course Name: Database Management Systems (Course Code:)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	-	-	3	-	-	-	2	2	3	-	-
CO2	3	3	-	3	-	-	-	3	-	2	-	-
CO3	3	3	3	3	-	-	-	3	-	2	-	-
CO4	2	2	2	3	-	-	-	2	-		-	-
CO5	2	2	2	3	-	-	-	-	-	2	-	-
CO6	2	3	3	3	2	2	2	3	3	3	2	2

Average of non-zeros entry in following table (should be auto calculated).

Course Code/ Name	PO1	PO2	PO3	PO 4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
/ **DBMS**	2.5	2.6	2.5	3	2	2	2	2.6	2.5	2.4	2	2

Strength of Correlation:1. Addressed to ***Slight (Low=1) extent*** ***2.*** Addressed to ***Moderate (Medium=2) extent***

School: SET		**Batch : 2021-2024**		
Program: B.Sc		**Current Academic Year: 2021-22**		
Branch: CS/IT		**Semester: I**		
1	Course Code		Course Name:	
2	Course Title	**Digital Electronics & Computer Organization**		
3	Credits	4		
4	Contact Hours (L-T-P)	4-0-0		
	Course Status	UG		
5	Course Objective	To provide students with an overview of digital electronics that forms the basic foundation of digital computer. It includes the number system, binary logic circuit and k-maps, evaluating circuit designs within the context of digital and combinational circuits. To understand the building blocks of computer and study various design issues		
6	Course Outcomes	CO1: Define the basic logic operations and simplify using Boolean algebra and/or Karnaugh mapping techniques, sum of products (SOP) and product of sums (POS). CO2: Illustrate combinatorial logic circuits and explain their operation. CO3: Construct different types of sequential logic circuits using Flip Flops. CO4: Analyze the basic structure and functional units of a digital computer & understand basic processing unit and organization of simple processor. CO5: Explain hierarchical memory systems including cache memories & select appropriate interfacing standards for I/O devices. CO6: Develop a real-life project applying the concepts of digital electronics and computer organization.		
7	Course Description	This course covers the core concepts of digital electronics that include AND, OR, NAND, NOR, NOT logic functions and integrated circuits, combinational and sequential logic circuits. The course also provides a study of Boolean algebra, binary and hexadecimal number systems, binary codes, and the analysis of the basic components and circuits used in semiconductor switching. This course also discusses the basic structure of a digital computer and used for understanding the organization of various units such as control unit, Arithmetic and Logical unit and Memory unit and I/O unit in a digital computer.		
8	Outline syllabus		**Proposed No. of Lectures**	CO Mapping
	Unit 1	**Logic Gates & Boolean Algebra**		
	A	AND, OR, NOT, NAND, NOR, XOR, XNOR, NAND & NOR as Universal Gates		CO1, CO6
	B	Theorems, Simplification of Boolean Expression using Boolean Algebra, SOP & POS Forms, Realization of Boolean Expression using Gates	**10**	CO1, CO6
	C	K-Maps, Simplification of Boolean Expression using K-Maps (upto 4- variables)		CO1, CO6
	Unit 2	**Combinational Logic Circuits**		
	A	Half Adder & Half Subtractor, Full Adder & Full Subtractor		CO2, CO6
	B	Multiplexers & Demultiplexers, Implementation of Boolean equations using Multiplexer and Demultiplexer	**12**	CO2, CO6
	C	Encoders & Decoders, Comparator, Basic Concepts of A/D and D/A converters		CO2, CO6
	Unit 3	**Sequential Logic Circuits: Synchronous & Asynchronous**		
	A	Latch, Flip Flops- R-S, J-K, Master-Slave J-K Flip-Flop, Race Condition, Removing Race Condition		CO3, CO6
	B	D Flip-Flop, T Flip-Flop, Sequential Circuits: Registers and Counters: Shift Registers, Ripple Counter, Synchronous Counter, Ring counter,	**14**	CO3, CO6
	C	Asynchronous Circuits: Analysis procedure, circuit with latches, Design procedure, Race free state assignment, hazards.		CO3, CO6

	Unit 4	**Basic Computer Organization and Design**			
	A	Digital computer: functional units and their interconnections, buses, Bus architecture, types of buses and bus arbitration. Bus and memory transfer, micro-operations		**12**	CO4, CO6
	B	**Control Unit:** Processor organization: general register organization, stack organization and addressing modes			CO4, CO6
	C	**Memory Unit:** Basic concept and hierarchy, semiconductor RAM memories and types, ROM memories and types.			CO4, CO6
	Unit 5	**Memory Management & I/O Interfaces**			
	A	Cache memories: concept and design issues (Performance, address mapping and replacement)		**12**	CO5, CO6
	B	Peripheral devices, I/O interface, I/O ports, Interrupts: interrupt hardware, types of interrupts, Modes of Data Transfer: Programmed I/O, interrupt initiated I/O and Direct Memory Access			CO5, CO6
	C	Case Study based on Memory Management			CO5, CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	
	Text book/s*	1. Moris Mano, "Digital Logic and Computer Design", PHI Publications, 2002 2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "Computer Organization", McGraw-Hill, Fifth Edition, Reprint 2012 3. David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/Software Interface"			
	Other References	1. Digital Electronics (TMH) 1998: Malvino and Leach 2. Computer Organization and Architecture: William Stallings			

CO and PO Mapping

S. No.	Course Outcome (CO)	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	CO1: Define the basic logic operations and simplify using Boolean algebra and/or Karnaugh mapping techniques, sum of products (SOP) and product of sums (POS).	PO1, PO2, PO3, PO4, PO8, PO9, PO10, PSO1
2.	CO2: Illustrate combinatorial logic circuits and explain their operation.	PO1, PO2, PO3, PO4, PO8, PO10
3.	CO3: Construct different types of sequential logic circuits using Flip Flops.	PO1, PO2, PO3, PO4, PO8, PO10, PSO1
4.	CO4: Analyze the basic structure and functional units of a digital computer & understand basic processing unit and organization of simple processor.	PO1, PO2, PO3, PO4, PO8, PO10, PSO1
5	CO5: Explain hierarchical memory systems including cache memories & select appropriate interfacing standards for I/O devices.	PO1, PO2, PO3, PO4, PO6, PO10
6	CO6: Develop a real-life project applying the concepts of digital electronics and computer organization.	PO1, PO2, PO3, PO4, PO5, PO6, PO8, PO9, PO10, PSO1

PO and PSO mapping with level of strength for Course Name: Digital Electronics & Computer Organization (Course Code:)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	3	-	3	-	-	-	2	2	3	3	-
CO2	3	3	3	3	-	-	-	3	-	2	3	-
CO3	3	3	3	3	-	-	-	3	-	3	2	-
CO4	3	3	3	3	-	-	-	3	-	3	3	-
CO5	2	2	2	3	-	2	-	-	-	2	-	-
CO6	2	3	3	3	2	2	-	3	3	3	3	-

Average of non-zeros entry in following table (should be auto calculated).

Course Code/ Name	PO1	PO2	PO3	PO 4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
/ Digital Electronics & Computer Organization	2.7	2.8	2.8	3.0	2.0	2.0	-	2.8	2.5	2.7	2.8	-

Strength of Correlation:1. Addressed to ***Slight (Low=1)*** ***extent*** ***2.*** Addressed to ***Moderate (Medium=2)*** ***extent***

School:		**School of Engineering and technology**	
Department		**Department of Computer Science and Engineering**	
Program:		**BSC-IT**	
Branch:			
1	Course Code		
2	Course Title	Discrete Structures and Data Structures	
3	Credits	4	
4	Contact Hours (L-T-P)	4-0-0	
	Course Status	Core	
5	Course Objective	This course provides a mathematical foundation for subsequent study in Computer Science, as well as developing the skills necessary to solve practical problems.	
6	Course Outcomes	After the completion of this course, students will be able to: CO-1. ***Apply*** *the* basic principles of sets and operations in sets**.** CO-2. ***Construct*** and prove models by using algebraic structures. CO-3. ***Classify*** logical notation and determine if the argument is or is not valid. CO-4. ***Apply*** the concepts of data structure, data type and ADT and appropriate data structures and Choose the suitable data structures like arrays, linked list, stacks and queues to solve real world problems efficiently. CO-5. ***Represent*** and manipulate data using nonlinear data structures like trees and graphs to design algorithms for various applications. CO-6 ***Formulate*** new solutions for programming problems as per industry standards.	
7	Course Description	The purpose of this course is to understand and use (abstract) discrete structures that are backbones of computer science. A basic understanding of discrete mathematical topics is fundamental for work in computer science. Many students of this course will find they have familiarity with some of the topics: for instance, truth tables, logical propositions, elements of set theory, as well as basic notions of functions and mathematical induction. In this course we will discover that logical propositions are the underlying model of discrete systems. From this modest beginning we develop algorithms and prove their efficacy. Topics include propositional and predicate logic, basic proof techniques, set algebra and Boolean algebra, recursion and induction. The knowledge gained will be extremely useful in upper level of computer science classes.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction to Set Theory, Relations and Functions.**	
	A	Set Theory: Introduction, Combination of sets, Multi sets, ordered pairs, Set Identities.	CO1
	B	Relations: Definition, Operations on relations, Properties of relations, Composite Relations, Equality of relations, Order of relations.	CO1
	C	Functions: Definition, Classification of functions, Operations on functions, Recursively defined functions.	CO1

	Unit 2	**Algebraic Structures**	
	A	Definition, Groups, Subgroups and order, Cyclic Groups, Cosets, Lagrange's theorem, Normal Subgroups,	CO2
	B	Homomorphism's, Definition and elementary properties of Rings and Fields, Integers Modulo n.	CO2
	C	Partial order sets: Definition, Partial order sets, Combination of partial order sets, Hasse diagram.	CO2
	Unit 3	**Logics and Mathematical Induction**	
	A	Propositional Logic: Proposition, well formed formula, Truth tables, Tautology, Satisfiability, Contradiction, Algebra of proposition, Theory of Inference, Natural Deduction.	CO1,CO3
	B	Predicate Logic: First order predicate, well formed formula of predicate, quantifiers, Inference theory of predicate logic.	CO1,CO3
	C	Natural Numbers: Introduction, Mathematical Induction, Variants of Induction , Definition, Properties of lattices – Bounded, Complemented, Modular and Complete Lattice, Morphisms of lattices.	CO1,CO3
	Unit 4	**Introduction to data structures**	
	A	Data Structure – Definition, Operations and Applications, Abstract Data Types, Algorithm – Definition, Introduction to Complexity, Big OH notation, Time and Space tradeoffs.	CO4
	B	Arrays and Linked list: Implementation of One Dimensional Arrays, Multidimensional Arrays, Applications of Arrays, Address Calculation, Matrix Operations, Concept of Linked List, Representation of linked List in memory, Operations on a Linked List. More types of linked list: Doubly Linked list, Header Linked List, Two way List and Circular linked list.	CO4
	C	Stacks & Queues: Concepts of Stack, Operation on Stack, Array Representation of Stack, Arithmetic Expression POLISH Notation, Concepts of Queue, Operation on Queue, Representation of queues, Other types of queue: Priority Queues, Deque and Circular queue.	CO4
	Unit 5	**Trees and Graph Theory.**	
	A	Trees: Definition, Binary tree, Binary tree traversal, Binary search tree.	CO4,CO5
	B	Graphs: Definition and terminology, Representation of graphs.	CO4,CO5
	C	Multi graphs, Bipartite graphs, Planar graphs, Isomorphism and Homeomorphism of graphs, Euler and Hamiltonian paths, Graph colouring. **Industry Problem solving skills, practice of interview questions.**	CO4,CO5, CO6
	Mode of examination	Theory/Jury/Practical/Viva	
	Weightage Distribution	CA: 30% / MTE: 20% / ETE: 50%	
	Text book/s*	1) *1. C. L. Liu, Elements of Discrete Mathematics, second edition 1985, McGraw-Hill Book Company. Reprinted 2000.* 2) *Jean Paul Trembley, R Manohar, "Discrete*	

		Mathematical Structures with Application to Computer Science", McGraw-Hill. *3) K. H. Rosen, Discrete Mathematics and applications, fifth edition 2003, Tata McGraw Hill Publishing Company.* *4) Lipschutz, "Data Structures" Schaum's Outline Series, TMH*	
	Other References	1) *J .L. Mott, A. Kandel, T.P .Baker, Discrete Mathematics for Computer Scientists and Mathematicians, second edition 1986, Prentice Hall of India.* *2) Aaron M. Tenenbaum, Yedidyah Langsam and Moshe J. Augenstein "Data Structures Using C and C++" , PHI* *3) Horowitz and Sahani, "Fundamentals of Data Structures", Galgotia Publication*	

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	**CO1:** ***Apply*** *the* basic principles of sets and operations in sets**.**	PO1,PO4 ,PSO2
2.	**CO2:** ***Construct*** and prove models by using algebraic structures.	PO3,PO4,PSO3,PSO4
3.	**CO3:** ***Classify*** logical notation and determine if the argument is or is not valid.	PO3,PSO2
4.	**CO4:** ***Apply*** the concepts of data structure, data type and ADT and appropriate data structures and Choose the suitable data structures like arrays, linked list, stacks and queues to solve real world problems efficiently.	PO1, PO3, PSO1
5.	**CO5:*Represent*** and manipulate data using nonlinear data structures like trees and graphs to design algorithms for various applications.	PO2, PO3, PO9, PSO1, PSO2
6.	CO6:***Formulate*** new solutions for programming problems as per industry standards.	PO1, PO3, PO4, PO5, PO9, PSO1, PSO2, PSO3

PO and PSO mapping with level of strength for Course Name Discrete Structures and Data Structures **(Course Code yyyy)**

Course Code_ Course Name	CO's	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
Discrete Structures and Data Structures	CO1	3	3	2	1	1	1	1	2	1	3		2
	CO2	3	3	2	2	1	1	1	2	1	3		2
	CO3	3	3	1	2	1	1	1	2	1	2		3
	CO4		2	2					2			1	2
	CO5		2	2						2		1	2
	CO6			1	2						2	3	2

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
	Discrete & Data Structure	2.83	2.67	1.67	1.67	1.00	1.00	1.00	2..00	1.00	2.67		2.50

Strength of Correlation

1. Addressed to ***Slight (Low=1) extent*** ***2.*** Addressed to ***Moderate (Medium=2) extent***
3. Addressed to ***Substantial (High=3) extent***

School:		**School of Engineering and technology**	
Department		**Department of Computer Science and Engineering**	
Program:		**BSC-IT**	
Branch:			
1	Course Code		
2	Course Title	Operating Systems and Unix shell Programming	
3	Credits	4	
4	Contact Hours (L-T-P)	4-0-0	
	Course Status	Core	
5	Course Objective	1. This course introduces the challenges for designing the operating systems. 2. Includes different design principles and algorithms. 3. Evaluation of algorithms proposed. 4. Implementation of algorithms and utilities.	
6	Course Outcomes	**CO1: Define** role, responsibilities, features, and design of operating system. **CO2: Evaluate** the strengths and weaknesses of the algorithms. And Identify the challenges and apply suitable algorithms for operating system. **CO3: Implement** tools and utility of operating system. **CO4: Apply** various memory management and memory management and to understand file and disk management and analyzing it. **CO5: Understand** the concepts of unix and shell programming. CO6: **Design** and develop solutions to real world problem using Linux	
7	Course Description	This course introduces the design principles of operating systems, resource management, identifying challenges and applying respective algorithms.This course will also provide the basic of unix and shell programming.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction to Operating System Concepts**	
	A	Operating System Concepts and functions, Comparison of different Operating system, Open-Source Operating Systems.	CO1, CO2
	B	Types of Operating Systems (Batch, Multiprogramming ,Multi-Tasking , Multiprocessing, Distributed and Real Time Operating System), Operating System Structure, Operating System Services.	CO1, CO2
	C	Operating System Structure, System Components, Operating System Services, Kernels, Monolithic and Microkernel Systems.	CO1, CO2
	Unit 2	**Process Management and Scheduling**	
	A	Process Concepts (PCB, Process States , Process Operations)	CO1, CO2
	B	CPU Scheduling: Concept , Types of schedulers(Short term, Long term, Middle term), Dispatcher,	CO1, CO2, CO4

	C	Performance CriteriaCPU Scheduling Algorithms(FCFS, SJF, Priority, Round Robin, Multilevel Queue, Multilevel feedback Queue)			CO1,CO2,CO4
	Unit 3	**Deadlock Handling**			
	A	Race condition, Critical sections, Mutual exclusion,			CO1,CO2
	B	Deadlock concepts & Handling Techniques: Avoidance, Prevention			CO1,CO3
	C	Deadlock Detection & Recovery			CO4
	Unit 4	**Memory Management and File Management**			
	A	Memory Hierarchy, Memory Management Unit, Paging, Segmentation			CO1, CO5
	B	Virtual memory concept, demand paging, Page replacement algorithms(FCFS, Optimal, LRU),			CO3, CO5
	C	File Concept ,File operations, File Directories, Case study of Windows Operating System, Disk structure , Disk scheduling(FCFS,SSTF, SCAN, LOOK,C-SCAN, C-LOOK)			CO2,CO3, CO5
	Unit 5	**Unix and Shell Scripting**			
	A	Unix file system, Commands related to Process and File Handling.			CO1, CO2,CO3
	B	Introduction to shell and various type of shell, Various editors present in linux, Different modes of operation in vi editor,			CO1, CO4,CO6
	C	Introduction to shell script, Writing and executing the shell script, Shell variable (user defined and system variables) System calls, Using system calls, Pipes and Filters, Decision making in Shell Scripts (If else, switch), Loops in shell, Functions, Utility programs (cut, paste, join, tr , uniq utilities), Pattern matching utility (grep)			CO1, CO4,CO6
	Mode of examination	Theory/Jury/Practical/Viva			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	
	Text book/s*	1. Silberschatz G, *Operating System Concepts*, Wiley			
	Other References	1. W. Stalling, "Operating System", Maxwell Macmillan 2. Tannenbaum A S, *Operating System Design and Implementation*, Prentice Hall India 3. Milenkovic M, *Operating System Concepts*, McGraw Hill			

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	**CO1: Define** role, responsibilities, features, and design of operating system.	PO1,PO2,PO3,PO4,PSO1
2.	**CO2: Evaluate** the strengths and weaknesses of the algorithms. And Identify the challenges and apply suitable algorithms for operating system.	PO1, PO3, PO4, PSO2
3.	**CO3: Implement** tools and utility of operating system.	PO1,PO2,PO3,PO4
4.	**CO4: Apply** various memory management and memory management and to understand file and disk management and analyzing it.	PO9, PO10,PO11
5.	**CO5: Understand** the concepts of unix and shell programming.	PO1,PO2,PO8,PO9,PO10,PSO1
6.	CO6: **Design** and develop solutions to real world problem using Linux	PO1,PO2,PO10,PSO1,PSO2

PO and PSO mapping with level of strength for Course Name Operating Systems and Unix shell Programming **(Course Code yyyy)**

Course Code_ Course Name	CO's	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2
	CO1	3	3	3	3	--	--	--	2	2	1	3	2
	CO2	3	2	3	3	--	--	--	2	2	2	2	3
	CO3	3	3	3	3	--	--	--	1	1	1	3	2
	CO4	2	2	2	2	1	--	--	2	3	3	2	2
OS & shell Programming	CO5	2	2	2					3	3	1	3	
	CO6	3	2								2	2	2

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
	OS & shell Programming	2.83	2.67	1.67	1.67	1.00	1.00	1.00	2.00	1.00	2.67		2.50

Strength of Correlation

1. Addressed to ***Slight (Low=1) extent*** ***2.*** Addressed to ***Moderate (Medium=2) extent***
3. Addressed to ***Substantial (High=3) extent***

School:		**School of Engineering and technology**	
Department		**Department of Computer Science and Engineering**	
Program:		**BSC-IT**	
Branch:			
1	Course Code		
2	Course Title	Operating Systems Using Linux Lab	
3	Credits	2	
4	Contact Hours (L-T-P)	0-0-4	
	Course Status	Compulsory	
5	Course Objective	Introduces the UNIX/Linux operating system, including: task scheduling and management, memory management, input/output processing, internal and external commands, shell configuration, and shell customization. Explores the use of operating system utilities such as text editors, electronic mail, file management, scripting, and C/C++ compilers	
6	Course Outcomes	On completion of this course the student should be able to: CO1: To Identify and use UNIX/Linux utilities to create and manage simple file processing operations, organize directory structures with appropriate security, and develop shell scripts to perform more complex tasks. CO2: To accomplish typical personal, office, technical, and software development tasks. CO3: To Analyze system performance and network activities. Effectively use software development tools including libraries, preprocessors, compilers, linkers, and make files. CO4: Comprehend technical documentation, prepare simple readable user documentation and adhere to style guidelines. CO5:Analyze various utilities to structure the Linux Program CO6:Implement the Linux utilities to successfully write a program	
7	Course Description	This courses introduces Linux Operating System	
8	Outline syllabus		CO Mapping
	Unit 1	**Practical based on Basic Linux Commands**	
		Introduction to Unix, Unix architecture, Features of Unix, Internal & External Commands, Basic unix commands: pwd, cd, mkdir, rmdir, ls, help, man, whatis	CO1, CO2, CO4
	Unit 2	**Practical based on File Management**	
		Unix file system, file permission, file handling commands: cat, touch, cp, rm, mv, more/less, lp, wc, cmp, diff, comm.,dos2unix & unix2dos, gzip&gunzip, zip & unzip, tar	CO1, CO2. CO3, CO4
	Unit 3	**Practical based on process Management**	
		Process basics: PID, PPID, ps, process states, zombies, foreground and background processes, nice, kill.	CO2, CO3, CO4
	Unit 4	**Practical Based on Filters**	
		Simple filters: pr, head, tail, cut, paste, sort, nl, tr,grep	CO2, CO3, CO4
	Unit 5	**Practical Based on Shell Scripting**	
		Shell scripts, execution of shell scripts, using command line arguments, loops , condition	CO1, CO2, CO3, CO4, CO6

	Mode of examination	Jury/Practical/Viva			
	Weightage Distribution	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	1. Sumitabha Das, "Unix Concepts and Applications", Tata McGraw Hill.			
	Other References	1. Unix Shell programming by Stephen G. Kochan and Patric Wood 2. Unix and shell programming by Richard F. Gilberg and Behrouz A. forouzan			

PO and PSO mapping with level of strength for Course Name Operating Systems Using Linux Lab **(Course Code yyyy)**

Course Code_ Course Name	CO's	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2
OS & shell Programming lab	CO1	3	3	3	3	--	--	--	2	2	1	3	2
	CO2	3	2	3	3	--	--	--	2	2	2	2	3
	CO3	3	3	3	3	--	--	--	1	1	1	3	2
	CO4	2	2	2	2	2	--	--	2	3	3	2	2
	CO5	2	2	2	2	2	--	--	2	3	3	2	2
	CO6	2	2	2	2	2	--	--	2	3	3	2	2

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
	OS & shell Programming lab	2.5	2.33	2.5	2.5	1.0			1.8	2.3	2.1	2.3	2.1

Strength of Correlation

1. Addressed to ***Slight (Low=1) extent*** ***2.*** Addressed to ***Moderate (Medium=2) extent***
3. Addressed to ***Substantial (High=3) extent***

School: SET		**Batch :**	
Program: BSC-IT		**Current Academic Year: 2021**	
Branch:		**Semester:1**	
1	Course Code		Course Name: Problem solving using C Programming
2	Course Title	Problem solving using C Programming	
3	Credits	4	
4	Contact Hours (L-T-P)		
	Course Status	Core	
5	Course Objective	1. Learn basic programming constructs –data types, decision structures, control structures in C 2. learning logic aptitude programming in c language 3. Developing software in c programming	
6	Course Outcomes	Students will be able to: CO1: D**emonstrate** the hardware components of computer system algorithm, and flow chart for the given problem. CO2**: Develop** better understanding of basic concepts of C programming. CO3: C**reate** and implement logic using array and function. CO4: C**onstruct** and implement the logic based on the concept of strings and pointers. CO5: A**pply** user-defined data types and I/O operations in file. CO6: D**esign** and develop solutions to real world problems using C.	
7	Course Description	Programming for problem solving gives the Understanding of C programming and implement code from flowchart or algorithm	
8	Outline syllabus		CO Mapping
	Unit 1	**Computer Fundamentals And Basic Computer Organization**	
	A	**Computer Fundamentals:** Introduction to Computers: Characteristics of Computers, Uses of computers, Types and generations of Computers.	CO1,
	B	Units of a computer, CPU, ALU, memory hierarchy, registers, I/O devices. Number System	CO1
	C	**Techniques of Problem Solving:** Flowcharting, decision table, algorithms, Structured programming concepts, Programming ethodologies viz. top-down and bottom-up programming.	CO1
	Unit 2	**Introduction to C Programming**	

	A	Introduction to C programming language, Data types, Variables, Constants, Identifiers and keywords, Storage classes	CO2, CO6
	B	Operators and expressions, Types of Statements: Assignment, Control, jumping.	CO2, CO6
	C	Control statements: Decisions, Loops, break, continue	CO2, CO6
	Unit 3	**Arrays and Functions**	
	A	Arrays: One dimensional and multi dimensional arrays: Declaration, Initialization and array manipulation	CO3, CO6
	B	Functions: Definition, Declaration/Prototyping and Calling, Types of functions, Parameter passing: Call by value, Call by reference.	CO3, CO6
	C	Passing and Returning Arrays from Functions, Recursive Functions.	CO3, CO6
	Unit 4	**Pre-processors and Pointers**	
	A	Pre-processors: Types, Directives, Pre-processors Operators (#,##,\)	CO4, CO6
	B	Pointer: Introduction, declaration of pointer variables, Operations on pointers: Pointer arithmetic, Arrays and pointers, Dynamic memory allocation.	CO4, CO6
	C	String: Introduction, predefined string functions, Manipulation of text data, Command Line Arguments.	CO4, CO6
	Unit 5	**User Defined Data Types and File Handling**	
	A	Structure and Unions: Introduction, Declaration, Difference, Application, Nested structure, self-referential structure, Array of structures, Passing structure in function.	CO5, CO6
	B	Files: Introduction, concept of record, I/O Streaming and Buffering, Types of Files: Indexed file, sequential file and random file,	CO5, CO6
	C	Creating a data file, Opening and closing a data file, Various I/O operations on data files: Storing data or records in file, adding records, Retrieving, and updating Sequential file/random file.	CO5, CO6
	Mode of examination	Theory	
	Weightage Distribution	CA: 30% / MTE: 20% / ETE: 50%	
	Text book/s*	Kernighan, Brian, and Dennis Ritchie. *The C Programming Language*	
	Other References	1. B.S. Gottfried - Programming With C - Schaum's Outline Series - Tata McGraw Hill 2nd Edition - 2004. 2. E. Balagurusamy - Programming in ANSI C - Second Edition - Tata McGraw Hill- 1999	

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	**CO1: demonstrate** the hardware components of computer system algorithm, and flow chart for the given problem.	**PO1,PO2,PO3,PO4, PO10, PSO1,PSO2**
2.	**CO2:** develop better understanding of basic concepts of C programming. .	**PO1,PO2,PO3,PO4, PO10, PSO1,PSO2**
3.	**CO3:** : create and implement logic using array and function.	**PO1,PO2,PO3,PO4, PO10, PSO1,PSO2**
4.	**CO4:** construct and implement the logic based on the concept of strings and pointers.	**PO1,PO2,PO3,PO4, PO10, PSO1,PSO2**
5.	**CO5:** apply user-defined data types and I/O operations in file.	**PO1,PO2,PO3,PO4, PO10, PSO1,PSO2**
6	**CO6:** design and develop solutions to real world problems using C.	**PO1,PO2,PO3,PO4,PO5,PO6,PO8,PSO1 PSO2.**

PO and PSO mapping with level of strength for Course Name Problem solving using C Programming **(Course Code:XXXX)**

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO1	PSO2
CO1	1	3	2	2	_	-	_	_		1	2	3
CO2	2	3	3	2	2	-	_	_		1	2	3
CO3	3	3	2	2	2	_	_	_	-	1	2	3
CO4	3	3	2	2	2	_	_	_	-	1	2	3
CO5	3	3	2	2	2	_	_	_	-	1	2	3
CO6	3	3	3	2	2	2	_	2		1	2	3

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
XXXX	Problem solving using C Programming	2.5	3	2.3	1.50	2.00					1	2.	3

Strength of Correlation

1. Addressed to ***Slight (Low=1) extent*** ***2.*** Addressed to ***Moderate (Medium=2) extent***
3. Addressed to ***Substantial (High=3) extent***

Syllabus: : Programming for problem solving Lab

School: SET		**Batch: 2021**	
Program: BSC-IT		**Current Academic Year: 2021**	
Branch:		**Semester: I**	
1	Course Code	XXXX	
2	Course Title	Programming for problem solving Lab	
3	Credits	2	
4	Contact Hours (L-T-P)	0-0-4	
	Course Status	Compulsory	
5	Course Objective	1. Learn basic programming constructs –data types, decision structures, control structures in C 2. learning logic aptitude programming in c language 3. Developing software in c programming	
6	Course Outcomes	Students will be able to: CO1: **Implement** core concept of c Programming CO2: **develop** programs using Array and String CO3: **create** Functions for any problem CO4: **Use** Union and Structure to write any program CO5: **implement** concept of Pointers CO6**: design** a real world problem with the help of c programming	
7	Course Description	Programming for problem solving gives the Understanding of C programming and implement code from flowchart or algorithm	
8	Outline syllabus		CO Mapping
	Unit 1	**Logic Building**	**CO1, CO6**
		Draw flowchart for finding leap year Write a c Program to Add Two Integers Write a program to create a calculator Write a program to add ‘n’ numbers. Write a program to find the area and circumference of a circle. Write a program to swap two numbers with or without use of a third variable.	
	Unit 2	**Introduction to C Programming AND**	**CO2, CO6**

		Write a c program to convert length meter to cm Write a c program to convert temp Write a c program to swap two numbers Write a program to find largest among two and three numbers. Write a program to find the roots of a quadratic equation (real and imaginary). Write a menu-driven program using Switch case to calculate the followings: i. Area of a circle ii. Area of a square iii. Volume of a sphere Write a program to check whether the given number is Armstrong or not.	
	Unit 3	**Arrays and Functions**	**CO3, CO6**
		Write a c program to calculate the average using arrays Write a c program to find the largest element of the array Write a program to calculate the factorial of the given number using function. Write a program to find the Fibonacci series. Write a program to find the sum & reverse of digits and check whether it is palindrome or not. Write a program to multiply two matrices. Write a program to sort the elements of an integer array. Write a program to calculate factorial using recursive function. Write a program to show the use macros. Write a program to implement call by value and call by reference.	
	Unit 4	**Pre-processors and Pointers**	**CO4, CO6**
		Write a c program to swap two values using pointers Write a c program to find largest number from array using pointers Write a program to access array element using pointers. Write a program to count vowels and consonants in a string using pointer. Write a program to perform the string operations. To write a program to print the employee details of employees using structure.	

	Unit 5	**User Defined Data Types and File Handling**	**CO5, CO6**
		Write a c program to store information of a student using structure Write a c program to store information of a student using union Write a program to create array of structures. Write a program to perform file I/O operations. A program to display college address using pointers and structures A program to write data file and read data from file A program to write integer data into file and read it from file A program to write product details A program to use command line arguments in files	
	Mode of examination	Practical	
	Weightage Distribution	CA: 60% / MTE: 0% / ETE: 40%	
	Text book/s*	Kernighan, Brian, and Dennis Ritchie. *The C Programming Language*	
	Other References	4. B.S. Gottfried - Programming With C - Schaum's Outline Series - Tata McGraw Hill 2nd Edition - 2004. 5. E. Balagurusamy - Programming in ANSI C - Second Edition - Tata McGraw Hill- 1999	

Course outline

This course implements array and pointer and Recursive applications. The course talks primarily about Array, string, functions, structure & union and Pointers etc.

Course Evaluation	
Attendance	None
Any other	CA judged on the practicals conducted in the lab , weightage may be specified
References	
Text book	Kernighan, Brian, and Dennis Ritchie. *The C Programming Language*
Other References	1. B.S. Gottfried - Programming With C - Schaum's Outline Series - Tata McGraw Hill 2nd Edition - 2004. 2. E. Balagurusamy - Programming in ANSI C - Second Edition - Tata McGraw Hill- 1999

Softwares	Turbo C

PO and PSO mapping with level of strength for Course Name Programming for problem solving Lab **(Course Code XXXX)**

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO1	PSO2
CO1	1	3	2	2	_	-	_	_		1	2	3
CO2	2	3	3	2	2	-	_	_		1	2	3
CO3	3	3	2	2	2	_	_	_	-	1	2	3
CO4	3	3	2	2	2	_	_	_	-	1	2	3
CO5	3	3	2	2	2	_	_	_	-	1	2	3
CO6	3	3	3	2	2	2	_	2		1	2	3

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
XXXX	Problem solving using C Programming	2.5	3	2.3	1.50	2.00					1	2.	3

Strength of Correlation

1. Addressed to ***Slight (Low=1) extent*** ***2.*** Addressed to ***Moderate (Medium=2) extent***
3. Addressed to ***Substantial (High=3) extent***

School:		**School of Engineering and technology**			
Department		**Department of Computer Science and Engineering**			
Program:		**Bachelor of Science**			
Branch:		**BSC**			
1	Course Code	**BOLXXX**			
2	Course Title	Object Oriented Programming Using Java and Web Designing Lab			
3	Credits	2			
4	Contact Hours (L-T-P)	0-0-4			
	Course Status	Compulsory/Elective			
5	Course Objective	To implement Java language syntax and semantics and concepts such as classes, objects, inheritance, polymorphism, packages, multithreading and Web development through HTML, CSS, JavaScript etc.			
6	Course Outcomes	CO1: Installing, Writing and executing Java programs and Web Desig. CO2: Understand and formulate the problems in basic programming constructs CO3: Applying OOP and Web Design concepts to solve real world problems CO4: Implement inheritance and polymorphism features of Java and HTML, CSS. CO5: Implementing multithreading, XML and JavaScript CO6: Develop Java and Web Program for application development			
7	Course Description	Basic Object Oriented Programming (OOP) concepts including objects, classes, methods, parameter passing, information hiding, inheritance and polymorphism are discussed. Web Designing is to give students the basic understanding of how things work in the Web world from the technology point of view as well as to give the basic overview of the different technologies.			
8	Outline syllabus				CO Mapping
	Unit 1	**Introduction**			
		Installation, Configuration and basic programming.			CO1
	Unit 2	**Introduction to Java with class and object**			
		Programs on the concept of class and object			CO2,CO3
	Unit 3	**Inheritance, Polymorphism & Exception and Multithreading**			
		Programs on the concept of Inheritance, Polymorphism & Exception and Multithreading			CO2,CO3
	Unit 4	**HTML and CSS**			
		Programs on the concept of HTML and CSS			CO3,CO4,CO6
	Unit 5	**XML and JavaScript**			
		Programs on the concept of XML and JavaScript			CO3,CO5,CO6
	Mode of examination	Jury/Practical/Viva			
	Weightage Distribution	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	1.Schildt H, "The Complete Reference JAVA2", TMH 2. Douglas Comer "The Internet Book - Pearson Education", Asia			
	Other	1. Balagurusamy E, "Programming in JAVA", TMH			

	References	2. Professional Java Programming: BrettSpell, WROX Publication Douglas E. Comer "Internetworking with TCP/IP", Volume-I, PHI	

PO and PSO mapping with level of strength for Course Name Introduction to Object Oriented Programming Using Java and Web Designing Lab **(Course Code BOLXXX)**

Course Code_ Course Name	CO's	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2	PSO3
BOLXXX Object Oriented Programming Using Java and Web Designing Lab	CO1	1			2	2					2		2	2		
	CO2	2			2	2					2			2		
	CO3	2	3	3	3	2					2		2	3		
	CO4	3			3	2					2			2	2	
	CO5	3			3	2					2			2	2	
	CO6	3	3	3	3	2					2		3	3	2	

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
BOL XXX	Object Oriented Programming Using Java and Web Designing Lab	2.5	3	3	2.5	3	0	0	0	0	2	2.5	2

Strength of Correlation

1. Addressed to ***Slight (Low=1) extent*** ***2.*** Addressed to ***Moderate (Medium=2) extent***
3. Addressed to ***Substantial (High=3) extent***

School:		**School of Engineering and technology**	
Department		**Department of Computer Science and Engineering**	
Program:		**Bachelor Of Science**	
Branch:		**Computer Science**	
1	Course Code	BCO XXX	
2	Course Title	Object Oriented Programming Using Java and Web Designing	
3	Credits	4	
4	Contact Hours (L-T-P)	4-0-0	
	Course Status	Core /Elective/Open Elective	
5	Course Objective	Understand the fundamentals of object-oriented concept in Java, defining classes, objects, invoking methods inheritance, interfaces and exception handling mechanisms. To develop skills in analyzing the usability of a web and understand fundamentals of tools and technology of web design.	
6	Course Outcomes	CO1: **Describe** the fundamental of object-oriented concept in java and web design. CO2: **Compare** and contrast different features of java and web design. CO3: **Develop** programs using core concepts of java and web development tools . CO4: **Analyze** Exception and Error in java programs and security in web design CO5: **Explain** the concept of inheritance, polymorphism and interfaces and web applications. CO6: **Design** application of real-world problem using Java and web development tools.	
7	Course Description	Basic Object-Oriented Programming (OOP) concepts, including objects, classes, methods, parameter passing, information hiding, inheritance and polymorphism are introduced and their implementations using Java are discussed.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction to Object Oriented Paradigm**	
	A	Procedural Languages, object-based languages, object-oriented languages, difference between programming paradigms, advantages of OOPs.	CO1, CO2
	B	Object oriented programming features: Abstraction, class, object, Encapsulation, data hiding, polymorphism, inheritance.	CO2
	C	Java virtual machine, Byte Code, Architecture of JVM, Class Loader, Execution Engine, Garbage collection.	CO2
	Unit 2	**Introduction to Java with class and object**	
	A	Java development Kit (JDK), Introduction to IDE for java development, setting java environment (steps for path and CLASSPATH setting)	CO2
	B	Constants, Variables, Data Types, Operators, Expressions, Decision Making, Branching, Loops, command line argument	CO2

	C	Arrays, Type conversion & casting, Input from keyboard, Classes, Objects, Methods, Method overloading, Constructors, Constructor's overloading, static keyword, Introducing Access Control, String handling			CO1, CO2, CO3
	Unit 3	**Inheritance, Polymorphism & Exception and Multithreading**			
	A	Types of inheritance, Implementing Interface, Concept of multiple inheritances, use of this and super, Polymorphism, Overriding methods			CO5
	B	Final class, method and variable, Abstract class and method, Introduction to Exception Handling, Introduction to try, catch, throw and throws.			CO4, CO5, CO6
	C	Checked and Unchecked exceptions, User define exception, Introduction to Multithreading: multithreading advantages and issues, creating thread using Runnable interface and Thread class, Thread life cycle.			CO4, CO5, CO6
	Unit 4	**Web Design and Architecture**			
	A	Introduction to Web: History of Internet, WWW, Client or Browser, website, internet browsers, Hypertext, Web server, Locating resource on internet-URI, URL, URN, ISP, Gateways.			CO1, CO2
	B	Basic features of HTTP, Working of HTTP, HTTP response code**,** social networks, search engines, Video Conferencing, e-Commerce, m-Commerce. Web Architecture: Server, Type of server, database server, mail server, web server			CO1, CO2, CO3
	C	Components of web, usage of Web, client-server architecture, Domain Name System, Type of DNS servers, Example of DNS query and response, Wildcards, Negative response caching, Zone maintenance and transfers			CO1, CO2
	Unit 5	**Web Applications and security**			
	A	SMTP-components, working of SMTP, SMTP protocol stack, SMTP headers, SMTP forwarding, SMTP relays, interoperation, how SMTP uses DNS, Concept of remote login, remote Login methods, setting environment for putty, login to remote system using putty			CO4, CO5, CO6
	B	FTP: FTP protocol, Usage of FTP, anonymous ftp, Setting FileZilla server and client, FTP commands: Access control commands, Transfer Parameter Commands, FTP Service Commands, FTP command arguments			CO4, CO5, CO6
	C	Security requirements, confidentiality, authenticity, integrity, plain text, cipher text, Symmetric Cryptography, Asymmetric Cryptography,			CO4, CO5, CO6
	Mode of examination	Theory/Jury/Practical/Viva			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	

	Text book/s*	1.Schildt H, "The Complete Reference JAVA2", TMH 2. Douglas Comer "The Internet Book - Pearson Education", Asia	
	Other References	3. Balagurusamy E, "Programming in JAVA", TMH 4. Professional Java Programming: BrettSpell, WROX Publication 5. Douglas E. Comer "Internetworking with TCP/IP", Volume-I, PHI	

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	CO1: Describe the fundamental of object oriented concept in java and web design.	PO3, PO10
2.	CO2: Compare and contrast different features of java and web design.	PO3,PO10
3.	CO3: Develop programs using core concepts of java and web development tools .	P01,PO2,PO3,PO4,PO10
4.	CO4: Analyze Exception and Error in java programs and security in web design	PO3,PO10
5.	CO5: Explain the concept of inheritance, polymorphism and interfaces and web applications.	PO3,PO10
6.	CO6: Design application of real world problem using Java and web development tools.	PO1,PO2,PO3,PO4,PO5,PO6,PO8, PO10,PSO1,PSO2

PO and PSO mapping with level of strength for Course Name Object Oriented Programming Using Java and Web Designing **(Course Code BCO-XXX)**

Course Code_ Course Name	CO's	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2
Object Oriented Programming Using Java and Web Designing **BCO-XXX**	CO1			2							2		
	CO2			2							2		
	CO3	2	3	2	2						2		
	CO4			2							2		
	CO5			2							2	2	1
	CO6	2	3	2	3	3	2		3		2	2	2

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
BCO XXX	Object Oriented Programming Using Java and Web Designing **BCO-XXX**	2	3	2	2.5	3	2	0	3	0	2	2	1.5