

Anekant Education Society's

Tuljaram Chaturchand College, Baramati

(Autonomous)

Four Year B. Sc. Degree Program in Computer Science (Faculty of Science & Technology)

CBCS Syllabus

F. Y. B.Sc. (Computer Science) Semester -I For Department of Computer Science Tuljaram Chaturchand College, Baramati

Choice Based Credit System Syllabus (2023 Pattern)

(As Per NEP 2020)

To be implemented from Academic Year 2023-2024

(Eligibility: 12th Science with Mathematics)

Title of the Programme: F. Y. B. Sc (Computer Science)

Preamble

AES's Tuljaram Chaturchand College has made the decision to change the syllabus of across various faculties from June, 2023 by incorporating the guidelines and provisions outlined in the National Education Policy (NEP), 2020. The NEP envisions making education more holistic and effective and to lay emphasis on the integration of general (academic) education, vocational education and experiential learning. The NEP introduces holistic and multidisciplinary education that would help to develop intellectual, scientific, social, physical, emotional, ethical and moral capacities of the students. The NEP 2020 envisages flexible curricular structures and learning based outcome approach for the development of the students. By establishing a nationally accepted and internationally comparable credit structure and courses framework, the NEP 2020 aims to promote educational excellence, facilitate seamless academic mobility, and enhance the global competitiveness of Indian students. It fosters a system where educational achievements can be recognized and valued not only within the country but also in the international arena, expanding opportunities and opening doors for students to pursue their aspirations on a global scale.

In response to the rapid advancements in science and technology and the evolving approaches in various domains of Computer Science and related subjects, the Board of Studies in Computer Science at Tuljaram Chaturchand College, Baramati - Pune, has developed the curriculum for the first semester of F.Y.B.Sc.(Computer Science), which goes beyond traditional academic boundaries. The syllabus is aligned with the NEP 2020 guidelines to ensure that students receive an education that prepares them for the challenges and opportunities of the 21st century. This syllabus has been designed under the framework of the Choice Based Credit System (CBCS), taking into consideration the guidelines set forth by the National Education Policy (NEP) 2020, LOCF (UGC), NCrF, NHEQF, Prof. R.D. Kulkarni's Report, Government of Maharashtra's General Resolution dated 20th April and 16th May 2023, and the Circular issued by SPPU, Pune on 31st May 2023.

A degree in Computer Science subject equips students with the knowledge and skills necessary for a diverse range of fulfilling career paths-Career in Computer Science is considered one of the most high-paying jobs and is full of opportunities; particularly when India's prowess in information technology industry is recognized across the globe. The pool of talented computer professionals working in IT companies of the USA, Canadaand other

countries shows that IT can take a person to higher levels. Numerous IT companies from India employ huge number of computer professionals in their Indian and overseas offices. Students who are interested in programming, software development, and have good analytical and reasoning skills may pursue this course. Job opportunities are available for Graduates and Post Graduates in Government as well as Private sector. Graduates may take up the following job posts- Software Engineer, Software Tester, Data Analyst, Project Manager, Network Administrator, database administrator and Application Developer.

Overall, revising the Computer Science syllabus in accordance with the NEP 2020 ensures that students receive an education that is relevant, comprehensive, and prepares them to navigate the dynamic and interconnected world of today. It equips them with the knowledge, skills, and competencies needed to contribute meaningfully to society and pursue their academic and professional goals in a rapidly changing global landscape.

Programme Specific Outcomes (PSOs)

For

B.Sc. (Computer Science)

PSO1: Apply fundamental principles and methods of Computer Science to a wide range of applications.

PSO2: Design, correctly implement and document solutions to significant computational problems.

PSO3: Impart an understanding of the basics of our discipline.

PSO4: Prepare for continued professional development.

PSO5: Understand the impact of the IT analyst solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.

PSO6: Develop proficiency in the practice of computing.

PSO7:Develop the capacity to study and research independently that will help to develop skills for transition to employment in hardware/software companies.

Anekant Education Society's Tuljaram Chaturchand College, Baramati (Autonomous)

Board of Studies (BOS) in Computer Science

Sr.No.	Name	Designation
1.	Mr. Upendra Choudhari	Chairman
2.	Dr. Vilas Kardile	Member
3.	Mr. Abhijeet Mankar	Member
4.	Mr. Vishal Shaha	Member
5.	Mrs. Prajakta Kulkarni	Member
6.	Mrs. Asmita Bhagat	Member
7.	Mr. Rahul Shah	Member
8.	Mr. Shashikant Nakate	Member
9.	Mr. Purushottam Dixit	Member
10.	Mr. Swapnil Chemte	Member
11.	Mrs. Kalyani Londhe	Member
12.	Mrs. Poornima Gavimath	Member
13	Dr.Kavita A. Khobragade	Vice-Chancellor Nominee
14	Dr.Sudhakar Bhoite	Expert from other University
15	Dr.Suhas S. Satonkar	Expert from other University
16	Mr. Rohit Shah	Industry Expert
17	Mr. Yogesh More	Meritorious Alumni
18	Mr. Abhijeet Chopade	Student Representative
19	Miss. Rutuja Harihar	Student Representative
20	Mr. Akshada Kulkarni	Student Representative
21	Mr. Prajwal Nimbalkar	Student Representative

From 2022-23 to 2024-25

el	SEM	Major		Minor	GE/OE	VSC, SEC	AEC, VEC,	OJT, FP, CEP,	Cum. Cr./	Degree/
		Mandatory	Electives	l		(VSEC)	IKS	UU, KP	Sem.	Cum. C
		COS-101-MJM:			COS-116-	COS-126-SEC(ST):	ENG-131-	CC:		
		Basic Programming		1	OEInternet	Introduction to	AEC:FunctionalE	NSS/NCC/Yoga/		
		using C		1	Awareness (TH)	Statistical Software	nglish – I	Cultural		
	Ι			1		OR (PR)		Activity/Sports		
		COS-102-		1		COS-126-SEC(MT)	COS-137-			
		MJM:DBMS-I		1		Mathematics for	IKS: Evolution of			
		000 400		1	COS-117-	Computer Science	Computer		22	
		COS-103-		1	OE:Introduction					
		MJM:Computer		l	to MS-Office	COS 126 SEC(EL)	000 125 VEG			
		Science Practical – I		l	(PR)	CUS-120-SEC(EL)	COS-135-VEC:			
				1		Electronics PractI	Environmental			U
		Cuadita 21212		1		Drahlam Salarina	Science			Certif
		Creans-2+2+2		l		Shille & DDMS		Credit- 2		44
				1	Credit 212	July Restars				
					Credit- 2+2	Credit- $2+2$	Credit- 2+2+2			
		COS-151-MIM··		COS-161-MN(ST)··	COS-166-	COS 176 SEC:	ENG-181-AEC:	CC		
		Advanced		Exploratory Data	OE Advanced	Pagia Graphics	Functional	NSS/NCC/Yoga/		
		Programming Using		Analysis-I	MS-Excel	Design using C	English II	Cultural		
	П	C		I OR		Design using C	English – fi	Activity/Sports		
		c		COS-161-MN(EL)::						
		COS-152-MJM:		Fundamentals of			COS-185-VEC:			
		DBMS-II		Electronics		COS-171-VSC:	Digital and			
				OR	COS-167-OE	Database	Technological		22	
		COS-153-MJM:		COS-161-	E-Banking	Applications using	Solutions			
		Computer Science		MN(MT):Discrete	0	PL/pgSQL				
		Practical – II		Mathematics						
				Credits-2	Credit- 2+2	Credit- 2+2	Credit- 2+2	Credit- 2		
	~	Credits-2+2+2								
	Cum	12	-	2	8	8	10	4	44	
	Cr.			L						

Credit Distribution Structure for F.Y.B.Sc.(Computer Science)-2023-2024

Department of Computer Science F. Y. B.Sc. (Comp.Sci.) Semester-I

Sem.	Sem. Course Type Course Code Title of Course Course		Course	No. of		
				Types	Credits	
	Major Mandatory	COS-101-MJM	Basic Programming using C	Theory	2	
	Major Mandatory	COS-102-MJM	DBMS-I	Theory	2	
	Major Mandatory	COS-103-MJM	Computer Science Practical – I	Practical	2	
	Open Elective (OE)	COS-116-OE	Internet Awareness	Theory	2	
	Open Elective (OE)	COS-117-OE	Introduction to MS-Office	Practical	2	
	Skill EnhancementCOS-126-SEC(S'Course (SEC)COS-126-SEC(M)(Any one)COS-126-SEC(E)		Introduction to Statistical Software Mathematics for Computer Science Electronics	Practical	2	
Ι	Vocational Skill Course (VSC)	COS-121-VSC	Problem Solving Skills & DBMS Using PostgreSQL	Theory	2	
	Ability Enhancement Course (AEC)	ENG-131-AEC	Functional English - I	Theory	2	
	Value Education Course (VEC)	COS-135-VEC	Environmental Science	Theory	2	
	Indian Knowledge System (IKS)	COS-137-IKS	Evolution of Computers	Theory	2	
	Co-curricular Course (CC)		To be selected from the Basket		2	
		Total	Credits I:		22	
	Major Mandatory	COS-151-MJM	Advanced Programming Using C	Theory	2	
	Major Mandatory	COS-152-MJM	DBMS-II	Theory	2	
	Major Mandatory	COS-153-MJM	Computer Science Practical – II	Practical	2	
	Minor (Any one)	COS-161-MN(ST) COS-161-MN(MT) COS-161-MN(EL)	Exploratory Data Analysis-I Discrete Mathematics Fundamentals of Electronics	Theory	2	
	Open Elective (OE)	COS-166-OE	Advanced MS-Excel	Practical	2	
	Open Elective (OE)	COS-167-OE	E-Banking	Theory	2	
11	Vocational Skill Course (VSC)	COS-171-VSC	Database Applications using PL/pgSQL	Theory	2	
	Skill Enhancement Course (SEC)	COS-176-SEC	Basic Graphics Design using C	Practical	2	
	Ability Enhancement Course (AEC)	ENG-181-AEC	Functional English – II	Theory	2	
	Value Education Course (VEC)	COS-185-VEC	Digital and Technological Solutions	Theory	2	
	Co-curricular Course (CC)		To be selected from the Basket		2	
Total Credits II:						
Cumulative Credits Semester I and II:						

Course Structure for F.Y.B.Sc. (Computer Science)(2023 Pattern)

SYLLABUS (CBCS as per NEP 2020) FOR F. Y. B. Sc. (Computer Science) (w. e. from June, 2023)

Name of the Programme	: B.Sc. Computer Science
Program Code	: USCOS
Class	: F.Y.B.Sc. (Computer Science)
Semester	: I
Course Type	: Major
Course Name	: Basic Programming using C (TH)
Course Code	: COS-101-MJM
No. of Lectures	:30
No. of Credits	: 02

A) Course Objectives:

- 1. Introduce students to the C programming language
- 2. Develop problem-solving skills
- 3. Learn how to write and execute C programs
- 4. Understand the basic syntax and structure of C
- 5. Master the use of functions and modular programming
- 6. Gain proficiency in working with arrays and strings
- 7. Introduce file handling and basic I/O operations

B) Course Outcomes:

- CO1- Understand the fundamentals of C programming language:
- CO2- Develop problem-solving skills
- CO3-Gain proficiency in C programming syntax and semantics
- CO4- Gain a foundation for advanced programming concepts
- CO5- Apply C programming concepts to real-world problems
- CO6- Improve code efficiency and optimization
- CO7- Develop debugging and error handling skills

TOPICS/CONTENTS:

UNIT	CONTENT	No. of Lectures
Unit – I	C Tokens 1.1 Keywords 1.2 Identifiers 1.3 Variables 1.4 Constants – character, integer, float, string, escape sequences 1.5 Data types – built-in and user defined	5

	1.6 Operators and Expressions					
	Control structures					
	2.1 Decision making structures if if-else switch-case					
	2.2 Loop Control structures While, do-while, for					
Unit - II	2.3 Jumping Statements break, continue and goto statement	10				
	2.4 Nested control structures					
	Functions in C					
	3.1 What is a function					
	3.2 Advantages of Functions					
	3.3 Standard library functions	10				
Unit III	3.4 User defined functions :Declaration, definition, function	10				
	call, parameter passing (by value), return keyword					
	3.5 Scope of variables, storage classes					
	3.6 Recursion					
	Arrays					
	4.1 Array Concept					
T T 1 / T T	4.2 Types – one, two and multidimensional	_				
Unit – IV	4.3 Array Operations - declaration, Initialization, accessing	5				
	array elements					
	4.4 Passing arrays to functions					
Dool: Dofo	4.5 Array Applications					
1 Vas	rences: havant Kanetkar : Let Us $C 7^{\text{th}}$ Edition PBP Publications					
1.1as 2 FB	alaguruswamy : Programming in ANSI C 7^{th} Edition. Tata Mc-Graw	Hill				
2. E D Pub	lishing Co Ltd -New Delhi	11111				
3. Bria	3 Brian W Kernighan and Dennis M Ritchie · The C Programming Language 2 nd					
Edi	Edition. Prentice Hall Publication					
4. Her	. Herbert Schildt, The Complete Reference to C					
5. Har	. Harrow, Problem Solving with C					
E-Resourc	es:					
1. <u>htt</u>	https://www.tutorialspoint.com/cprogramming/index.htm					
2. <u>htt</u>	https://www.w3schools.com/c/index.php					
3. <u>htt</u>	os://www.guru99.com/c-programming-tutorial.html					
4. <u>htt</u>	os://www.geeksforgeeks.org/c-programming-language/					
5. <u>htt</u>	os://nptel.ac.in/courses					

Course		Programme Outcomes (POs)					
Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	2	2	1	1
CO2	3	3	3	3	3	2	3
CO3	3	3	2	3	3	1	2
CO4	2	2	2	3	3	1	2
CO5	3	3	3	3	3	2	3
CO6	2	3	2	3	3	1	2
CO7	2	3	2	3	3	2	2

Mapping of this course with Programme Outcomes

Weight:1 - Partially related2 - Moderately Related3 - Strongly relatedCourse Objectives (CO) and Program Outcomes (PO) Mapping:

1. Justification of PO1 to ALL COs :

CO1:PO1-Understanding the digital paradigm provides foundational context for designing computational solutions that leverage digital technologies effectively.

CO2:PO1-Recognizing the importance of digital tools influences the design of computational solutions to address relevant technological and financial challenges.

Communication and network knowledge is essential for designing robust computational solutions that CO3:PO1-involve data transmission, networking protocols, and system connectivity.

CO4:PO1-While awareness of e-governance and Digital India initiatives is beneficial, its direct impact on designing and implementing computational solutions is limited compared to other COs.

CO5:PO1-Understanding practical applications of digital technology informs the design and implementation of computational solutions tailored to specific technological contexts

CO6:PO1-Basic knowledge of machine learning and big data is relevant for designing computational solutions that involve data analytics, pattern recognition, and decision-making processes.

CO7:PO1-Knowledge of social networking, while interesting, has limited direct relevance to designing and implementing computational solutions to significant problems compared to other COs.

2. Justification of PO2 to ALL COs :

CO1:PO2-A solid understanding of C fundamentals is crucial for acquiring practical skills and expertise in professional tasks, as it forms the base for all programming activities.

CO2:PO2-Problem-solving skills are essential for effectively applying industry standards and best practices in real-world scenarios, directly contributing to professional competence.

CO3:PO2-Proficiency in C syntax and semantics is vital for carrying out professional tasks with precision and adhering to industry standards.

CO4:PO2-While foundational knowledge in advanced programming is important, its direct application to practical professional tasks may vary, making it moderately related.

CO5:PO2- Applying programming concepts to real-world problems is directly aligned with the ability to perform professional tasks and apply knowledge effectively in real-world scenarios.

CO6:PO2-Code efficiency and optimization are key aspects of professional expertise, adhering to best practices and industry standards.

CO7:PO2-Debugging and error handling are essential skills for professional competence, enabling effective troubleshooting and adherence to quality standards in real-world scenarios.

3. Justification of PO3 to ALL COs:

CO1:PO3-Understanding C programming fundamentals provides basic skills useful in entrepreneurship, though not directly related.

CO2:PO3-Problem-solving skills are crucial for identifying opportunities and fostering innovation, key in entrepreneurship.

CO3:PO3-Proficiency in programming supports innovation, aiding entrepreneurial activities.

CO4:PO3-Advanced programming concepts enhance innovation, contributing to entrepreneurial ventures.

CO5:PO3-Applying programming to real-world problems is tied to innovation and business opportunities, essential for entrepreneurship.

CO6:PO3-Efficient and optimized code can lead to competitive products, aiding entrepreneurial success.

CO7:PO3-Debugging and error handling ensure robust solutions, valuable in entrepreneurial ventures.

4. Justification of PO4 to ALL COs:

CO1:PO4-Fundamentals of C programming build the foundational technical skills necessary for specialized competencies.

CO2:PO4-Problem-solving is critical for analytical abilities and adaptability, essential for specialized skills.

CO3:PO4-Proficiency in programming syntax and semantics is a fundamental technical skill required for specialized competencies.

CO4:PO4-Advanced programming concepts enhance technical skills and analytical abilities, key for specialized competencies.

CO5:PO4-Applying programming to real-world problems involves technical skills and problem-solving, aligning with specialized competencies.

CO6:PO4-Code efficiency and optimization demonstrate analytical abilities and innovation, crucial for specialized skills.

CO7:PO4-Debugging and error handling require problem-solving and analytical abilities, contributing to specialized competencies.

5. Justification of PO5 to ALL COs :

CO1:PO5-Fundamentals of C programming are crucial for basic application and problemsolving, but they form the starting point.

CO2:PO5-Problem-solving skills are essential for tackling complex problems and applying analytical reasoning effectively.

CO3:PO5-Proficiency in C programming syntax and semantics is crucial for accurate application and effective problem-solving.

CO4:PO5-Advanced programming concepts enhance analytical reasoning and the ability to solve complex problems creatively.

CO5:PO5-Applying programming to real-world problems is key for practical application, critical thinking, and adaptability.

CO6:PO5-Code efficiency and optimization are vital for solving complex problems effectively and enhancing analytical reasoning.

CO7:PO5-Debugging and error handling are critical for solving problems and require strong analytical reasoning and adaptability.

6. Justification of PO6 to ALL COs:

CO1:PO6-Fundamentals of C programming are important for technical knowledge but not directly related to communication skills or collaboration.

CO2:PO6-Problem-solving often requires teamwork and effective communication to address challenges.

CO3:PO6-Proficiency in programming syntax and semantics is essential for technical tasks, with limited impact on communication and collaboration.

CO4:PO6-Advanced programming concepts are important for technical competence but not directly related to communication or collaboration.

CO5:PO6-Applying programming concepts to real-world problems involve teamwork and effective communication of solutions.

CO6:PO6-Improving code efficiency is a technical skill that may involve some communication but is not primarily focused on collaboration.

CO7:PO6-Debugging and error handling involve communicating with team members to resolve issues, enhancing communication and collaboration.

7. Justification of PO7 to ALL COs:

CO1:PO7-Fundamentals of C programming provide a base but only indirectly support research-related skills.

CO2:PO7-Problem-solving is critical for formulating research questions, designing methodologies, and analyzing data.

CO3:PO7-Proficiency in syntax and semantics supports writing code for research activities, indirectly aiding research skills.

CO4:PO7-Advanced programming concepts aid in developing methodologies for research but vary in direct impact on research skills.

CO5:PO7-Applying programming concepts to real-world problems are essential for conducting practical research.

CO6:PO7-Code efficiency and optimization are important for handling large datasets and analyses in research.

CO7:PO7-Debugging and error handling ensure the accuracy and reliability of research findings, supporting research skills.

SYLLABUS (CBCS as per NEP 2020) FOR F. Y. B. Sc. (Computer Science)

Name of the Programme	: B.Sc. Computer Science
Program Code	: USCOS
Class	: F. Y. B. Sc. (Computer Science)
Semester	: I
Course Type	: Major (TH)
Course Name	: DBMS-I
Course Code	: COS-102-MJM
No. of Lectures	: 30
No. of Credits	: 02

(w. e. from June, 2023)

Course objective:

- 1. Students successfully completing this course will be able to:
- 2. Introducing students to the DBMS Database Language.
- 3. Students will learn the fundamentals of the relational data model, the entity-relationship model, the relational database architecture, and relational algebra.
- 4. Able to Understand and development of essential DBMS concepts.
- 5. Creating ER model to reflect straightforward database application scenarios.
- 6. Understanding of fundamental database access & storage approaches: Organization of files and pages, indexing techniques
- 7. Understand the basic concepts of database systems.
- 8. Talk about database management systems, databases, and their applications.

Course Outcomes:

- CO1: Master the basics of database concepts and database management system.
- CO2: Model an application's data requirements using conceptual modelling tools like ER & relational model.
- CO3: Demonstrate the basic elements of a relational database management system.
- CO4: Identify the data models for relevant problems.
- CO5: Draw Entity-Relationship diagrams to represent simple database application scenarios.
- CO6: Study the hashing, indexing, and file organization systems.
- CO7: Additionally, using a database management system, students will be able to construct, assess, and design real database applications.

Units	Title & Content			
	1. Introduction to File organization &DBMS			
	1.1 Introduction			
	1.2 Types of file organization			
	1.3 File system Vs DBMS			

	1.4 Data models				
Unit 1	1.5 Levels of abstraction	06			
	1.6 Data in dependence				
	1.7 Structure of DBMS				
	1.8 Users of DBMS				
	1.9 Advantages of DBMS				
	2.Conceptual Design (E-R model)				
	2.1 Overview of DB design				
	2.2 ER data model (entities, attributes, entity sets, relations, relationship	12			
Unit 2	sets)				
	2.3 Additional constraints (Key constraints, Mapping constraints)				
	2.4 Conceptual design using ER modelling.				
	2.5 Case studies				
	3. Relational data model				
	3.1 Structure of Relational Databases (concepts of a table, a row, a				
	relation, a Tuple, and a key in a relational database)	06			
Unit 3	3.2 Conversion of ER to Relational model	00			
	3.3. Integrity constraints (primary key, referential integrity, unique				
	constraint, Null constraint, Check constraint)				
	4. Relational algebra				
TT \$4 4	4.1 Preliminaries	06			
Unit 4	4.2 Relational algebra (selection, projection set operations,				
	renaming, joins, division) Problems.				
L		1			

References

- 1. Shamkant B. Navathe, Ramez Elmasri, Database Systems, ISBN:9780132144988, PEARSON HIGHEREDUCATION
- 2. Richard Stones, Neil Matthew, Beginning Databases with PostgreSQL: From Novice to Professional, ISBN:9781590594780, Apress
- 3. Korry Douglas, PostgreSQL, ISBN:9780672327568, Sams
- 4. JohnWorsley, Joshua Drake, Practical PostgreSQL (BCD), ISBN:9788173663925Shroff/O'reilly
- 5. Joshua D. Drake, John C Worsley, Practical Postgresql, (O'Reilly publications)
- 6. Bipin C Desai, "An introduction to Database systems", Galgotia Publications
- 7. Henrey Korth, Sudarshan, Silberschatz "Database System Concepts" (4th Ed), McGraw Hill.

Course	Programme Outcomes (POs)							
Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	
CO1	3	3	2	2	1	3	3	
CO2	3	3	2	2	1	3	3	
CO3	3	3	2	2	2	3	3	
CO4	3	3	2	3	2	3	3	
CO5	3	2	1	2	2	2	2	
CO6	2	2	1	1	1	2	2	
CO7	3	3	1	3	2	3	3	

Mapping of this course with Programme Outcomes

Weight:1 - Partially related2 - Moderately Related3 - Strongly related

Course Objectives (CO) and Program Outcomes (PO) Mapping: 1. Justification of PO1 to ALL COs:

CO1:PO1- Knowing syntax enables autonomy in writing database logic independently.

CO2:PO1- Understanding RDBMS elements supports responsibility in data management tasks.

CO3:PO1- Understanding SQL & PL/pgSQL techniques fosters responsibility in database querying and management.

CO4:PO1- Analyzing PL/SQL structures requires accountability for ensuring efficient database operations.

CO5:PO1- Mastering database concepts enhances autonomy in managing database systems.

CO6:PO1- Applying advanced SQL features like views demonstrates responsibility in optimizing database performance.

CO7:PO1- Writing SQL commands reflects accountability in data manipulation and retrieval tasks.

2. Justification of PO2 to ALL COs:

CO1:PO2- Knowledge of query execution and performance is crucial for practical database management.

CO2:PO2- Demonstrating basic elements of an RDBMS is essential for practical application in database management.

CO3:PO2- Gaining a foundation in DBMS concepts is necessary for practical understanding and application.

CO4:PO2- Knowledge of aggregate operations is important but slightly less directly related to practical procedures compared to other COs.

CO5:PO2- Mastering basics of database concepts and DBMS is essential for practical proficiency in database management.

CO6:PO2-Modeling data requirements using ER and relational models supports practical application but is more specific.

CO7:PO2-Writing SQL commands for data manipulation and querying is directly related to practical database management skills.

3. Justification of PO3 to ALL COs:

CO1:PO3- Understanding query execution and performance can support entrepreneurial decisions but is not directly entrepreneurial in nature.

CO2:PO3- Demonstrating RDBMS elements is foundational but does not directly correlate with entrepreneurial mindset.

CO3:PO3- Gaining a foundation in DBMS concepts provides technical background but does not directly relate to entrepreneurial mindset.

CO4:PO3- Knowledge of aggregate operations is less directly related to entrepreneurial mindset compared to other COs.

CO5:PO3- Mastering database concepts supports technical proficiency rather than entrepreneurial mindset directly.

CO6:PO3- Modelling data requirements is useful for application development but not directly entrepreneurial.

CO7:PO3-Writing SQL commands are fundamental but not directly related to entrepreneurial mindset.

4. Justification of PO4 to ALL COs:

CO1:PO4- Knowledge of query execution and performance is crucial for specialized database optimization and tuning.

CO2:PO4- Demonstrating RDBMS elements is fundamental for specialized database management tasks.

CO3:PO4-Gaining a foundation in DBMS concepts is essential for specialized database management roles.

CO4:PO4- Knowledge of aggregate operations is crucial for specialized data analysis and reporting tasks.

CO5:PO4- Mastering database concepts is essential for specialized database design and optimization.

CO6:PO4- Modelling data requirements using conceptual modelling tools are crucial for specialized database design and architecture.

CO7:PO4- Writing SQL commands proficiently is essential for specialized database development and maintenance tasks.

5. Justification of PO5 to ALL COs:

CO1:PO5- Knowledge about query execution and performance is essential for solving complex database performance issues.

CO2:PO5- Understanding RDBMS elements is crucial for applying database solutions and solving database-related problems.

CO3:PO5- A strong foundation in DBMS concepts enables effective problem-solving and analytical reasoning in database management.

CO4:PO5- Knowledge about aggregate operations is vital for analyzing and solving datarelated queries and problems.

CO5:PO5- Mastering database concepts is essential for applying solutions to various database management problems.

CO6:PO5-Modeling data requirements using conceptual tools aids in problem-solving and designing effective database solutions.

CO7:PO5- Writing SQL commands is critical for applying database solutions and solving data manipulation problems.

6. Justification of PO6 to ALL COs:

CO1:PO6- Justification: Understanding query execution and performance is a technical skill that has limited direct impact on communication and collaboration.

CO2:PO6- Demonstrating basic elements are primarily a technical task, with minimal influence on communication and collaboration.

CO3:PO6- Gaining foundational knowledge is essential for communication within technical teams but has limited direct impact on broader collaboration skills.

CO4:PO6- Knowledge about aggregate operations is a technical detail that does not directly enhance communication or collaboration skills.

CO5:PO6- Mastering basic database concepts is primarily a technical competency with limited direct relation to communication and collaboration.

CO6:PO6- Modelling data requirements often involves teamwork and collaboration, as it requires understanding and integrating input from various stakeholders.

CO7:PO6- Writing SQL commands is a technical skill, but collaborating on database operations and ensuring data integrity often requires communication within a team.

7. Justification of PO7 to ALL COs:

CO1:PO7- Understanding query execution and performance involves analyzing and optimizing queries, which are key research-related skills in database management.

CO2:PO7- Demonstrating basic elements are foundational knowledge that supports research but is not directly research-focused.

CO3:PO7- A foundational understanding is essential for conducting research but does not directly involve research activities.

CO4:PO7- Understanding aggregate operations can lead to researching more efficient data processing techniques and applications.

CO5:PO7- Mastery of database concepts is crucial for conducting research in database systems, though it is not the sole focus of research activities.

CO6:PO7- Modelling data requirements involves investigative and analytical skills, which are essential for research in database design and optimization.

CO7:PO7- Writing SQL commands is a technical skill that supports research but is not directly involved in research methodology.

SYLLABUS (CBCS as per NEP 2020) FOR F. Y. B. Sc. (Computer Science)

(w. e. from June, 2023)

Name of the Programme	: B.Sc. Computer Science
Program Code	: USCOS
Class	: F.Y.B.Sc. (Computer Science)
Semester	: I
Course Type	: Major
Course Name	: Computer Science Practical – I (PR)
Course Code	: COS-103-MJM
No. of Practical's	: 15 (60 Hours)
No. of Credits	: 02

A) Course Objectives:

- 1. Develop problem-solving skills
- 2. Learn how to write and execute C programs
- 3. Understand the basic syntax and structure of C
- 4. Master the use of functions and modular programming
- 5. Understand design and implementation of a database system.
- 6. Study physical, logical database designs and database modeling.
- 7. Understanding and development of essential DBMS concepts.

B) Course Outcomes:

- CO1. Develop problem-solving skills
- CO2. Apply C programming concepts to real-world problems
- CO3. Gain a foundation for advanced programming concepts
- CO4. Develop debugging and error handling skills
- CO5. Master the basics of database concepts and database management system.

CO6. Model an application's data requirements using conceptual modeling tools like ER & relational model.

CO7. Write SQL commands to create tables, insert, update, delete and query data.

	Title of Experiment/ Practical
1	Assignment based on fundamental concepts of C
2	Assignment based on decision making statements of C
3	Assignment based on loops in C
4	Assignment to demonstrate menu driven programs
5	Assignment based on functions in C
6	Assignment based on recursive functions in C
7	Assignment based on Arrays (1-D)
8	Assignment based on Arrays (2-D)
9	Create simple tables, with only the primary key Constraint
10	Create more than one table with integrity constraint.
11	Create more than one table, with referential integrity constraint.
12	Drop a table from database, Alter the table.
13	Insert/Update/Delete statements.
14	Query for the tables using simple form of Select Statement
15	Query solving for table operations (Aggregate function)
16	Nested Query solving for table operations (Union, Intersect, Except, Set membership, Cardinality, Comparison)

Mapping of this course outcomes with Programme outcomes

Course			Progran	nme Outco	mes (POs)		
Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	3	3	2	2
CO2	3	3	3	3	3	2	2
CO3	3	3	2	3	3	2	2
CO4	3	3	1	3	3	1	1
CO5	3	3	2	3	3	2	2
CO6	3	3	3	3	3	2	2
CO7	3	3	2	3	3	2	2

Weight: 1 - Partially related

2 - Moderately Related

3 - Strongly related

Course Objectives (CO) and Program Outcomes (PO) Mapping:

1. Justification of PO1 to ALL COs:

CO1:PO1-Problem-solving and programming capability are foundational skills that contribute directly to a profound understanding of the field of study

CO2:PO1-Applying C programming concepts to real-world problems demonstrates practical application and understanding of foundational theories and methodologies.

CO3:PO1-Foundation in advanced programming concepts deepens understanding of key methodologies within the field.

CO4:PO1-Debugging and error handling skills enhance mastery of programming principles, contributing to overall understanding.

CO5:PO1-Understanding C programming fundamentals is crucial for grasping foundational theories and principles in the field.

CO6:PO1-Developing problem-solving skills are essential for effective application of theories and concepts within the field.

CO7:PO1-Proficiency in C programming syntax and semantics supports understanding of foundational theories and key concepts.

2.Justification of PO2 to ALL COs:

CO1:PO2-Problem-solving and programming capability are fundamental practical skills necessary for professional tasks.

CO2:PO2-Applying C programming concepts to real-world problems demonstrates practical skills essential for professional tasks.

CO3:PO2-Foundation in advanced programming concepts supports effective application of industry standards and best practices.

CO4:PO2-Debugging and error handling skills are crucial for maintaining quality and adhering to regulations in professional tasks.

CO5:PO2-Understanding C programming fundamentals is essential for acquiring practical skills and expertise in professional tasks.

CO6:PO2-Developing problem-solving skills enable effective application of knowledge in real-world scenarios within the field.

CO7:PO2-Proficiency in C programming syntax and semantics enhances capability for professional tasks in the programming field.

3. Justification of PO3 to ALL COs:

CO1:PO3-Problem-solving and programming capability support entrepreneurial activities by enabling technical solutions and innovations.

CO2:PO3-Applying C programming concepts to real-world problems directly fosters an entrepreneurial mindset through practical applications.

CO3:PO3-Foundation in advanced programming concepts enhances technical knowledge, indirectly supporting entrepreneurial endeavours.

CO4:PO3-Debugging and error handling skills, while important, have less direct impact on entrepreneurial mindset and knowledge.

CO5:PO3-Understanding programming fundamentals indirectly support entrepreneurial activities by enabling effective technical communication.

CO6:PO3-Developing problem-solving skills are crucial for fostering an entrepreneurial mindset and creatively addressing challenges.

CO7:PO3-Proficiency in C programming syntax and semantics facilitates technical implementations that can support entrepreneurial innovations.

4. Justification of PO4 to ALL COs:

CO1:PO4-Problem-solving and programming capability are core skills demonstrating proficiency in technical and analytical abilities.

CO2:PO4-Applying C programming concepts to real-world problems showcases practical problem-solving and technical proficiency.

CO3:PO4-Foundation in advanced programming concepts enhances analytical abilities and technical competence in specialized skills.

CO4:PO4-Developing debugging and error handling skills demonstrates technical proficiency and problem-solving capabilities.

CO5:PO4-Understanding programming fundamentals support effective communication and technical skills relevant to the field.

CO6:PO4-Developing problem-solving skills directly contribute to adapting and innovating in response to changing circumstances.

CO7:PO4-Proficiency in C programming syntax and semantics is crucial for effective technical communication and leadership in the field.

5. Justification of PO5 to ALL COs:

CO1:PO5-Problem-solving and programming capability directly contribute to the capacity for application and analytical reasoning.

CO2:PO5-Applying C programming concepts to real-world problems demonstrates critical thinking and effective problem-solving skills.

CO3:PO5-Foundation in advanced programming enhances the ability to solve complex problems and analyze data effectively.

CO4:PO5-Debugging and error handling skills ensure data accuracy and support effective problem-solving in practical settings.

CO5:PO5-Understanding C programming fundamentals supports practical application and effective data analysis in real-world scenarios.

CO6:PO5-Developing problem-solving skills demonstrate critical thinking and readiness to take calculated risks in problem-solving.

CO7:PO5-Proficiency in C programming syntax and semantics supports critical analysis and adaptability in applying learned concepts.

6. Justification of PO6 to ALL COs:

CO1:PO6-Problem-solving capability indirectly supports effective task management and team coordination in collaborative efforts.

CO2:PO6-Applying C programming concepts aids in articulating technical solutions, supporting effective communication within teams.

CO3:PO6-Understanding advanced programming concepts enhance the ability to communicate technical ideas effectively to diverse audiences.

CO4:PO6-Debugging and error handling skills have limited direct impact on communication and collaboration skills.

CO5:PO6-Understanding programming fundamentals supports clear communication of technical concepts to diverse stakeholders.

CO6:PO6-Developing problem-solving skills foster effective teamwork and collective problem-solving approaches in collaborations.

CO7:PO6-Proficiency in C programming syntax ensures clarity and precision in technical discussions within collaborative settings.

7. Justification of PO7 to ALL COs:

CO1:PO7-Problem-solving capability indirectly supports research question formulation and methodology application in data analysis.

CO2:PO7-Applying C programming concepts aids in practical problem-solving relevant to research tasks like data analysis methodologies.

CO3:PO7-Understanding advanced programming concepts supports innovative research methodologies and advanced data analysis techniques.

CO4:PO7-Debugging skills have limited direct impact on research-related skills such as formulating research questions and methodologies.

CO5:PO7-Understanding programming fundamentals facilitate algorithm implementation and analysis relevant to research tasks.

CO6:PO7-Developing problem-solving skills support addressing research challenges, formulating hypotheses, and data analysis in research.

CO7:PO7-Proficiency in C programming enhances technical capability to develop and apply methodologies for research data collection and analysis.

SYLLABUS (CBCS as per NEP 2020) FOR F. Y. B. Sc. (Computer Science)

(w. e. from June, 2023)

: B.Sc. Computer Science
: USCOS
: B.A./ B.com
: I
: OE
: Internet Awareness
: COS-116-OE
: 30
: 2

Course Objectives:

- **1.** Understand the fundamental concepts and history of the Internet, including its infrastructure, protocols, and governance.
- **2.** Identify and explain the various components of Internet infrastructure, such as ISPs, data centers, and content delivery networks.
- **3.** Demonstrate knowledge of essential web technologies, including HTTP, HTML, and web development basics.
- **4.** Explore and analyze different forms of online communication, such as email, instant messaging, social media, and online communities.
- 5. Recognize and address online safety and security threats.
- **6.** Develop a sense of digital citizenship and ethical responsibility in online environments.
- **7.** Cultivate information literacy skills and criticalthinking abilities for evaluating online sources, recognizing biases, and identifying misinformation.
- **8.** Examine the social, cultural, and political implications of the Internet, including topics such as the digital divide, online commerce, censorship, and freedom of speech.
- **9.** Explore emerging trends and technologies shaping the future of the Internet, including the Internet of Things,

Course Outcomes:

- **CO1:** Explain the historical development and key concepts of the Internet, including its infrastructure, protocols, and governance.
- **CO2:** Identify and describe the components of Internet infrastructure, such as ISPs, data centers, and content delivery networks.
- **CO3:**Apply web technologies, including HTML, HTTP, and basic web development principles, to create and navigate web content.
- **CO4:**Communicate effectively using various online communication tools, such as email, instant messaging, and social media platforms.
- CO5: Evaluate and implement strategies to enhance online safety and security, including

recognizing and mitigating common online threats.

- **CO6:** Demonstrate ethical behaviour and responsible digital citizenship in online interactions.
- **CO7:**Analyse the social, cultural, and political implications of the Internet, including its impact on access, commerce, censorship, and freedom of speech.

UNIT	CONTENT	No. of Lectures
UNIT I	 Introduction to the Internet 1.1 Definition and evolution of the Internet. 1.2 Key concepts: networks, protocols, IP addresses, domain names 1.3Internet governance and organizations 	4
UNIT-II	Internet Infrastructure 2.1 Internet Service Providers (ISPs) 2.2Wired and wireless technologies (e.g. fibre optics, Wi-Fi, cellular, networks) 2.3Data centres and cloud computing	5
UNIT-III	Web Technologies 3.1 Hypertext Transfer Protocol (HTTP) and Hypertext Markup Language (HTML) 3.2Web browsers and search engines 3.3Web standards and accessibility	5
UNIT – IV	Online Communication 4.1 Email and instant messaging 4.2Voice over IP (VoIP) and video conferencing 4.3Social media platforms and their impact 4.4Online communities and forums	5
UNIT – V	Online Safety and Security 5.1Password security and two-factor authentication 5.2 Protecting personal information online 5.3Cyberbullying and online harassment	5
UNIT – VI	 Emerging Trends and Future of the Internet 6.1Internet of Things (IoT) 6.2 Artificial intelligence and machine learning 6.3 Virtual reality (VR) and augmented reality (AR) 	5

Course			Program	me Outco	omes (PO	s)	
Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	2	3	1	3
CO2	3	3	1	3	3	1	2
CO3	2	3	1	3	3	1	2
CO4	1	2	2	2	2	3	1
CO5	2	3	1	2	3	1	2
CO6	1	2	2	1	2	3	1
CO7	2	1	2	1	3	2	3

Mapping of this course with Programme Outcomes

Weight: 1 - Partially related

2 - Moderately Related

3 - Strongly related

Justifications:

PO1 with all Cos:

CO1 (3): Explains historical development and key concepts of the Internet, providing a strong foundation for understanding the Internet.

CO2 (3): Identifies and describes components of Internet infrastructure, critical for a comprehensive understanding of Internet operations.

CO3 (2): Applies web technologies to create web content, offering practical knowledge which moderately contributes to a comprehensive understanding.

CO4 (1): Involves communication tools, offering partial relevance to a broad understanding of the Internet.

CO5 (2): Focuses on online safety and security, providing essential knowledge for secure Internet usage, moderately contributing to comprehensive understanding.

CO6 (1): Covers ethical behaviour and responsible digital citizenship, which is partially relevant to a comprehensive understanding of the Internet.

CO7 (2): Analyzes social, cultural, and political implications, providing moderate insight into the broader impact of the Internet.

PO2 with all Cos:

CO1: Explains historical development and key concepts of the Internet, providing foundational theoretical knowledge which moderately supports professional understanding. CO2: Identifies and describes components of Internet infrastructure, essential for practical and professional application in Internet-related fields.

CO3: Applies web technologies to create web content, crucial for hands-on experience and practical skills in web development.

CO4: Involves communication tools, which are vital for effective professional communication in various online platforms.

CO5: Focuses on strategies for online safety and security, directly applicable to professional practices and procedures.

CO6: Covers ethical behaviour and responsible digital citizenship, supporting professional conduct and practices.

CO7: Analyzes social, cultural, and political implications, providing contextual knowledge that is important for professional understanding of the broader impact of the Internet.

PO3 with all Cos:

CO1: Explains the Internet's historical development and key concepts, providing foundational knowledge useful for identifying entrepreneurial opportunities.

CO2: Identifies components of Internet infrastructure, aiding in the recognition of potential business opportunities within tech infrastructure.

CO3: Applies web technologies to create and navigate web content, crucial for developing and managing web-based entrepreneurial ventures.

CO4: Involves effective online communication tools, essential for marketing, networking, and customer engagement in entrepreneurship.

CO5: Focuses on online safety and security strategies, important for building trust and maintaining integrity in entrepreneurial activities.

CO6: Covers ethical behaviour and responsible digital citizenship, supporting sustainable and responsible entrepreneurial practices.

CO7: Analyzes broader implications of the Internet, providing entrepreneurs with insights to navigate the social, cultural, and political landscape.

PO4 with all Cos:

CO1: Explains the Internet's historical development and key concepts, providing foundational knowledge which moderately supports specialized competencies.

CO2: Identifies components of Internet infrastructure, essential for developing specialized technical skills required in networking and data management.

CO3: Applies web technologies to create and navigate web content, crucial for acquiring specialized skills in web development.

CO4: Involves effective communication using online tools, important for professional roles that require specialized communication skills.

CO5: Focuses on online safety and security strategies, critical for specialized competencies in cyber security.

CO6: Covers ethical behaviour and responsible digital citizenship, partially relevant to maintaining professional standards in specialized fields.

CO7: Analyzes broader implications of the Internet, providing contextual knowledge which moderately supports specialized roles.

PO5 with all Cos:

CO1: Explains the Internet's historical development and key concepts, providing foundational knowledge that supports analytical reasoning.

CO2: Identifies and describes components of Internet infrastructure, essential for applying knowledge and solving technical problems related to network architecture.

CO3: Applies web technologies to create and navigate web content, involving hands-on problem-solving and analytical reasoning in web development.

CO4: Involves effective communication using online tools, moderately important for collaborative problem-solving.

CO5: Focuses on online safety and security strategies, involving critical problem-solving and analytical reasoning to mitigate threats.

CO6: Covers ethical behaviour and responsible digital citizenship, which is moderately relevant to solving problems in social contexts.

CO7: Analyzes broader implications of the Internet, requiring strong analytical reasoning to understand and address complex issues.

PO6 with all Cos:

CO1: Explains the Internet's historical development and key concepts, providing foundational knowledge which moderately supports effective communication about its concepts.

CO2: Identifies and describes components of Internet infrastructure, aiding in understanding and effectively communicating technical aspects related to networks.

CO3: Applies web technologies for content creation, partially related to collaborative efforts in digital environments.

CO4: Involves effective communication using online tools, crucial for developing strong communication skills required for collaboration.

CO5: Focuses on online safety and security strategies, involving communication and collaboration to implement effective mitigation measures.

CO6: Covers ethical behaviour and responsible digital citizenship, supporting constructive online collaboration and communication.

CO7: Analyzes broader implications of the Internet, partially related to communicating and collaborating in diverse social, cultural, and political contexts.

PO7 with all Cos:

CO1: Explains the Internet's historical development and key concepts, crucial for conducting comprehensive research on Internet evolution.

CO2: Identifies and describes components of Internet infrastructure, providing foundational knowledge for researching network architecture and operations.

CO3: Applies web technologies for creating and navigating web content, moderately related to researching web development trends and technologies.

CO4: Involves effective communication using online tools, necessary for collaborative research efforts.

CO5: Focuses on evaluating online safety and security strategies, involving research into cyber security threats and mitigation measures.

CO6: Covers ethical behaviour and responsible digital citizenship, partially relevant to ethical considerations in conducting research.

CO7: Analyzes social, cultural, and political implications of the Internet, providing critical insights for conducting research in these areas.

SYLLABUS (CBCS as per NEP 2020) FOR F. Y. B. Sc. (Computer Science)

(w. e. from June, 2023)

Name of the Programme	: B.Sc. Computer Science
Program Code	: USCOS
Class	: F.Y.B. Sc. (Computer Science)
Semester	: I
Course Type	: OE
Course Name	: Introduction to MS-Office (PR)
Course Code	: COS-117-OE
No. of Lectures	:60 (15 Practical)
No. of Credits	: 2

A) CourseObjectives:

- 1. Apply the knowledge of computer fundamentals to IT application
- 2. Design solution for IT applications using latest technologies and develop and implement the solutions using various latest languages.
- 3. Use of Microsoft Office tool.
- 4. Understand the impact of the Office tools in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.
- 5. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice using office tools.
- 6. Use of MS Excel inmultidisciplinary environment.
- 7. Identify opportunity, pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

B) CourseOutcomes:

- CO1: Students are able to use office tools in their office work.
- CO2: Students can design Pay Sheet, Own Bio-data, Projects Reports etc.
- CO3: Students are familiar with Microsoft Office tool.

CO4: Understand the impact of the Office tools in societal and environmental contexts,

and

demonstrate the knowledge and need for sustainable development.

CO5: Apply ethical principles and commit to professional ethics and responsibilities and norms

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of the engineering practice using office tools.

CO6: Use of MS Excel inmultidisciplinary environment.

CO7: Identify opportunity, pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

UNITS	CONTENT	No. of Lectures		
UNIT -I	Basic of Computer	3		
	1.1 Introduction to Computer			
	1.2 File Explorer			
	1.3 Introduction – Notepad			
	1.4 Introduction - WordPad			
	1.5 Introduction – Paint			
	MS Word			
	2.1 Home tab Operations			
TINIT II	2.2 Inserting Objects			
UN11-11	2.3 Designing Page Layout	4		
	2.4 Mailing , Review , View			
	MS Excel			
	3.1 Introduction to Excel Layout			
UNIT-III	3.2 Inserting Charts	4		
	3.3 Using Formulas			
	3.4 Operations on Data			
	MS Power Point			
	4.1 Introduction to Power Point			
	4.2 Designing Slides			
UNIT –	4.3 Transition Effects	4		
IV	4.4 Animations			
BookRefer	ences:			
1.Microsoft	Office 2007: Essentials Concepts & Techniques , Cengage Learning India	Pvt.		
	Ltd.			
2.CCL - Mi	crosoft Office 2010, Bittu Kumar			
Web Refer	ences:			
1. Tutorials Point -				
https://www.tutorialspoint.com/word/index.htmhttps://www.guru99.com/c-programming-				
<u>tutorial.html</u>				

Course			Programme Outcomes (POs)				
Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	2	2	1	2
CO2	3	3	1	3	3	2	3
CO3	2	2	2	2	3	2	2
CO4	3	2	1	3	2	2	2
CO5	2	3	2	2	2	3	3
CO6	2	3	1	3	3	2	3
CO7	2	3	1	3	3	3	3

Mapping of this course with Programme Outcomes

Weight :	1 - Partially related	2 - Moderately Related	3 - Strongly related
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PO1: Comprehensive Knowledge and Understanding

- **CO1 (3)**: Cybersecurity landscapes and issues encompass foundational theories and principles.
- **CO2 (3)**: Analyzing and evaluating cyber-attacks involves understanding key concepts and methodologies.
- **CO3 (2)**: Applying cybersecurity knowledge in daily life requires understanding foundational principles.
- **CO4 (3)**: Understanding various cybersecurity concepts and principles is crucial for comprehensive knowledge.
- **CO5 (2)**: Characterizing privacy, legal, and ethical issues includes understanding key theories and principles.
- **CO6 (2)**: Identifying vulnerabilities requires an understanding of foundational cybersecurity concepts.
- **CO7 (2)**: Diagnosing attacks involves understanding key concepts within the cybersecurity field.

PO2: Practical, Professional, and Procedural Knowledge

- **CO1 (2)**: Familiarity with cybersecurity issues contributes to practical knowledge.
- **CO2 (3)**: Analyzing and evaluating attacks requires practical, professional skills.
- **CO3 (2)**: Applying cybersecurity knowledge in real-world scenarios involves practical expertise.
- **CO4 (2)**: Understanding cybersecurity principles supports professional tasks.
- **CO5 (3)**: Addressing privacy, legal, and ethical issues requires knowledge of industry standards and regulations.
- **CO6 (3)**: Identifying vulnerabilities is essential for professional expertise.
- **CO7 (3)**: Diagnosing attacks is a key professional task in the cybersecurity field.

PO3: Entrepreneurial Mindset and Knowledge

- **CO1 (1)**: Basic understanding of cybersecurity landscapes can help identify opportunities.
- **CO2 (1)**: Evaluating cyber-attacks can foster innovative approaches.
- CO3 (2): Applying knowledge in everyday life can lead to entrepreneurial thinking.

- **CO4 (1)**: Understanding concepts can contribute to innovation.
- CO5 (2): Addressing legal and ethical issues can uncover market opportunities.
- CO6 (1): Identifying vulnerabilities may highlight business opportunities.
- **CO7 (1)**: Diagnosing attacks can lead to innovative cybersecurity solutions.

PO4: Specialized Skills and Competencies

- CO1 (2): Familiarity with issues requires some specialized skills.
- CO2 (3): Analyzing and evaluating attacks needs specialized technical skills.
- CO3 (2): Applying knowledge requires specialized competencies.
- CO4 (3): Understanding concepts involves specialized skills.
- **CO5 (2)**: Characterizing issues requires analytical abilities.
- CO6 (3): Identifying vulnerabilities involves technical skills.
- **CO7 (3)**: Diagnosing attacks requires specialized competencies.

PO5: Capacity for Application, Problem-Solving, and Analytical Reasoning

- **CO1 (2)**: Understanding issues aids in problem-solving.
- CO2 (3): Analyzing and evaluating attacks involves strong problem-solving skills.
- **CO3 (3)**: Applying conceptual knowledge requires problem-solving.
- CO4 (2): Understanding principles supports analytical reasoning.
- CO5 (2): Addressing legal and ethical issues involves problem-solving.
- **CO6 (3)**: Identifying vulnerabilities requires analytical reasoning.
- **CO7 (3)**: Diagnosing attacks involves problem-solving.

PO6: Communication Skills and Collaboration

- **CO1 (1)**: Basic familiarity with issues aids communication.
- **CO2 (2)**: Analyzing attacks requires effective communication of findings.
- **CO3 (2)**: Applying knowledge involves explaining concepts to others.
- **CO4 (2)**: Understanding principles helps in communicating them.
- CO5 (3): Addressing legal and ethical issues requires effective communication.
- **CO6 (2)**: Identifying vulnerabilities requires effective communication.
- **CO7 (3)**: Diagnosing attacks involves clear communication with stakeholders.

PO7: Research-related Skills

- **CO1 (2)**: Familiarity with issues requires research skills.
- CO2 (3): Analyzing and evaluating attacks involves research methodologies.
- **CO3 (2)**: Applying knowledge involves using research skills.
- CO4 (2): Understanding concepts requires research.
- **CO5 (3)**: Addressing privacy, legal, and ethical issues involves research.
- **CO6 (3)**: Identifying vulnerabilities involves data analysis and research.
- **CO7 (3)**: Diagnosing attacks involves research skills.

(2023 Pattern)			
Name of the Programme	: B.Sc. (Computer Science)		
Class	: USCOS : F.Y.B.Sc. (Computer Science)		
Semester Course Type	: I : SEC Practical		
Course Code	: COS-126-SEC(ST)		
No. of Credits	: Introduction to MIS Excel and R-Software : 2		
No. of Teaching Hours	: 00(12+48)		

Course Objectives:

- 1. To understand the basics of Microsoft Excel and its various applications.
- 2. To navigate the Excel interface proficiently and grasp the concepts of workbooks, worksheets, and cells.
- 3. To learn how to enter and edit data effectively in Excel.
- 4. To gain proficiency in using formulas and functions for calculations and data manipulation.
- 5. To understand the history, features, and importance of R software.
- 6. To identify and understand keywords in R.
- 7. To learn how to create vectors using functions.

Course Outcomes:

Student will be able to

- **CO1.** demonstrate the basic mechanics and navigation of an Excel.
- CO2. basic techniques of MS-Excel.
- CO3. basic concept of R-Software.
- CO4. statistical analysis with simple tools.
- **CO5.** diagrammatic and graphical representation techniques.
- CO6. learn Statistics using R software.
- **C07.** Data transformation, data import/export, combination techniques.

Topics and Learning Points

UNIT 1 - Fundamentals of MS-Excel

Introduction to Excel:

Overview of Microsoft Excel and its uses, Navigating the Excel interface, understanding workbooks, worksheets, and cells, Entering and editing data in Excel.

1. Basic Formulas and Functions:

Understanding formulas and functions in Excel, using mathematical operators and basic functions, Performing calculations and using cell references, Using built-in functions for common tasks

2. Formatting and Cell Styling:

Formatting cells, rows, and columns, applying number formats and text formatting, using cell styles and themes, Applying conditional formatting for data visualization.

3. Working with Worksheets and Workbooks:

Managing multiple worksheets and workbooks, Renaming, inserting, and deleting worksheets, organizing data with freeze panes and split views, Linking data between worksheets and workbooks.

4. Data Management and Analysis:

Sorting and filtering data, Using data validation for data integrity, creating and managing tables, Introduction to data analysis tools in Excel.

5. Data Visualization with Charts

Creating basic charts (bar, line, pie), Customizing chart elements (titles, axes, legends) Formatting and enhancing charts, Creating combination charts and sparklines

UNIT 2 - Fundamentals of R

1. Introduction to R, History of R, features of R, Need and importance of R software, starting and ending R session, getting help in R, R commands and case sensitivity.

2. Data types: Character, Numeric

- a) Character Set: Alphabets, Numeric digits, Special Characters
- b) Keywords
- 3. Vectors and vector arithmetic

a) Creation of vectors using R functions.

- b) Arithmetic operations on vectors using operators +, -, *, /, $^{\wedge}$.
- c) Arithmetic expressions, Relational Operators, Logical Operators

List of Practicals:

Sr. No.	Title of the Experiment
1	Introduction to MS- Excel
2	Representation of raw data in excel worksheets, Pivot data analysis and
	Computation of summary statistics using MS-Excel.
3	Diagrammatic representation using MS-Excel
4	Graphical representation using MS-Excel.
5	Combinatorial Techniques, Probability distribution and Simulationusing MS-
	Excel
6	Introduction to Numerical Functions and Vector Access using R Software.
7	Managing Data Frames and Importing from Excel in R Software.
8	Combinatorial Techniques, Probability distribution and Simulationusing R
	Software.
9	Measures of central tendency for both grouped and ungrouped data using R
	Software.
10	Measures of dispersion for both grouped and ungrouped data using R Software
11	Implementing Conditional Statements with if-else, loop in R Software
12	Applying Excel and R skills for analysing and interpreting case studies.

Note: Everypractical isequivalenttofour hoursperbatchperweek

References:

- 1. M. L. Humphrey, Excel for Beginners
- 2. S. C. Gupta, V.K. Kapoor, Fundamental of Mathematical Statistics
- 3. William Fischer, Excel: Quickstart Guide for Beginner to Expert
- **4.** Michkel Alexander, Dick Kusleika, John Walkenbeach, Microsoft Excel 2019 BIBLE The Comprehensive Tutorial Resource, Wiley Publication.
- 5. Frag Curtis (2013). Step by Step Microsoft Excel 2013, MS Press
- **6.** Frye Curtis D. (2007). Step by step Microsoft Office Excel 2007, Microsoft Press
- **7.** Salkind Neil J. and Frey Bruce B (2021). Statistics for people who (Think They) Hate Statistics, Using MS- Excel, Sage Publications.

CBCS Syllabus as per NEP 2020 for F.Y.B.Sc.(Comp) Mathematics

(2023 Pattern)

Name of the Programme	: B.Sc.(Computer Science)
Program Code	: USCOS
Class	:F.Y.B.Sc. (ComputerScience)
Semester	:I
Course Type	: Skill Enhancement Course (SEC)
Course Code	: COS-126-SEC(MT)
Course Name	: Mathematics for Computer Science
No. of Teaching Hours	: 60
No. of Credit	:02

Course Objectives:

- 1. Solve system of linear equation using multiple methods.
- 2. Learn how to create matrices, perform basic matrix operations.
- 3. Learn how to create plots, graphs and charts to represent and analyze data.
- 4. Apply Scilab to real-world problems and practice problem-solving skills.
- 5. Learn how to perform prime factorization, greatest common divisor (GCD), least common multiple (LCM).
- 6. Learn the basic principles of set, basic set equalities, the basic concepts of relations and functions.
- 7. Learn how to write an argument using logical notation and determine if the argument is valid or invalid.

Course Outcomes:

By the end of the course, students will be able to:

- CO1. Students will be able to understand the basic principles of set, basic set equalities, the basic concepts of relations and functions.
- CO2. Students will be able to write an argument using logical notation and determine if the argument is valid or invalid.
- CO3. Students will be able to apply these mathematical concepts in the study of computer science.

- CO4. Students will be able to apply logical reasoning to solve a variety of problems.
- CO5. Student will be able to solve linear equations.
- CO6. Student will be able to identify the special properties of matrices.
- CO7. Able to use Scilab and Maxima Software to solve problems.

Topics and Learning Points

Teaching Hours

Theory:

12

- 1) Introduction to Matrices and operations on them.
- 2) Logical methods.
- 3) Graphs of functions.
- 4) Fundamental of Algebra
- 5) System of Linear Equation.

Practicals:

- 1. IntroductionofScilab withsomebasiccommands.
- 2. Graph Plotting in 2-D and 3-D using Scilab.
- 3. Basicoperationsonmatrices using Scilab.
- 4. Solution for system of linear equation using Scilab.
- 5. Basic Commands for logic using Scilab.
- 6. Introduction of Maxima using basic commands.
- 7. Polynomial, Sets, Function and Inverse of a Function in Maxima.
- 8. Basic Commands for Numbers, Complex Number, Prime Numbers in Maxima.
- 9. Graph plotting in 2-D and 3-D using Maxima.
- 10. Basicoperationsonmatrices using Maxima.
- 11. Solution for system of linear equation using Maxima.
- 12. Basic Commands for logic using Maxima.

Reference Book:

- 1. Edwin L. Woollett, Maxima by example: A step by step introduction to computer algebra using Maxima
- 2. Tejas Sheth, Satish Annigeri and Rajesh Jakhotia, *Scilab: A practical introduction to programming and problem solving.*
- 3. Gilbert Strang, Linear Algebra and its applications (4th Edition).

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CBCS Syllabus as per NEP 2020 for F. Y. B.Sc.(Computer Science) Electronics (2023 Pattern)

Name of the Programme	: B.Sc.(Computer Science)Electronics
Programme Code	: USCOS
Class	: F. Y. B.Sc.
Semester	:I
Course Type	: Skill Enhancement Course (Practical)
Course Code	: COS-126-SEC(EL)
Course Title	: Electronics Practical
No. of Credits	: 02
No. of Teaching Hours	: 60

Course Objectives:

- 1. To teach students how to know, identify, draw different symbols, logic diagrams and circuit diagrams.
- 2. To develop skill of circuit connections.
- 3. To train them to design and analyse circuits for specific purpose.
- 4. To motivate them to work on different mini projects.

Course Outcomes:

By the end of the course, students will be able to:

CO1.To identify different components, devices, IC's, as well as their types.

CO2.To understand basic parameters.

CO3.To know operation of different instruments used in the laboratory.

CO4.To connect circuit and do required performance analysis.

CO5.Develop hobby projects.

List of Practical: (Any 8)

- 1. Electronics components: Resistors, capacitors, Inductors, Transformer, Switches, Relays, Fuses, Batteries, Cables, Connectors, Color coding of resistors, series and parallel combinations of resistors, capacitors & Inductors, diode, clipper and clamper, transistor.
- 2. Ohms law, voltage and current dividers, Kirchhoff's Laws (KCL, KVL), Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Superposition theorem.
- 3. Concept of Logic Gates Statement, Symbol, Expression, Truth table of basic gates, Pinout diagrams IC 7400, IC 7402, IC 7432, IC 7408, IC 7486, Basic Binary Rules for

addition and subtraction, Half adder, Full adder, DE Morgan's theorem, Interconversion- Binary to Gray and Gray to Binary.

- 4. Use of measuring electronic Instruments (Multimeter, Signal Generators, Power supply)
- 5. Measurement of signal parameters (amplitude, period, frequency, peak voltage, peak to peak voltage, RMS value)
- 6. Study of electronic components (Resistor, Capacitor, inductor, Transformer, Switches, Fuses, Connectors, Cables, Diodes, Transistors, IC's)
- 7. Verification of network theorems: KCL / KVL.
- 8. Verification of network theorems: Thevenin/ Norton/ Maximum Power Transfer.
- 9. Build and test Clipper / Clampercircuit.
- 10. Verification of logic gates using IC's (7400, 7402, 7408, 7404, 7432, 7486)
- 11. Realization of basic gates using universal gates (NAND, NOR)
- 12. Study of Half & Full adder using gates.
- 13. Code converter : Binary to Gray and Gray to Binary
- 14. Verification of DE Morgan's theorem
- 15. To study Universal adder & subtractor

Activity: (Any one Activity equivalent to two experiments)

Students must perform at least one additional activity out of two activities in addition to eight experiments mentioned above. Total Laboratory work with additional activities should be equivalent to ten experiments.

SYLLABUS (CBCS as per NEP 2020) FOR F. Y. B. Sc. (Computer Science)

Name of the Programme	· B Sc. Computer Science
Program Code	: USCOS
Class	: F.Y.B.Sc. (Computer Science)
Semester	: I
Course Type	: VSC
Course Name	: Problem Solving Skills & DBMS Using PostgreSQL (TH)
Course Code	: COS-121-VSC
No. of Lectures	: 30
No. of Credits	: 02

(w. e. from June, 2023)

A) Course Objectives:

- 1. Develop problem-solving skills.
- 2. Learn how to write and execute C programs.
- 3. Understand the basic syntax and structure of C.
- 4. Master the use of functions and modular programming
- 5. Understand design and implementation of a database system.
- 6. Study physical database designs and database modeling.
- 7. Understand creation, manipulation and querying of data in databases.

B) CourseOutcomes:

- CO1: Develop problem-solving skills.
- CO2: Understand the fundamentals of C programming language.
- CO3: Gain proficiency in C programming syntax and semantics.
- CO4: Develop debugging and error handling skills.
- CO5: Master the basics of database concepts and database management system.
- CO6: Write SQL commands to create tables, insert, update, delete and query data.
- CO7: Gain knowledge about query execution and its performance.

UNIT I	Introduction to Computer programming languages	05
	1.1 Problem Solving	

	1.2 Algorithms & Flowcharts	
	1.3 Programming Languages	
	Machine language Assembly language High level languages	
	Problem solving Using Computer	
	2.1 Problem solving using a computer.	
	2.2 Algorithms & flowcharts	
UNIT II	2.3 Programming tools	05
	2.4 Structure of a C program	
	2.5 C program development cycle	
	2.6 Application areas	
	3. Introduction toSQL	
	3.1 Introduction	
	3.2 Basic structure	
	3.3 Set operations.	
Unit III	3.4 Aggregate functions	08
	3.5 Null values	
	3.6 SQL: Data types, Language structure	
	3.7 Design time constraints: (NOT NULL, UNIQUE,	
	PRIMARY, FOREIGN, CHECK & EXCLUSION)	
	4. Basics Queries Operations withSQL	
	4.1 NestedSubqueries	
	• Set Membership	
TI:4 TX7	 Set Comparison Test for Empty Palation 	
Unitiv	Test for absence of duplicate tuples	0.4
	4.2 Modification of database	04
	• Insert Command (Single & Multiple records)	
	Delete Command	
	Update Command	
	5. Operational Queries	
	5.1 DML (INSERT, SELECT, DELETE)	
	5.2 DDL (CREATE, ALTER, TRUNCATE, DROP,	
	KENAME)	
	5.3 TCL (COMMIT, ROLLBACK, SAVEPOINT)	
Unit V	5.4 DCL (GRANT, REVOKE)	
	5.5 SQL mechanisms for joining relations (inner joins, outer	08
	joins, and their types)	
	5.6 SQL mechanisms for joining relations (inner joins, outer	
	joins, and their types)	
	5./ Evaluating Performance: EXPLAIN (Basics, ANALYZE &	
	Caveats etc.)	
	Solving Examples on SQL (Case Studies)	

Course	Programme Outcomes (POs)						
Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2				2
CO2	3	2	2				
CO3	2	2	3				2
CO4	2	3	1				2
CO5	2	3	3				2
CO6	3	2	3				2
CO7	3	3	3				3

Mapping of this course with Programme Outcomes

Weight: 1 - Partially related

2 - Moderately Related

3 - Strongly related

Justifications:

PO1 with all Cos:

CO1 is strongly related to PO1 with a Weightage of 3 because developing problem-solving skills is foundational for gaining comprehensive knowledge and applying concepts effectively.

CO2 has a weightage of 3 as it is strongly related to PO1; understanding the fundamentals of C programming builds a robust foundation for technical knowledge.

CO3 is also strongly related with a weightage of 3 since gaining proficiency in C programming syntax and semantics is critical to achieving a deep and thorough understanding of programming concepts.

CO4 is moderately related to PO1, with a weightage of 2, as debugging and error handling contribute to practical knowledge but are more specialized skills.

CO5 is moderately related, with a weightage of 2, because mastering the basics of database concepts enhances specific areas of knowledge but does not cover as broad a spectrum as core programming skills.

CO6 has a weightage of 2 and is moderately related to PO1 since writing SQL commands for database operations is essential for practical applications but remains focused on a narrower domain.

CO7 is partially related, with a weightage of 1, as gaining knowledge about query execution and its performance is more specialized and does not contribute significantly to broad, comprehensive understanding.

PO2 with all Cos:

CO1 is strongly related to PO2 with a weightage of 3, as problem-solving is essential for applying practical knowledge and developing professional competencies in real-world scenarios.

CO2 has a weightage of 3, as understanding the fundamentals of C programming is strongly related to developing procedural knowledge that underpins professional programming skills.

CO3 is also strongly related with a weightage of 3 because gaining proficiency in C programming syntax and semantics is crucial for mastering practical and procedural aspects of programming.

CO4 is strongly related to PO2, with a weightage of 3, since developing debugging and error handling skills is directly tied to practical and professional programming practices.

CO5 is moderately related, with a weightage of 2, because mastering basic database concepts contributes to practical knowledge in a specialized domain, though it's narrower in focus compared to programming fundamentals.

CO6 is strongly related with a weightage of 3, as writing SQL commands is a key practical skill for database management and plays a significant role in professional and procedural tasks.

CO7 is moderately related, with a weightage of 2, because gaining knowledge about query execution and its performance provides important practical insights, though it's more specialized compared to broader professional skills.

PO3 with all Cos:

CO1 is moderately related to PO3 with a weightage of 2, as gaining knowledge about query execution and its performance contributes to understanding how data-driven decisions can impact business outcomes.

CO2 is moderately related with a weightage of 2, since demonstrating the basic elements of a relational database management system supports an entrepreneurial mindset by fostering an understanding of essential business data structures.

CO3 is strongly related to PO3, with a weightage of 3, because gaining a foundation in database management system concepts is critical for entrepreneurs looking to leverage data effectively in decision-making.

CO4 is moderately related, with a weightage of 2, as knowledge about aggregate operations can help entrepreneurs analyze data trends but is more specialized than broader entrepreneurial skills.

CO5 is strongly related with a weightage of 3, as mastering basic database concepts and database management systems equips entrepreneurs with vital tools for managing and utilizing business data efficiently.

CO6 is strongly related to PO3 with a weightage of 3, as modeling an application's data requirements using conceptual modeling tools like ER and relational models is essential for building data-driven applications that support business goals.

CO7 is moderately related, with a weightage of 2, since writing SQL commands to manage data is important for operational aspects but is less directly tied to entrepreneurial strategy compared to broader concepts.

PO4 with all Cos:

CO1 is moderately related to PO4 with a weightage of 2, as developing problem-solving skills is important but more of a general competency than a specialized skill.

CO2 is strongly related with a weightage of 3 because understanding the fundamentals of C programming is essential for developing specialized programming skills that are highly sought after in the tech industry.

CO3 is strongly related to PO4, with a weightage of 3, as gaining proficiency in C programming syntax and semantics is critical for acquiring specialized competencies in software development.

CO4 is strongly related with a weightage of 3 since developing debugging and error handling skills are specialized competencies necessary for maintaining high-quality code and ensuring software reliability.

CO5 is moderately related to PO4 with a weightage of 2, as mastering the basics of database concepts provides a foundational understanding but does not encompass the full range of specialized skills in database management.

CO6 is strongly related to PO4, with a weightage of 3, since writing SQL commands for data manipulation is a crucial specialized skill for database management and application development.

CO7 is moderately related, with a weightage of 2, as gaining knowledge about query execution and its performance is beneficial but is more specialized than the core competencies required for broader database management.

PO5 with all Cos:

CO1 is strongly related to PO5 with a weightage of 3 because developing problem-solving skills is fundamental to applying knowledge and reasoning to overcome challenges.

CO2 is moderately related with a weightage of 2, as understanding the fundamentals of C programming provides a basis for applying programming concepts, but it does not directly emphasize analytical reasoning.

CO3 is strongly related to PO5 with a weightage of 3 since gaining proficiency in C programming syntax and semantics enhances the ability to apply programming knowledge effectively and analytically in various contexts.

CO4 is strongly related with a weightage of 3, as developing debugging and error handling skills directly involves applying analytical reasoning to identify and resolve issues in code.

CO5 is moderately related to PO5 with a weightage of 2 because mastering the basics of database concepts aids in problem-solving but is more focused on foundational knowledge rather than application.

CO6 is strongly related to PO5, with a weightage of 3, as writing SQL commands requires the application of problem-solving skills and analytical reasoning to effectively manage and manipulate data.

CO7 is moderately related, with a weightage of 2, since gaining knowledge about query execution and its performance supports analytical reasoning but is more specialized in nature compared to broader problem-solving skills.

PO6 with all Cos:

CO1 is moderately related to PO6 with a weightage of 2 because developing problem-solving skills can enhance communication and collaboration when working in teams to address challenges.

CO2 is partially related with a weightage of 1, as understanding the fundamentals of C programming is more technical in nature and does not inherently involve communication or collaborative skills.

CO3 is partially related to PO6, with a weightage of 1, since gaining proficiency in C programming syntax and semantics focuses primarily on technical skills rather than on communication.

CO4 is moderately related with a weightage of 2, as developing debugging and errorhandling skills can promote collaboration among team members by facilitating discussions about code issues and solutions.

CO5 is partially related to PO6 with a weightage of 1 because mastering basic database concepts is essential for technical knowledge but does not directly foster communication skills.

CO6 is moderately related to PO6, with a weightage of 2, as writing SQL commands requires clear communication of technical processes and may involve collaboration when managing data in team projects.

CO7 is partially related with a weightage of 1, since gaining knowledge about query execution and its performance is primarily focused on technical understanding and does not directly enhance communication or collaboration skills.

PO7 with all Cos:

CO1 is moderately related to PO7 with a weightage of 2, as developing problem-solving skills encourages critical thinking, which is essential for conducting research.

CO2 is partially related with a weightage of 1, as understanding the fundamentals of C programming does not directly involve research-related skills but provides a foundational technical knowledge.

CO3 is moderately related to PO7 with a weightage of 2 since gaining proficiency in C programming syntax and semantics can support research efforts in programming and software development.

CO4 is partially related with a weightage of 1, as developing debugging and error handling skills is more focused on practical application than on research-related skills.

CO5 is moderately related to PO7 with a weightage of 2, as mastering the basics of database concepts can enhance research capabilities in data management and analysis.

CO6 is partially related to PO7 with a weightage of 1, as writing SQL commands is primarily a practical skill that supports data manipulation but does not inherently involve research methodologies.

CO7 is moderately related, with a weightage of 2, since gaining knowledge about query execution and its performance can inform research strategies related to database optimization and data retrieval.

SYLLABUS (CBCS as per NEP 2020) FOR F. Y. B. Sc. (Computer Science)

Name of the Programme	: B.Sc. Computer Science
Program Code	: USCOS
Class	: F.Y.B.Sc. (Computer Science)
Semester	: I
Course Type	:IKS
Course Name	: Evolution of Computers
Course Code	: COS-137-IKS
No. of Lectures	: 30
No. of Credits	: 02

(w. e. from June, 2023)

A) Course Objectives:

- 1. Students will understand about the history of computers.
- 2. Students will gain knowledge about the evolution of different programming languages.
- 3. Students will study program structure of some high level language.
- 4. Students will study the features of different types of scripting languages.
- 5. Students will study the features of different types of Operating Systems.
- 6. Students will study the features of different types of clouds.
- 7. Students will know the current trends in Computer Science.
- **B**) Course Outcomes:

After completing this course, students will be able to

CO1: Compare different phases of development of computer and its components.

- CO2: Categorize the programming languages based on its features.
- CO3: Compare the programming languages based on program structure.
- CO4: Distinguish among different scripting languages based on its features .
- CO5: Compare among different types of Operating Systems.
- CO6: Compare among different types of cloud.
- CO7: Compare among recent computing techniques.

TOPICS/CONTENTS:

UNIT1: Early computing devices and beginning years Lectures)

- Early computing devices (Abacus, Pascal adding machine, Leibniz calculator, Difference
 Engine)
- Early inventors (Charles Babbage, Ada Lovelace, George Boole, Dr. Herman Hollerith,

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(08

John Von Neumann, Howard Aiken)

- The Turing Machine (mathematical model) : Concept, Example
- First programmable computes Colossus, ENIAC
- Solid State Transistors (1947) and emergence of second generation of computers
- High Level Programming Languages: COBOL, FORTRAN, LISP and their features
- Program structure in COBOL, FORTRAN and LISP
- Invention of Integrated Circuits by Kilby and Noyce

UNIT 2: Middle years

- BASIC language
- Invention of ARPANET
- First ever communication on a mobile phone by Martin Cooper
- Development of TCP/IP (Vint Cert and Bob Kahn) and its features
- Launching of Apple-I(1976) and Apple-II(modern PC) (1977)
- VLSI
- Development of Pascal and its features
- Evolution of C language(1972) from B(1969), BCPL(1967), ALGOL 68(1968) and its features
- Development of Prolog language (1972) and its features
- Applications of Prolog
- Development of SQL by IBM (1972) and its features
- Importance of SQL
- Emergence of UNIX OS
- Rise of the Operating Systems (Linux, Microsoft Windows, Solaris, Mac OS)
- Comparison among different OS
- Evolution of C++ from C with classes (C + Simula 67)
- Features and applications of C++

UNIT 3: Moving ahead towards future

- The Word Wide Web (www) and its importance
- Development of HTML
- Features and applications of HTML
- Development of Python, R, Java
- Features and applications of Python, R, Java
- Development of scripting languages: PHP, JavaScript, VBScript, ASP, JSP
- Features and applications of PHP, JavaScript, VBScript, ASP, JSP
- Comparison among PHP, JavaScript, VBScript, ASP, JSP
- Emergence of Cloud Computing
- Types of Cloud
- Artificial Intelligence: Machine Learning, Deep Learning
- Applications of Artificial Intelligence
- Internet of Things (IoT), Image Processing
- Development of Dart, Kotlin

(10 Lectures)

(12 Lectures)

- Features of Dart and Kotlin
- Recent trends : Quantum Computing, Edge Computing, Fog Computing, Robotics, Cybersecurity, Blockchain

References:

- 1. Basandra, S.K. (2010). Computer Today. Galgotia Publications Pvt. Ltd.
- 2. Rajaraman V.(2010). Fundamentals of Computer. PHI Learning Pvt. Ltd. New Delhi.

Web References:

- 1. https://en.wikipedia.org/wiki/
- 2. https://www.computerhistory.org
- 3. https://www.livescience.com/20718-computer-history.html
- 4. https://www.g2.com/articles/history-of-computers
- 5. https://home.cern/science/computing/birth-web/short-history-web

Mapping of this course with Programme Outcomes

Course	Programme Outcomes (POs)						
Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		2					
CO2		2					
CO3			2				
CO4			2				
CO5	2						
CO6			2				
CO7			2				

Weight: 1 - Partially related 2 - Moderately Related 3 - Strongly related

Examination Pattern / Evaluation Pattern

Teaching and Evaluation (for Major, Minor, AEC, VEC, IKS courses)

Course	No. of Hours per	No. of Hours per	Maximum	CE	ESE
Credits	Semester	Week	Marks	40 %	60%
	Theory/Practical	Theory/Practical			
1	15 / 30	1 / 2	25	10	15
2	30 / 60	2 / 4	50	20	30
3	45 / 90	4 / 6	75	30	45
4	60 / 120	4 / 8	100	40	60

Teaching and Evaluation (for VSC, SEC & CC courses)

- Evaluation to be done by Internal & External Experts
- No descriptive end semester written examination
- Evaluation to be done at Department level preferably prior to commencement of Theory /Practical Examinations
- Evaluation to be done on the Skills gained by student