

# *B.Sc. Computer Science*

# Syllabus

(For students admitted from 2020-2021 onwards)



**Department of Computer Science**  
**Bishop Heber College (Autonomous)**

Nationally Re-accredited at the 'A' by NAAC with a CGPA of 3.58 out of 4

Recognized by UGC as "College of Excellence"

Tiruchirappalli 620017

## VISION

The Department of Computer Science is driven to provide excellent educational opportunities that accomplished the needs of our students, and empower them as an active technocrat in the top – notch IT industry and nation building.

## MISSION

- Facilitating the quality technical education through enriched curriculum to solve the real-world problems.
- Creating the knowledge of innovative and sustainable research areas of computational science to build technological advanced society/nation.
- Educating the professional ethics, attitude, human values and career building skills for their professional and personal life.

## PROGRAMMING OUTCOMES (POs)

Upon completion of BSc Computer Science degree, under-graduates will possess the following computer science skills and abilities.

**PO1:** Acquiring the knowledge through a set of required courses covering essential areas in computing and a set of technical electives enabling students to deepen their knowledge in chosen areas of computational sciences.

**PO2:** Imbibing a strong computational oriented technical basis with a flexible interdisciplinary component and an emphasis on communication skills.

**PO3:** Applying the analytical skills to assess the problem and identify its solution using appropriate development of applications.

**PO4:** Design the applications using the programming skills of latest computing languages for societal needs and business use-cases.

**PO5:** Proposing original ideas and solutions, culminating into a modern, easy to use tool, by a larger section of the society with longevity.

**PO6:** Rendering eminent employability platform as a Up Grad professionals in a significant and indigenous sectors.

**PO7:** Perform effectively as an individual and as a member or a leader in a multidisciplinary setting to accomplish a goal.

**PO8:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the scientific practice.

**PO9:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

## PROGRAMME SPECIFIC OUTCOMES (PSOs)

On the completion of the course the graduate will be able to

**PSO1:** Demonstrate the analytical and technical skills in the development of applications development using the knowledge of programming languages, operating systems, database management systems, computer graphics and software engineering.

**PSO2:** Integrate with the computer science community by the ability to function effectively on teams to accomplish shared computing design, evaluation, or implementation goals and also develop an entrepreneurship spirit.

**PSO3:** Exhibit the skills for getting the higher studies and employment in the computing and inter-disciplines for the development of professional and societal needs.

**PSO4:** Apply the technical skills for the development of rural areas and technically illiterate areas by providing the solutions of their problems to build the digitally empowered nation.

### Programme Articulation Matrix - B.Sc., Computer Science

Sem	Course Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
<b>I</b>	U18TM1L1				H	H	H	H	H	H				
	U20EG1L1				H	H	H	H	H	H				
	U18CS101	H	H	H	H	H				H	H	H	H	H
	U18CS1P1	H	H	H	H	H				H	H	H	H	H
	U20MAZ11	M	M	M	H	H				M	M	M	M	H
	U16EST11				H	H	H	H	H	H				
	U15VL1:1/ U15VL1:2				H	H	H	H	H	H				
<b>II</b>	U18TM2L2				H	H	H	H	H	H				
	U20EG2L2				H	H	H	H	H	H				
	U18CS202	H	H	H	H	H				H	H	H	H	H
	U18CS2P2	H	H	H	H	H				H	H	H	H	H
	U20MAZ22	M	M	M	H	H				M	M	M	M	H
	U20MAZ23	M	M	M	H	H				M	M	M	M	H
	U18CSPS1	H	H	H	H	H			H	H	M	H	H	H
<b>III</b>	U18TM3L3				H	H	H	H	H	H				
	U16EG3L3				H	H	H	H	H	H				
	U18CS303	H	H	H	H	H				H	H	H	H	H
	U18CS3P3	H	H	H	H	H				H	H	H	H	H
	U13PHZ34		H	H	H				H	H	M	M	M	H
	U13PHZP1		H	H	H				H	H	M	M	M	H
	U18CS3E1	H	H	H	H	H			H	H	L	L	L	M
<b>V</b>	U18TM4L4				H	H	H	H	H	H				
	U16EG4L4				H	H	H	H	H	H				
	U18CS404	H	H	H	H	H				H	H	H	H	H
	U18CS4P4	H	H	H	H	H				H	H	H	H	H
	U13PHZ45		H	H	H				H	H	M	M	M	H
	U13PHZP1		H	H	H				H	H	M	M	M	H
	U18CS4E2	H	H	H	H	H			H	H	L	L	L	M
	U16LFS41				H	H	H	H	H	H				
	U16ETA41				H	H	H	H	H	H				
<b>VI</b>	U18CS505	H	H	H	H	H				H	H	H	H	H
	U18CS506	M	M	M	H	H					H	H	H	H
	U18CS507	L	M	M	M	H	H			H	M	M	M	H
	U18CS5P5	H	H	H	H	H					H	H	H	H

	U18CS5:1	L	H	L	H	H	H	H		H	M	M	H	H
	U18CSPS2	H	H	H	H	M	M	H	M	H	H	H	H	H
	U18CSPS3				H	H	H	H	H	H		H	H	H
<b>VI</b>	U18CS608	H	H	H	H	H			M		H	H	H	H
	U18CS6:1	M	H	H	M	H			H		M	M	H	H
	U18CS6P6	M	H	M	M	H			M		M	M	M	M
	U18CS6:4	M	H	H	M	H			H		M	M	H	H
	U18CS6PJ	H	H	H	H	M	M	H	M	H	H	H	H	H
	U16GST61				H	H	H	H	H	H				

**Programme Structure - B.Sc., Computer Science**  
(Applicable to Candidates admitted From the Academic Year (2020-2021) onwards)

Sem	Part	Course	Course Title	Course Code	Hours / Week	Credits	Marks		
							CIA	ESE	Total
I	I	Tamil I	செய்யுள், இலக்கிய வரலாறு, உரைநடை, மொழிப்பயிற்சியும் படைப்பாக்கமும்	U18TM1L1	6	3	25	75	100
	II	English I	Literature and Language: Prose and Short Stories	U20EG1L1	6	3	40	60	100
	III	Core I	Programming Principles and Abstractions using C	U18CS101	6	5	25	75	100
		Core Practical I	Programming Principles and Abstractions using C Lab	U18CS1P1	3	2	40	60	100
		Allied I	Operation Research	U20MAZ11	5	4	25	75	100
		Env. Studies	Environmental Studies	U16EST11	2	2	25	75	100
	IV	Val.Edu.	Value Education (VLO - RI / MI)	U15VL1:1/ U15VL1:2	2	2	25	75	100
II	I	Tamil II	செய்யுள், இலக்கிய வரலாறு, சிறுகதைத்தரட்டு, மொழிப்பயிற்சி ரு	U18TM2L2	6	3	25	75	100
	II	English II	Literature and Language: Poetry and Shakespeare	U20EG2L2	6	3	40	60	100
	III	Core II	Exploring Data Using Python	U18CS202	5	5	25	75	100
		Core Practical II	Exploring Data Using Python Lab	U18CS2P2	3	2	40	60	100
		Allied II	Numerical Methods	U20MAZ22	4	4	25	75	100
		Allied III	Probability and Statistics	U20MAZ23	4	4	25	75	100
	IV	SBEC I	Business Communication and Collaboration Tools	U18CSPS1	2	2	40	60	100
III	I	Tamil III	செய்யுள், காப்பியங்கள், இலக்கிய வரலாறு, நாவல் மொழிப்பயிற்சி	U15TM3L3	6	3	25	75	100
	II	English III	English for Competitive Examinations	U16EG3L3	6	3	40	60	100
	III	Core III	Object Oriented System Design	U18CS303	6	5	25	75	100
		Core Practical III	Object Oriented System Design Lab	U18CS3P3	3	2	40	60	100
		Applied I	Electricity, Magnetism and Electromagnetism	U13PHZ34	4	3	25	75	100
		Applied Practical I	Applied Physics Practicals	U13PHZP1	3	---	---	---	---
	IV	NMEC I	Basics of Computer Programming	U18CS3E1	2	2	25	75	100

Sem	Part	Course	Course Title	Course Code	Hours / Week	Credits	Marks			
							CIA	ESE	Total	
IV	I	Tamil IV	செய்யுள், நாடகம், இலக்கிய வரலாறு, மொழிப்பயிற்சி	U15TM4L4	5	3	25	75	100	
	II	English IV	English through Literature	U16EG4L4	5	3	40	60	100	
	III	Core IV	Database Design		U18CS404	6	5	25	75	100
		Core Practical IV	Database Design Lab		U18CS4P4	3	2	40	60	100
		Applied II	Solid State Devices and Microprocessor		U13PHZ45	4	4	25	75	100
		Applied Practic II	Applied Physics Practicals		U13PHZP1	3	3	40	60	100
	IV	NMEC II	Fundamentals of Information Technology		U18CS4E2	2	2	25	75	100
		Soft Skills	Life Skills		U16LFS41	2	1	---	---	100
	V	Extension Activities	NSS, NCC, Rotract, Lioclub, etc...,		U16ETA41	---	1	---	---	---
V	III	Core V	Database – Driven Web Design	U18CS505	5	5	25	75	100	
		Core VI	Principles of Operating Systems	U18CS506	5	5	25	75	100	
		Core VII	Computer Graphics	U18CS507	5	5	25	75	100	
		Core Practical V	Database – Driven Web Design Lab	U18CS5P5	6	4	40	60	100	
		Elective I	1a) Software Engineering		U18CS5:1	5	5	25	75	100
	1b) Internet of Things			U18CS5:2						
	1c) Cloud Computing			U18CS5:3						
	IV	SBEC II	Project Proposal		U18CSPS2	2	2	40	60	100
		SBEC III	Technical Communication for Computer Scientists		U18CSPS3	2	2	40	60	100
VI	III	Core VIII	Computer Networking	U18CS608	6	5	25	75	100	
		Elective II	2a) Multimedia Technologies		U18CS6:1	6	5	25	75	100
			2b) Web Applications Development		U18CS6:2					
			2c) XML Basics		U18CS6:3					
		Core Practical VI	Digital Electronics and Microprocessors Lab		U18CS6P6	6	5	40	60	100
		Elective III	3a) Business Analytics		U18CS6:4	6	5	25	75	100
			3b) Foundations of Enterprise Computing		U18CS6:5					
	3c) Mobile Application Development			U18CS6:6						
Core / Project	Project Implementation		U18CS6PJ	6	5	---	---	100		
V	Gender Studies	Gender Studies		U16GST61	---	1	---	---	100	
<b>Total Credits</b>						<b>140</b>				

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**CORE I: PROGRAMMING PRINCIPLES AND ABSTRACTIONS USING C****SEMESTER: I**  
**CREDITS: 5****CODE: U18CS101**  
**HOURS /WEEK: 6**

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**1. COURSE OUTCOMES**

S. No	Course Outcomes	Level	Unit
CO1	Examine the basic concepts of C programming and use them in creating simple applications	K4	1
CO2	Apply the looping concepts and different types of arrays for solving computing problems	K3	2
CO3	Develop applications using the concept of pointers, declaration, initialization, operations on pointers and its usage	K6	3
CO4	Create a file in order to read, write, display and append data using file functions	K6	4
CO5	Select the appropriate data structures based on the requirements of the problem.	K5	5
CO6	Develop the Programs for Data Structures with real world use-cases	K6	5

**2. A. SYLLABUS****Unit I: Basics of C and Decisions****15**

Data types, Variables, Assignment statements – Printf, puts, scanf statements, Format specifiers, Escape specifications – Arithmetic operators, Arithmetic expressions, Order of precedence, Evaluation of arithmetic expressions – Logical, relational and bitwise operators – Decision statements: if, if-else, if-else-if and nested if statements – Switch statement, break statement – Constants, C keywords, C character set, Type conversions – Switch statement.

**Unit II: Loops, Arrays and Functions****15**

For loop, Continue statement – While loop – Do-while loop – 1-D Arrays: Definition, initialization and Array index – 2-D Arrays: Definition, initialization and Array index – Multi-dimensional arrays – Functions: definition, arguments, return statement and calling – Local variables and global variables. Functions with arrays – Functions with decision and looping statements. – Recursion.

**Unit III : Pointers, Structures and Union****15**

Strings processing: Standard string library functions – Pointers: declaration, assigning to pointer variable, using a pointer, printing pointer, null pointer – Arithmetic operation with pointers – Pointers and arrays, pointers and strings – Pointers and functions, variable length arrays – Array of pointers, Storage class – Structures: declaration, initialization, array of structures – Pointer to structures, Structures and functions – Typedef, Enumerated data types, Unions.

**Unit IV : File Processing****15**

Files: introduction and files functions – Writing and reading in Text mode – Simple application: Display the contents of a file. Write data to a file. Append data to existing file – Writing and reading in Binary mode – Simple application: Display the contents of a file. Write data to a file. Append data to existing file – File IO – Reading and writing structures – Command line arguments.

**Unit V : Data Structures****15**

Stack: LIFO concept, Stack operations, Array implementation of stack – Queue: FIFO concept, Queue operations, Array implementation of queue – Singly Linkedlist: concepts, operations – Doubly Linkedlist: concepts, operations – Trees: General trees, Binary trees – Tree traversal algorithms: inorder, preorder and postorder – Binary search trees: concepts, operations – Graphs: concepts, graph implementations using adjacency matrix and adjacency list – Graph traversals: Breadth first search – Graph traversals: Depth first search.



## B. TOPICS FOR SELF - STUDY

S. No	Topic	Web links
1	Embedded Software in C	<a href="https://www.youtube.com/watch?v=CYvJPra7Ebk">https://www.youtube.com/watch?v=CYvJPra7Ebk</a>
2	Art of Code	<a href="https://www.youtube.com/watch?v=6avJHaC3C2U">https://www.youtube.com/watch?v=6avJHaC3C2U</a>
3	Google Coding	<a href="https://www.youtube.com/watch?v=qz9tKIF431k">https://www.youtube.com/watch?v=qz9tKIF431k</a>
4	Structures and Unions	<a href="https://www.youtube.com/watch?v=KL65a0TyeYo">https://www.youtube.com/watch?v=KL65a0TyeYo</a>

## C. TEXT BOOKS

1. Ashok N Kamthane, *“Programming and Data Structures”*, Pearson, 2009.
2. E.Horowitz, S.Sahni and Susan Anderson Freed, *“Fundamental Data Structures in C”*, 2ed, Orient BlackSwan Publisher, 2009.

## D. REFERENCES

1. Steve Oualline, *“Practical C Programming”*, 3ed, Oreilly Publishers, 1997.
2. Reema Thareja, *“Data Structures using C”*, Oxford University Press, 2014.

## E. WEB LINKS

- <https://www.udemy.com/course/advanced-c-programming-course/>
- <https://www.coursera.org/courses?query=c%20programming>
- <http://www.ictacademy.in/pages/Advanced-C-Programming.aspx>

## 3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning outcomes	Blooms Taxonomy Highest Level of Transaction
<b>I</b>	<b>Basics of C and Decisions</b>		
1.1	Data types, variables, assignment statements	Choose the right data representation formats based on the requirements of the problem	K5
1.2	Printf, puts, scanf statements, format specifiers, escape specifications	Apply different types of I/O functions (e.g. printf and scanf)	K3
1.3	Arithmetic operators, logical, relational and bitwise operators	Utilize the different types of operators in C	K3
1.4	Arithmetic expressions & order of precedence	Solve arithmetic expressions based on operator precedence	K6
1.5	Evaluation of arithmetic expressions	Analyze how to evaluate the expressions based on BODMAS rule	K4
1.6	Decision statements: if, if-else, if-else-if and nested if statements – switch statement, break statement	Construct alternative statements for finding the largest of three numbers	K6
		Compare decision-making statements with looping statements	K5
1.7	Constants, C keywords, C character set, type conversions	Summarize constants, C keywords and C character set	K2

<b>II</b>	<b>Loops, Arrays and Functions</b>		
2.1	For loop, continue statement – while loop – do-while loop	Apply the concepts of looping statements in real-time applications	K3
2.2	1-D Arrays: definition, initialization and array index	Make use of the concept of 1-D arrays	K3
		Demonstrate memory allocation for 1-D arrays and accessing of array elements	K3
2.3	2-D Arrays: definition, initialization and array index – multi-dimensional arrays	Make use of the concept of 2-D and multi-dimensional arrays	K3
		Demonstrate memory allocation for 2-D and multi-dimensional arrays and accessing of array elements	K3
2.4	Functions: definition, arguments, return statement and calling	Analyze calling function and returning a statement	K4
		Distinguish between built-in functions and user-defined functions	K4
2.5	Local variables and global variables	Compare local variables with global variables	K5
2.6	Functions with arrays	Develop a function to find the ascending and descending order of the numbers	K6
2.7	Functions with decision and looping statements	Create a function to find the length of a string and also reverse it	K6
2.8	Recursion	Construct a recursive function to generate factorial of a number and Fibonacci series	K6
<b>III</b>	<b>Pointers, Structures and Union</b>		
3.1	Strings processing: standard string library functions	Differentiate various standard string library functions	K4
3.2	Pointers: declaration, assigning to pointer variable, using a pointer, printing pointer, null pointer	Distinguish between an address operator and a dereferencing operator	K3
3.3	Arithmetic operation with pointers	Solve arithmetic operation with pointers	K6
3.4	Pointers and arrays	Justify the statement that name of an array can be used as a pointer	K5
3.5	Pointers and strings	Interpret the relationship between pointers and strings	K5
3.6	Pointers and functions	Discuss how to pass pointers to functions	K6
3.7	Variable length arrays – array of pointers	Compare variable length arrays and array of pointers	K5
3.8	Storage class	Distinguish between automatic and static variables	K4
3.9	Structures: declaration, initialization, array of structures – pointer to structures, structures and functions	Compare and contrast structures and unions	K5
		Develop a structure to accept the details of the employees and compute the gross salary	K6
3.10	Typedef, enumerated datatypes	Compare and contrast typedef and enum datatypes	K3
3.11	Unions	Summarize the concept of unions	
<b>IV</b>	<b>File Processing</b>		

4.1	Files: introduction and file functions	Apply the file functions such as fprintf, fopen, etc., to create a file	K3
4.2	Writing and reading in text mode – simple application: Display the contents of a file. Write data to a file. Append data to existing file	Develop a simple application to read, write and append data to a file in text mode	K6
		Examine how to read and write a file in text mode	K4
4.3	Writing and reading in binary mode – simple application: Display the contents of a file. Write data to a file. Append data to existing file	Develop a simple application to read, write and append data to a file in binary mode	K6
		Examine how to read and write a file in binary mode	K4
4.4	File I/O	Apply file I/O functions to perform various tasks on a file	K3
4.5	Reading and writing structures	Develop an application to create a data file to store the information of a student	K6
4.6	Command line arguments	Construct a program to receive values from command line	K6
<b>V</b>	<b>Data Structures</b>		
5.1	Stack: LIFO concept, stack operations, array implementation of stack	Apply push and pop operations on stack	K3
		Solve arithmetic expressions using stack	
5.2	Queue: FIFO concept, queue operations, array implementation of queue	Apply insertion and deletion operations in queue	K3
5.3	Singly linkedlist: concepts, operations	Demonstrate the working principle of singly linked lists	K3
5.4	Doubly linkedlist: concepts, operations	Discuss the various operations performed on doubly linked lists	K6
5.5	Trees: General trees and binary trees	Examine in detail about binary trees	K5
5.6	Tree traversal algorithms: inorder, preorder and postorder	Build binary trees to perform traversal algorithms	K6
5.7	Binary search trees: concepts, operations	Construct binary search trees for performing operations like insertion, deletion, and searching	K6
5.8	Graph concepts	Distinguish between graphs and trees	K4
5.9	Graph implementations using adjacency matrix and adjacency list	Compare the adjacency matrix with adjacency list	K5
5.10	Graph traversals: Breadth first search – Graph traversals: Depth first search.	Analyze graph traversal techniques like breadth first search and depth first search	K4

#### 4. MAPPING SCHEME (CO, PO, PSO)

L-Low

M-Moderate

H-High

U18CS101	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	H	-	M	M	L	-	M	M	-	H	-		M
CO2	H	-	M	M	M	-	-	-	-	H	-		M
CO3	H	-	M	M	M	-	M	M	-	H	-		M
CO4	H	-	M	M	M	-	-	-	-	H	-		H
CO5	H	M	M	M	M	-	-	-	-	H	M	M	H
CO6	H	H	H	H	H	M	-	-	-	H	M	M	H

#### 5. COURSE ASSESSMENT METHODS

##### DIRECT:

1. Continuous Assessment Test: T1, T2 (Theory & Practical Components): Closed Book
2. Open Book Test.
3. Cooperative Learning Report, Assignment, Group Presentation, Group Discussion, project Report, Field Visit Report, Poster Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

##### INDIRECT:

1. Course end survey (Feedback)

Name of the Course Coordinator : Prof. V. Bhuvanewari

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**PROGRAMMING PRINCIPLES AND ABSTRACTIONS USING C LAB****SEMESTER: I**  
**CREDITS : 2****CODE: U18CS1P1**  
**HOURS /WEEK: 3**

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**1. COURSE OUTCOMES**

S. No.	Course Outcomes	Level	Unit
1	To identify the data types and use them in simple data processing applications	K2	1
2	To develop the ability to analyse a problem and develop an algorithm to solve it	K4	2
3	To analyse and relate the concept of pointers and their usage	K5	3
4.	To apply the concept of data structures like tree, stack and queue in the programming context	K6	4-8
5.	To interpret the programming task involved for a given computational problem	K6	4-8
6.	To Develop the file operations based programmes for file processing	K6	9-10

**2. SYLLABUS**

EXP NO	CONTENT
1.	Starter application: Read and print name, Convert temperature from F to C and vice versa, Find biggest of 3 numbers, Compute area of shapes: rectangle, circle and cylinder.
2.	Sorting student marks: Sort the given marks of students in ascending order and descending order
3.	Arithmetic calculator: Develop menu-driven arithmetic calculator application using functions. Each function should receive values and return the calculated output.
4.	Sorting a stack: Given a stack, sort it such that the top of the stack has the largest element. Read the size of the stack, followed by the numbers to be pushed to stack. The output should be the popped elements from the sorted stack.
5.	Car washing queue: A car washing garage has 2 gates one to enter another to exit and can wash 3 cars at a time. Cars can enter the garage in one gate and exit in another gate. For this application, ask user which operation one wants such as '1-insert car', '2-remove car', '3-show queue' or '4-quit'. Perform the following sequence of operations: 1 1; 1 2; 1 3; 2; 3; 1 4; 3; 2; 1 5; 1 6; 2; 3; 4
6.	Binary search tree of filenames: Given a set of file names (such as hello.c), create a binary search tree. Read 10 file names and display the names based on inorder traversal.

7.	Detecting cycles in a graph: Given a directed graph, your task is to detect if there is a cycle in the graph or not. Read two integers 'N' and 'M' which denotes the no of vertices and no of edges respectively. Read 'M' pairs u and v denoting that there is an uni-directed edge from u to v. Print if there is a cycle or not.
8.	Intersection of two linked lists: Given two linked lists, your task is to complete the function findIntersection(), that returns the intersection (ie., common elements) of two linked lists. The function takes 2 arguments, reference pointer to the head of the first linked list (head1) and reference pointer to the head of the second linked list (head2). The function should return reference pointer to the head of the new list that is formed by the intersection of the two the lists.
9.	Sorting employees: Each employee record contains name and salary. Read name and salary of 10 employees into structure. Sort the records based on salary, if same then sort on name
10.	Mark List Generation: Read a file that contains details of 5 students. Each record contains student name, mark1, mark2 and mark3. Prepare a mark list that displays student name, marks and average mark of each student.

### 3. SPECIFIC LEARNING OUTCOMES (SLO)

EXP NO	CONTENT	Blooms Taxonomy Highest Level of Transaction
1	Starter application: Read and print name, Convert temperature from F to C and vice versa, Find biggest of 3 numbers, Compute area of shapes: rectangle, circle and cylinder.	K1
2	Sorting student marks: Sort the given marks of students in ascending order and descending order	K3
3	Arithmetic calculator: Develop menu-driven arithmetic calculator application using functions. Each function should receive values and return the calculated output.	K2
4	Sorting a stack: Given a stack, sort it such that the top of the stack has the largest element. Read the size of the stack, followed by the numbers to be pushed to stack. The output should be the popped elements from the sorted stack.	K3
5	Car washing queue: A car washing garage has 2 gates one to enter another to exit and can wash 3 cars at a time. Cars can enter the garage in one gate and exit in another gate. For this application, ask user which operation one wants such as '1-insert car', '2-remove car', '3-show queue' or '4-quit'. Perform the following sequence of operations: 1 1; 1 2; 1 3; 2; 3; 1 4; 3; 2; 1 5; 1 6; 2; 3; 4	K3

6	Binary search tree of filenames: Given a set of file names (such as hello.c), create a binary search tree. Read 10 file names and display the names based on inorder traversal.	K3
7	Detecting cycles in a graph: Given a directed graph, your task is to detect if there is a cycle in the graph or not. Read two integers 'N' and 'M' which denotes the no of vertices and no of edges respectively. Read 'M' pairs u and v denoting that there is an uni-directed edge from u to v. Print if there is a cycle or not.	K3
8	Intersection of two linked lists: Given two linked lists, your task is to complete the function findIntersection(), that returns the intersection (ie., common elements) of two linked lists. The function takes 2 arguments, reference pointer to the head of the first linked list (head1) and reference pointer to the head of the second linked list (head2). The function should return reference pointer to the head of the new list that is formed by the intersection of the two the lists.	K4
9	Sorting employees: Each employee record contains name and salary. Read name and salary of 10 employees into structure. Sort the records based on salary, if same then sort on name	K5
10	Mark List Generation: Read a file that contains details of 5 students. Each record contains student name, mark1, mark2 and mark3. Prepare a mark list that displays student name, marks and average mark of each student.	K6

#### 4. MAPPING SCHEME ( CO, PO, PSO)

L-Low

M-Moderate

H- High

U18CS1P1	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	H	-	-	M	M	M	-	-	-	-	-	-	-
CO2	H	M	-	M	M	M	-	-	-	M	-	M	-
CO3	H	-	-	M	M	M	-	-	-	-	-	-	-
CO4	H	-	-	M	M	M	-	-	-	M	-	M	-
CO5	H	M	L	M	M	M	-	-	-	M	-	M	-
CO6	H	M	L	M	M	M	-	-	-	M	-	M	-

#### 5. COURSE ASSESSMENT METHODS

##### DIRECT:

1. Continuous Assessment Test: T1, T2 (Practical Components): Closed Book
2. Cooperative Learning Report, Assignment, Group Discussion, project Report, Field Visit Report, Seminar.
3. Pre/Post Test, Viva, Report for each Exercise.
4. Lab Model Examination & End Semester Practical Examination

##### INDIRECT:

## 1. Course end survey (Feedback)

Name of the Course Coordinator : Prof. V. Bhuvanewari

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### EXPLORING DATA USING PYTHON

SEMESTER: II

CODE : U18CS202

CREDITS : 2

HOURS /WEEK: 5

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#### 1. COURSE OUTCOMES

S No	Course Outcomes	Level	Unit
CO1	Describe the core syntax and semantics of Python programming language.	K3	1
CO2	Discover the need for working with the strings and functions.	K5	2
CO3	Illustrate the process of structuring the data using lists, dictionaries, tuples and built-in functions to navigate the file system.	K5	3
CO4	Infer the Object-oriented Programming concepts in Python.	K4	4
CO5	Indicate the use of regular expressions and build a real time application using the python concepts	K6	5
CO6	Design the basic web applications using Python Internet Programming	K6	5

#### 2. A. SYLLABUS

##### Unit I: Python Basics and Functions

6

Variables – Operators – Statements – Getting Inputs – Boolean conditions – Alternative, chained and nested conditions – Catching exceptions – Function calls – Built-in functions – Type conversion functions and math functions – Creating new functions, parameters and arguments – Need for functions.

##### Unit II: Loops and Strings

6

While statement – Infinite loops – Continue statement – For loops – Counting and summing loops – Maximum and minimum loops – Traversal through strings – String slice – Looping and counting in strings – The in operator – String comparison – String methods – parsing strings – Format operator.

##### Unit III: Files and Lists

6

Opening files – Text files – Reading files – Searching through files – Selecting files names from user – Writing files – Traversing list – List operations – List slice – List methods – Deleting elements – Built-in list functions – Objects, value and aliasing – List arguments.

##### Unit IV: Dictionaries, Tuples and OOP

6

Dictionaries – Files and dictionaries – Looping and dictionaries – Advanced text processing – Tuples – Comparing tuples – Tuple assignments – Dictionaries and tuples – Tuples as keys in dictionaries – Creating objects – Encapsulation – Classes as types – Object lifecycle – Instances – Inheritance.

##### Unit V: Internet Programming

6



Regular expressions – Character matching – Extracting data – Escape character – Designing simple web browser using sockets – Retrieving images using HTTP – Retrieving web pages using urllib – Reading binary files using urllib.

## B. TOPICS FOR SELF - STUDY

S.No.	Topics	Web Links
1	Speech Recognition in Python	<a href="https://www.youtube.com/watch?v=qz9tKlF431k">https://www.youtube.com/watch?v=qz9tKlF431k</a>
2	Algorithmic Trading	<a href="https://www.youtube.com/watch?v=SEQbb8w7VTw">https://www.youtube.com/watch?v=SEQbb8w7VTw</a>
3	Java Vs Python	<a href="https://www.youtube.com/watch?v=s3Ejdx6clho">https://www.youtube.com/watch?v=s3Ejdx6clho</a>
4	Files and Dictionaries	<a href="https://www.youtube.com/watch?v=mcWlhx4dws&amp;list=PLGYpb6ADpoKcWjgkktEHLpU1mGMb0ZTmj">https://www.youtube.com/watch?v=mcWlhx4dws&amp;list=PLGYpb6ADpoKcWjgkktEHLpU1mGMb0ZTmj</a>

## C. TEXT BOOK

1. Charles R. Severance, Python for Everybody: “*Exploring data using Python 3*”, Schroff Publishers, 1ed, 2017, ISBN 978-9352136278.

## D. REFERENCE BOOK

1. Allen Downey, Think Python: “*How to think like a computer scientist*”, Schroff / O’Reilly Publishers, 2ed, 2016, ISBN 978-9352134755.

## E. WEB LINKS

- <https://www.udemy.com/course/learn-advanced-python-programming/>
- <https://realpython.com/tutorials/advanced/>
- <https://python-course.eu/advanced-python/>

## 3. SPECIFIC LEARNING OUTCOMES (SLO)

UNIT	CONTENT	LEARNING OUTCOMES	Blooms Taxonomy Highest Level of Transaction
I	<b>Python Basics and Functions</b>		
1.1	Variables, Operators, Statements, Getting Inputs	Interpret basics of programming Concepts.	K2
1.2	Boolean Conditions	Identify the Python language control statements	K2
1.3	Alternative, Chained and nested conditions	Make out the python Nested Conditions	K2
1.4	Catching Exceptions	Apply and analysis the catching exceptions	K2

1.5	Function Calls	Illustrate the structure of python functions.	K3
1.6	Built-in Functions	Interpret the predefined library functions.	K3
1.7	Type Conversion functions and math functions	Infer the method of type conversion and functionalities of math functions.	K3
1.8	Creating new functions, parameters and arguments	Make out the creation of new python functions	K3
1.9	Need for Functions	Infer the need for functions.	K3
<b>II</b>	<b>Loops and Strings</b>		
2.1	While Statement, Infinite Loops, Continue Statement	Illustrate the Python language syntax including control statements.	K2
2.2	For loops	Illustrate the Python language loops.	K2
2.3	Loop patterns	inspect the loop concept and evaluate loop patterns.	K4
2.4	Traversal through strings, String slice	Illustrate the functionalities of String	K3
2.5	Looping and Counting in Strings	Interpret and evaluate the functionalities of strings	K3
2.6	The in operator, String comparison, String methods, Parsing Strings, Format operator	List out and evaluate the set of String functions	K4
<b>III</b>	<b>Files and Lists</b>		
3.1	Opening files, Text files and Reading	Determine the csv file using DataFrame Illustrate and evaluate the functions for reading tabular data as a DataFrame object	K5 K4
3.2	Search through file	Illustrate the easiest ways to store data efficiently in binary format.	K4
3.3	Selecting and writing file	Illustrate and apply the python APIs for connecting python with web	K4
3.4	Traversing List, List operations	Explain how to connect data base with python. Illustrate and evaluate the data and store it in database	K5 K4
3.5	Built in list functions	Illustrate and evaluate the Data contained in pandas objects can be combined together	K3
3.6	List arguments	Create and apply the functionalities for rearranging tabular data	K4
<b>IV</b>	<b>Dictionaries, Tuples and OOP</b>		
4.1	Files and Dictionaries	Apply and evaluate the data in dictionaries	K4
4.2	Looping and Dictionaries	Apply and evaluate the data in dictionaries using looping	K4
4.3	Advanced text processing	Apply and evaluate the data in advanced functionalities.	K4
4.4	Tuples, Comparison, assignments	Create and evaluate the data using tuples	K4
4.5	Dictionaries and tuples, Tuples as keys in Dictionaries	Illustrate and analysis the tuples as keys in dictionaries	K4
4.6	Creating Objects, Encapsulation	Illustrate the oops concepts	K3
	Classes as types, Object life cycle	Interpret the class types and object life cycle	K3
	Instances, Inheritance	Illustrate the instances and inheritance	K3
<b>V</b>	<b>Internet Programming</b>		
5.1	Regular Expressions	Illustrate and evaluate the regular expressions	K5
5.2	Character matching, Extracting Data, Escape Character	Illustrate and evaluate regular expression using escape character and extracting and matching data.	K5

5.3	Designing simple web browser using Sockets	Illustrate evaluate and create web browser using sockets	K5
5.4	Retrieving images using HTTP	Illustrate and evaluate images using HTTP	K5
5.5	Retrieving web pages using urllib	Illustrate and evaluate the web pages using urllib	K5
5.6	Reading binary files using Urllib	Interpret the binary files using urllib Build the real time application using python library	K5,K6

## MAPPING SCHEME ( CO, PO, PSO)

U18CS201	L-Low									M-Moderate				H-High			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4				
CO1	H	-	M	M	L	-	M	M	-	H	-		M				
CO2	H	-	M	M	M	-	-	-	-	H	-		M				
CO3	H	-	M	M	M	-	M	M	-	H	-		M				
CO4	H	-	M	M	M	-	-	-	-	H	-		H				
CO5	H	M	M	M	M	-	-	-	-	H	M	M	H				
CO6	H	H	H	H	H	M	-	-	-	H	M	M	H				

## 5. COURSE ASSESSMENT METHODS

### DIRECT:

1. Continuous Assessment Test: T1, T2 (Theory & Practical Components): Closed Book
2. Open Book Test.
3. Learning Report, Assignment, Group Presentation, Group Discussion, project Report, Field Visit Report, Poster Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

### INDIRECT:

1. Course end survey (Feedback).

**Name of the Course Coordinator: Prof. S. Maheswari**

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## EXPLORING DATA USING PYTHON LAB

**SEMESTER: II**  
**CREDITS : 2**

**CODE: U18CS2P2**  
**HOURS /WEEK: 3**

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### 1. COURSE OUTCOMES

S. No.	Course Outcomes	Level	Exercise No
CO1	Develop the python programming for data analysis using basic operations	K5	1-3
CO2	Design the python for date time module methods and operators	K5	4
CO3	Develop the python programming for solving the data analysis problems (sorting, removing duplicates)	K6	5-10
CO4	Develop the python programming to test for data analysis problems using list, tuples and dictionary.	K6	11-12
CO5	Design the applications for processing the text files	K6	13-14
CO6	Construct the database file CSV file and analysis that data.	K6	15

### 2. SYLLABUS

#### SIMPLE APPLICATIONS

**15**

- 1). Practice using the Python interpreter as a calculator:
  - A). The volume of a sphere with radius  $r$  is  $\frac{4}{3}\pi r^3$ . What is the volume of a sphere with radius 5?
  - B). Suppose, cover price of a book is INR 24.95, but a bookstore offers a 40% discount. Shipping costs INR 3.00 for the first copy and 75 Paise for each additional copy. What is the total wholesale cost for 60 copies?
  - C). If I leave my house at 6:52 am and run 1 km at an easy pace (8:15 per km), then 3 km at tempo (7:12 per km) and 1 km at easy pace again, what time do I get home for breakfast?
- 2). Develop an application to prompt for a score between 0.0 and 1.0. If the score is out of range, print an error message. If the score is between 0.0 and 1.0, print a grade using the following table:

Score	Grade	Score	Grade	Score	Grade	Score	Grade	Score	Grade
$\geq 0.9$	A	$\geq 0.8$	B	$\geq 0.7$	C	$\geq 0.6$	D	$< 0.6$	F

- 3). Develop an application that repeatedly reads numbers until the user enters “done”. Once “done” is entered, print out the total, count, and average of the numbers. If the user enters anything other than a number, detect their mistake using try and except and print an error message and skip to the next number.
- 4). The **datetime** module provides time objects that are similar to the Time objects, but they provide a rich set of methods and operators. Write a program that takes a birthday as input and prints the user’s age and the number of days, hours, minutes and seconds until their next birthday.
- 5). Given a list of strings, return the count of the number of strings where the string length is 2 or more and the first and last chars of the string are the same.
- 6). Develop a function front\_x(). Given a list of strings, return a list with the strings in sorted order, except group all the strings that begin with 'x' first. Eg. ['mix', 'xyz', 'apple', 'xanadu', 'aardvark'] yields ['xanadu', 'xyz', 'aardvark', 'apple', 'mix']. Hint: this can be done by making 2 lists and sorting each of them before combining them.
- 7). Develop a function sort\_last(). Given a list of non-empty tuples, return a list sorted in increasing order by the last element in each tuple. E.g. [(1, 7), (1, 3), (3, 4, 5), (2, 2)] yields [(2, 2), (1, 3), (3, 4, 5), (1, 7)]. Hint: use a custom key= function to extract the last element form each tuple.
- 8). Develop a function remove\_adjacent(). Given a list of numbers, return a list where all adjacent same elements have been reduced to a single element, so [1, 2, 2, 3] returns [1, 2, 3]. List [2, 2, 3, 3, 3] returns [2, 3]. List [ ] returns [ ]. You may create a new list or modify the passed in list.
- 9). Write a function verbing(). Given a string, if its length is at least 3, add 'ing' to its end. Unless it already ends in 'ing', in which case add 'ly' instead. If the string length is less than 3, leave it unchanged. Return the resulting string. So ‘hail’ yields: hailing; ‘swimming’ yields: swimmingly; ‘do’ yields: do.

- 10). Develop a function `not_bad()`. Given a string, find the first appearance of the substring 'not' and 'bad'. If the 'bad' follows the 'not', replace the whole 'not'...'bad' substring with 'good'. Return the resulting string. So 'This dinner is not that bad!' yields: This dinner is good!

## II. ADVANCED APPLICATIONS

15

- 11) Develop an application that prompts the user for a list of numbers and prints out the maximum and minimum of the numbers at the end when the user enters “done”. If the user enters anything other than a number, detect their mistake using try and except and print an error message and skip to the next number. The program should store the numbers the user enters in a list and use the `max()` and `min()` functions to compute the maximum and minimum numbers after the loop completes.
- 12) Develop an application that reads a file and prints the *letters* in decreasing order of frequency. Your program should convert all the input to lower case and only count the letters a-z. Your program should not count spaces, digits, punctuation, or anything other than the letters a-z. Also, print the top N (say N=10) words.
- 13) Develop an application to open the file (say, romeo.txt) and read it line by line. For each line, split the line into words using the *split* function. For each word, check to see if the word is already in a list. If the word is not in the list, add it to the list. When the program completes, sort and print the resulting words in alphabetical order.
- 14). Develop an application to read through the email data and when you find line that starts with “From”, you will split the line into words using the *split* function. We are interested in who sent the message, which is the second word on the From line.  
 From stephen.marquard@uct.ac.za Sat Jan 5 09:14:16 2008  
 You will parse the From line and print out the second word for each From line, then you will also count the number of From (not From:) lines and print out a count at the end.
- 15) Develop an application to look for lines of the form, (say, “New Revision: 39772”) and extract the number from each of the lines using a regular expression and the `findall()` method. Compute the average of the numbers and print out the average.

## 3. SPECIFIC LEARNING OUTCOMES (SLO)

EX. NO	CONTENT	Blooms Taxonomy Highest Level of Transaction																				
1.	Practice using the Python interpreter / Jupyter Notebook as a calculator: A. The volume of a sphere with radius $r$ is $4/3\pi r^3$ . B. What is the volume of a sphere with radius 5? Suppose cover price of a book is INR 24.95, but a bookstore offers a 40% discount. Shipping costs INR 3.00 for the first copy and 75 Paise for each additional copy. What is the total wholesale cost for 60 copies? If I leave my house at 6:52 am and run 1 km at an easy pace (8:15 per km), then 3 km at tempo (7:12 per km) and 1 km at easy pace again, what time do I get home for breakfast?	K5																				
2.	Develop an application to prompt for a score between 0.0 and 1.0. If the score is out of range, print an error message. If the score is between 0.0 and 1.0, print a grade using the following table: <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Score</th> <th>Grade</th> <th>Score</th> <th>Grade</th> <th>Score</th> <th>Grade</th> <th>Score</th> <th>Grade</th> <th>Score</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>&gt;= 0.9</td> <td>A</td> <td>&gt;= 0.8</td> <td>B</td> <td>&gt;= 0.7</td> <td>C</td> <td>&gt;= 0.6</td> <td>D</td> <td>&lt; 0.6</td> <td>F</td> </tr> </tbody> </table>	Score	Grade	Score	Grade	Score	Grade	Score	Grade	Score	Grade	>= 0.9	A	>= 0.8	B	>= 0.7	C	>= 0.6	D	< 0.6	F	K5
Score	Grade	Score	Grade	Score	Grade	Score	Grade	Score	Grade													
>= 0.9	A	>= 0.8	B	>= 0.7	C	>= 0.6	D	< 0.6	F													

3.	Develop an application that repeatedly reads numbers until the user enters “done”. Once “done” is entered, print out the total, count, and average of the numbers. If the user enters anything other than a number, detect their mistake using try and except and print an error message and skip to the next number.	K5
4.	The <b>datetime</b> module provides time objects that are similar to the given objects, but they provide a rich set of methods and operators.  Write a program that takes a birthday as input and prints the user’s tag and the number of days, hours, minutes and seconds until their birth.	K5
5.	Given a list of strings, return the count of the number of strings here the string length is 2 or more and the first and last chars of the string are the same.	K5
6.	Develop a Python function front_x(). Given a list of strings, return a list with the strings in sorted order, except group all the strings that begin with 'x' first. Eg. ['mix', 'xyz', 'apple', 'xanadu', 'aardvark'] yields ['aardvark', 'xyz', 'aardvark', 'apple', 'mix']. Hint: this can be done by king 2 lists and sorting each of them before combining them.	K5
7.	Develop a Python function sort_last(). Given a list of non-empty tuples, return a list sorted in increasing order by the last element in each tuple. E.g. [(1, 7), (1, 3), (3, 4, 5), (2, 2)] yields [(2, 2), (1, 3), (3, 4, 5), (1, 7)]. Hint: use a custom key= function to extract the last element form each tuple.	K5
8.	Develop a Python function remove_adjacent(). Given a list of numbers, return a list where all adjacent same elements have been reduced to a single element, so [1, 2, 2, 3] returns [1, 2, 3]. List [2, 2, 3, 3] returns [2, 3]. List [ ] returns [ ]. You may create a new list or identify the passed in list.	K5
9.	write a function verbing(). Given a string, if its length is at least 3, 'ing' to its end. Unless it already ends in 'ing', in which case add instead. If the string length is less than 3, leave it unchanged. turn the resulting string. So ‘hail’ yields: hailing; ‘swimming’ yields: immingly; ‘do’ yields: do.	K5
10.	Develop a function not_bad(). Given a string, find the first appearance of the substring 'not' and 'bad'. If the 'bad' follows the replace the whole 'not'...'bad' substring with 'good'. Return the resulting string. So 'This dinner is not that bad!' yields: This dinner is not bad!	K5
11.	Develop an application that prompts the user for a list of numbers and prints out the maximum and minimum of the numbers at the end when the user enters “done”. If the user enters anything other than a number, detect their mistake using try and except and print an error message and skip to the next number. The program should store the numbers the user enters in a list and use the max() and min() functions to compute the maximum and minimum numbers after the loop completes.	K5
12.	Develop an application that reads a file and prints the <i>letters</i> in decreasing order of frequency. Your program should convert all the input to lower case and only count the letters a-z. Your program should not count spaces, digits, punctuation, or anything other than the letters a-z. Also, print the top N (say N=10) words.	K5
13.	Develop an application to open the file (say, romeo.txt) and read it by line. For each line, split the line into words using the <i>split</i>	K6

	action. For each word, check to see if the word is already in a list. If the word is not in the list, add it to the list. When the program updates, sort and print the resulting words in alphabetical order.	
14.	Develop an application to read through the email data and when you find line that starts with "From", you will split the line into words using the split function. We are interested in who sent the message, which is the second word on the From line.  From stephen.marquard@uct.ac.za Sat Jan 5 09:14:16 2008 y You will parse the From line and print out the second word for each From line, then you will also count the number of From (not From:) lines and print out a count at the end.	K6
15.	Develop an application to look for lines of the form, (say, "New Revision: 39772") and extract the number from each of the lines using a regular expression and the findall() method. Compute the average of the numbers and print out the average.	K6

#### 4. MAPPING SCHEME( CO, PO, PSO)

**L-Low**

**M-Moderate**

**H- High**

U18CS2P2	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	H	M	M	M	L	L	-	-	M	H	-	L	M
CO2	H	M	M	M	M	L	-	-	M	H	-	L	M
CO3	H	H	M	M	M	M	-	-	M	H	-	M	M
CO4	H	H	M	M	M	M	-	-	M	H	-	H	H
CO5	H	M	M	M	M	M	-	-	M	H	M	H	H
CO6	H	H	H	H	H	M	-	-	M	H	M	H	H

#### 5. COURSE ASSESSMENT METHODS

##### DIRECT:

1. Continuous Assessment Test: T1, T2 (Practical Components): Closed Book
2. Cooperative Learning Report, Assignment, Group Discussion, project Report, Field Visit Report, Seminar.
3. Pre/Post Test, Viva, Report for each Exercise.
4. Lab Model Examination & End Semester Practical Examination

##### INDIRECT:

2. Course end survey (Feedback)

**Name of the Course Coordinator: Prof. S. Maheswari**

**1. COURSE OUTCOMES**

S. No.	Course Outcomes	Level	Ex. No.
CO1	Apply the text manipulation techniques like font style, font size, bullets, headers and footers	K4	1-2
CO2	Create and edit a table and apply table styles and formatting	K5	3-4
CO3	Practice the concept of Mail Merge	K5	5
CO4	Solve real-time problems like payroll calculation and grade calculation	K5	6-7
CO5	Design the and electricity bill generation	K6	8
CO6	Analyze the data using different charts like bar chart, pie chart, etc.	K5	9-10

**2. A. SYLLABUS**

1. Prepare a Bio-Data to apply for job in IT Company using the text manipulation techniques like font style, font size, bullets, footers and headers.
2. Create a mark sheet for 10 students containing the following fields: name, roll no., mark1, mark2 and mark3 and total.
3. Design an effective Class Time Table.
4. Create mathematical formulae.
5. Write a letter to invite your friends for a get together using Mail Merge option.
6. Tabulate a list of 10 students and grade them based on their seminar performance and then sort them according to their grades
7. Prepare a payroll for 10 employees of a company using the following details.
  - If the basic salary is between 15000 and 20000, then 20% of basic salary is given to HRA, 25% to DA, 12% to LIC and 15% to PF.
  - If the basic salary is less than 15000, then 25% is given to HRA, 30% to DA, 11% to LIC and 16% to PF.
  - If the basic salary is more than 20000, then 15 % is given to HRA, 40% to DA, 14% to LIC and 15% to PF Compute the GrossPay, Deductions and NetPay.

8. Prepare a Electricity Bill for the following table:

	1-500 Units	501-800 Units	>800 Units
House	6	8	11.50
Business Enterprise	9	12	17.50
Education Institution	7	10	13.25

Compute the amount to be paid to the Electricity Board.

9. Prepare a Bar chart for analyzing the admission of students in your college for the past five years.
10. Prepare a pie chart for scheduling your daily activities.



### 3. SPECIFIC LEARNING OUTCOMES

EXP NO	LEARNING OUTCOMES	Blooms Taxonomy Highest Level of Transaction																
1.	Prepare a Bio-Data to apply for job in IT Company using the text manipulation techniques like font style, font size, bullets, footers and headers.	K3																
2.	Create a mark sheet for 10 students containing the following fields: name, roll no., mark1, mark2 and mark3 and total.	K3																
3.	Design an effective Class Time Table.	K6																
4.	Create mathematical formulae.	K3																
5.	Write a letter to invite your friends for a get together using Mail Merge option.	K6																
6.	Tabulate a list of 10 students and grade them based on their seminar performance and then sort them according to their grades.	K5																
7.	Prepare a payroll for 10 employees of a company using the following details. <ul style="list-style-type: none"> <li>If the basic salary is between 15000 and 20000, then 20% of basic salary is given to HRA, 25% to DA, 12% to LIC and 15% to PF.</li> <li>If the basic salary is less than 15000, then 25% is given to HRA, 30% to DA, 11% to LIC and 16% to PF.</li> <li>If the basic salary is more than 20000, then 15 % is given to HRA, 40% to DA, 14% to LIC and 15% to PF</li> </ul> Compute the GrossPay, Deductions and NetPay.	K3																
8.	Prepare a Electricity Bill for the following table: <table border="1" style="margin-left: 40px;"> <thead> <tr> <th></th> <th>1-500 Units</th> <th>501-800 Units</th> <th></th> </tr> </thead> <tbody> <tr> <td>House</td> <td>6</td> <td>8</td> <td></td> </tr> <tr> <td>Business Enterprise</td> <td>9</td> <td>12</td> <td></td> </tr> <tr> <td>Education Institution</td> <td>7</td> <td>10</td> <td></td> </tr> </tbody> </table>		1-500 Units	501-800 Units		House	6	8		Business Enterprise	9	12		Education Institution	7	10		K3
	1-500 Units	501-800 Units																
House	6	8																
Business Enterprise	9	12																
Education Institution	7	10																
9.	Prepare a Bar chart for analyzing the admission of students in your college for the past five years	K4																
10.	Prepare a pie chart for scheduling your daily activities.	K4																

#### 4. MAPPING SCHEME (CO, PO & PSO)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	H	M	M	M	L	L	-	-	M	H	-	L	M
CO2	H	M	M	M	M	L	-	-	M	H	-	L	M
CO3	H	H	M	M	M	M	-	-	M	H	-	M	M
CO4	H	H	M	M	M	M	-	-	M	H	-	H	H
CO5	H	M	M	M	M	M	-	-	M	H	M	H	H
CO6	H	H	H	H	H	M	-	-	M	H	M	H	H

#### 5. COURSE ASSESSMENT METHOD

##### DIRECT:

1. Continuous Assessment Test: T1, T2 (Practical Components): Closed Book
2. Cooperative Learning Report, Assignment, Group Discussion, project Report, Field Visit Report, Seminar.
3. Pre/Post Test, Viva, Report for each Exercise.
4. Lab Model Examination & End Semester Practical Examination

##### INDIRECT:

1. Course end survey (Feedback)

Name of the Course Coordinator: Dr. M. Jayakkumar

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**CORE III: OBJECT ORIENTED SYSTEM DESIGN****SEMESTER: III**  
**CREDITS : 5****CODE: U18CS303**  
**HOURS /WEEK: 6**

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**1. COURSE OUTCOMES**

S.No.	Course Outcomes	Level	Unit
CO1	Apply the concepts of the variables, constants, arrays and operators for various problems	K5	1
CO2	Apply various input and output functions for getting values and displaying the result	K5	2
CO3	Explain the usage of control structures like decision statements and looping statements	K5	3
CO4	Analyze the user-defined and built-in functions for various modules	K6	4
CO5	Analyze the object oriented concepts like classes, objects, constructors and create the real time applications using inheritance	K6	5
CO6	Create GUI based applications through applets	K6	5

**3. A. SYLLABUS****Unit I : Java Fundamentals and decisions****15**

Parts of Java program, println and print methods, Escape sequences - Variables, literals and primitive data types - Arithmetic operators, expressions, precedence and evaluation of expressions - Type conversion, Math class, String class and comment statements - Reading keyboard input: Scanner class and its methods - Reading keyboard input: Message dialog box - Reading keyboard input: Input dialog box - Converting String inputs to numbers - Relational operators, if, if-else, if-else-if statements - Logical operators and its precedence, String comparison and Conditional operator.

**Unit II : Multi point selection and Loops****15**

Switch statement, String cases for switch statement - Arithmetic calculator application - Format specifications using printf method, Increment and decrement operators - While loop, indefinite loop, while loop for input validation - Do-while loop - For loop, variable declaration in for loop, multiple statements in initialization - Running totals and sentinels - Nested loops - Break and continue statement, Deciding which loop to use - Exception handling using try-catch-finally statements.

**Unit III : Methods and Arrays****15**

Method Definition: Void and value-returning methods, Calling a method, Method calling another method - Passing single argument to a method - Passing multiple arguments to a method, Passing object references to a method, Local variables - Defining and calling value returning method - Returning Boolean value, Returning a reference to an object - Problem solving with methods : Divide and conquer technique - Arrays: declaration, accessing elements, inputting and outputting array contents, Bounds checking, Array initialization - Processing array elements: Array length, Enhanced For loop, Copying arrays - Passing arrays as arguments, Returning arrays from methods, Array of objects - 2D arrays: Initialization, Displaying elements, Summing rows and columns, Passing 2D arrays to methods, Multi-dimensional arrays.

## Unit IV : Object Oriented Programming using Java

15

Objects, classes, Writing a simple class and its methods, Showing access specification in UML diagram - Instance variables and methods, Constructors, default constructor - Overloading methods and constructors - Static variables, Static methods - Passing objects as arguments to methods, Returning objects from methods – Aggregation - Inheritance: Generalization & specialization, IS-A relationship - Calling superclass constructor, Overriding superclass methods, Protected members - Abstract classes and abstract methods – Interfaces.

## Unit V : Data structures, Files and Applets

15

Stack - String Tokenizer, Hashtable - Writing data to file using PrintWriter class - Reading text and primitive data from file using Scanner's nextLine method - FileOutputStream and FileInputStream classes - FileWriter and FileReader classes - Creating and running Applets - Drawing Lines, Rectangles and Ovals in Applets - Drawing Arcs and Polygons in Applets - Playing Audio clips in Applets.

### B. TOPICS FOR SELF STUDY

S.No.	Topics	Web Links
1	Uml Class diagram	<a href="https://www.youtube.com/watch?v=UI6lqHOVHic">https://www.youtube.com/watch?v=UI6lqHOVHic</a>
2	Entity Diagram	<a href="https://www.youtube.com/watch?v=QpdhBUYk7Kk">https://www.youtube.com/watch?v=QpdhBUYk7Kk</a>
3	Sql Applications	<a href="https://www.youtube.com/watch?v=dPx1228_EYM">https://www.youtube.com/watch?v=dPx1228_EYM</a>
4	String Tokenizer	<a href="https://www.youtube.com/watch?v=goXyTvV1M40">https://www.youtube.com/watch?v=goXyTvV1M40</a>

### C. TEXT BOOK

1. Tony Gaddis. “*Starting out with Java: From control structures through objects*”, 5ed, Pearson, 2013

### D. REFERENCE BOOKS

1. Stuart Reges and Marty Stepp. “*Building Java programs: Back to basics approach*, 3ed, Pearson, 2014.
2. Robert Sedgewick and Kevin Wayne. “*Introduction to Programming in Java: An Interdisciplinary Approach*”, 1e, Pearson, 2014

### E. WEB LINKS

- <https://www.coursera.org/courses?query=advanced%20java>
- <https://www.learnvern.com/course/advanced-java-tutorial>
- <https://nareshit.in/advanced-java-training/>

### 3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit	Course Content	Learning outcomes	Blooms Taxonomy Level
I	Java Fundamentals and decisions		

1.1	Data types and Variables	1. Recall the different data types. 2. Create variable for real life entities(eg: age, height, weight)	[K1]
1.2	I/O Statements	1. Classify different types of Input functions to get a value of different data types of variables.(such as nextInt, nextFloat etc.,) 2. Apply print statements for both numeric and alphanumeric characters.	[K2,K3]
1.3	Operators	1. Categorize the different types of operators.	[K4]
1.4	Decision Statements	1. Construct alternative statements to find the biggest value of n values.	[K6]
1.5	Math Class	1. Apply various mathematical functions(eg: max, min, abs etc.,)	[K3]
1.6	String Class	1. List out the string functions 2. Apply various string functions(eg: length, toUpperCase, charAt etc.,)	[K3,K4]
<b>II</b>	<b>Multi point selection and Loops</b>		
2.1	Switch Statement	1. Constructs branches of conditions of a program. 2. Compare Switch statement and if-else statement.	[K3,K4]
2.2	Format specifications	Apply the format specification statement to get an output in various ways.(eg: System.out.printf) statement.	[K3]
2.3	Looping Statements	1. Compare different looping statements (such as For, while and Do.. while) 2. Categorize Different types of Looping 2. Apply looping statements for a continuous process.	[K2-K5]
2.4	Exception Handling	Apply exception handling statements to the debug process.	[K3]
<b>III</b>	<b>Methods and Arrays</b>		
3.1	Method	1. Recollect the syntax for define a function 2. Classify different types of functions 3. Examine calling and returning a function 4. Develop a function to swap two values	[K1-K6]
3.2	Variables	1. Contrast local and global variables	[K3]
3.3	Arrays	1. Explain Array variables 2. Illustrate memory allocation for arrays and accessing an array elements.	[K2,K3]
3.4	Problem Solving Methods	Apply divide and conquer techniques for solving real time complex problems.	[K3]
<b>IV</b>	<b>Object Oriented Programming using Java</b>		
4.1	Class and Object	1. Create a class and objects for an entity(eg: Human, Car etc.,) 2. Analyze the behavior of an object,Constructors	[K4-K6]

4.2	Static Variable and Methods	Create static variables and methods of a class.	[K6]
<b>V</b>	<b>Data structures, Files and Applets</b>		
5.1	String Tokenanizer	1.Summarize String Tokenanizer	[K2]
5.2	Stack	1.Apply the stack concepts and evaluate if the given expression is balanced or not.	[K3,K5]
5.3	Files	1. Apply various types of read and write streams to be used to get a value from the local directory. 2. Analyze the contents placed in the file.	[K3,K4]
5.4	Applets	Create a GUI using Applet controls.	[K6]

#### 4. MAPPING (CO, PO, PSO)

**L-Low**

**M-Moderate**

**H- High**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
<b>CO1</b>	H	M	M	M	L	L	-	-	M	H	-	L	M
<b>CO2</b>	H	M	M	M	M	L	-	-	M	H	-	L	M
<b>CO3</b>	H	H	M	M	M	M	-	-	M	H	-	M	M
<b>CO4</b>	H	H	M	M	M	M	-	-	M	H	-	H	H
<b>CO5</b>	H	M	M	M	H	M	-	-	M	H	M	H	H
<b>CO6</b>	H	H	H	H	H	M	-	-	M	H	M	H	H

#### 5. COURSE ASSESSMENT METHODS

##### **DIRECT:**

1. Continuous Assessment Test: T1, T2 (Theory & Practical Components): Closed Book
2. Open Book Test.
3. Cooperative Learning Report, Assignment, Group Presentation, Group Discussion, project report, Field Visit Report, Poster Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

##### **INDIRECT:**

- 1.Course end survey (Feedback)

**Name of the Course Coordinator: Prof. C. Linda Hepsiba**

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## Core Practical III: OBJECT ORIENTED SYSTEM DESIGN LAB

SEMESTER: III

CODE: U18CS3P3

CREDITS: 2

HOURS /WEEK: 3

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### 1. COURSE OUTCOMES

S. No.	Course Outcomes	Level	Exercise No.
CO1	Develop the applications for simple use-cases using preliminary concepts	K5	I: 1-7
CO2	Design the scientific calculator using the java operators	K6	II: 1
CO3	Develop the applications for employee roll and students' mark list	K6	II: 2:3
CO4	Develop the applications for matching the brackets	K6	II: 4
CO5	Design the applications for counting the words in text files	K6	II: 5
CO6	Develop an application with GUI by having Applets and Swing.	K6	II: 6

### 2. A. SYLLABUS

#### Part-I: Simple Applications

15

1. Read salaries (*double* values) of three employees and display the highest salary
2. Calculate the grade for a given mark of a student. Grade is A if mark  $\geq 80$ , B if mark in between 60 and 79, C if mark in between 40 and 59, F if mark less than 40)
3. Check an year leap or not
4. Print the multiplication table of order  $N \times N$
5. Generate the first  $n$  Prime numbers
6. Calculate Factorial of a given number
7. Create an array *temp* and read into this array 7 temperature values (in Celsius) of a city, representing the weather from Monday to Sunday and display which day was the hottest in that week.

#### Part-II: Advanced Applications

15

1)**Scientific Calculator:** Develop an application that performs the following operations.

- Addition, subtraction, multiplication, division and reminder
- $\sin(x)$ ,  $\cos(x)$ ,  $\tan(x)$
- $\log(x)$ ,  $e^x$ ,  $2^x$

**Note:** The application should repeatedly perform operations until a user quits the program, based on some condition (eg. operator == '#')

2)**Top Employee:** Develop an application that reads salaries of  $N$  employees in  $M$  departments and perform the following operations

- Display the average salary of each employee

- Display the top employee, the one whose average salary is the highest

**3) Students Mark List:** Create a class *Student* with *roll no*, *name* and 3 marks (say, *m1*, *m2*, *m3*). Create a *constructor* that assigns the values of roll no, name and 3 marks. Then, create a method *display()* that displays the rollno, name and 3 marks. Create another method *calculate\_result()* that prints the result as either “Pass” or “Fail”. The student has passed all exams if he secures at least 40 marks in each subject. Create a public class *Mark List* that instantiates *N* student objects by reading roll no, name and marks and displays the details and result of those students.

**4) Brackets Matcher:** Develop an application that reads a sequence of characters, and determines whether its parentheses, braces, and curly braces are balanced. (Hint: for left delimiters, push onto Stack; for right delimiters, pop from Stack and check whether popped element matches right delimiter).

**5) Word Counter:** Develop an application to read the contents of a large text file and count the occurrences of each word (Hint: use String Tokenizer to parse the file and Hashtable/ HashMap to store the words and their count, also use File Reader for reading the file contents).

**6) Smiley face Applet:** Create an applet that will display 3 smiley faces in three different colors.

### 3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Blooms Taxonomy Level
<b>I</b>	<b>Part -1 Simple Applications</b>	
1	Read salaries (double values) of three employees and display the highest salary	K6
2	Calculate the grade for a given mark of a student. Grade is A if mark $\geq 80$ , B if mark in between 60 and 79, C if mark in between 40 and 59, F if mark less than 40)	K6
3	Check an year leap or not	K6
4	Print the multiplication table of order <b>N x N</b>	K6
5	Generate the first <b>n</b> Prime numbers	K6
6	Calculate Factorial of a given number	K6
7	Create an array <b>temp</b> and read into this array 7 temperature values (in Celsius) of a city, representing the weather from Monday to Sunday and display which day was the hottest in that week	K6
	<b>Part-II: Advanced Applications</b>	
1	<b>Scientific Calculator:</b> Develop an application that performs the following operations. <ul style="list-style-type: none"> <li>• Addition, subtraction, multiplication, division and reminder</li> <li>• Sin(x), Cos(x), Tan(x)</li> <li>• Log(x), <math>e^x</math>, <math>2^x</math></li> </ul> <b>Note:</b> The application should repeatedly perform operations until a user quits the program, based on some condition (eg. operator == '#')	K6
2	<b>Top Employee:</b> Develop an application that reads salaries of N employees in M departments and perform the following operations	K6



	<ul style="list-style-type: none"> <li>• Display the average salary of each employee</li> <li>• Display the top employee, the one whose average salary is the highest</li> </ul>	
3	<b>Students Mark List:</b> Create a class Student with roll no, name and 3 marks (say, m1, m2, m3). Create a constructor that assigns the values of roll no, name and 3 marks. Then, create a method <b>display</b> ( ) that displays the roll no, name and 3 marks. Create another method <b>calculate_result</b> ( ) that prints the result as either “Pass” or “Fail”. The student has passed all exams if he secures at least 40 marks in each subject. Create a public class Mark List that instantiates N student objects by reading roll no, name and marks and displays the details and result of those students.	K6
4	<b>Brackets Matcher:</b> Develop an application that reads a sequence of characters, and determines whether its parentheses, braces, and curly braces are balanced. (Hint: for left delimiters, push onto Stack; for right delimiters, pop from Stack and check whether popped element matches right delimiter).	K6
5	<b>Word Counter:</b> Develop an application to read the contents of a large text file and count the occurrences of each word (Hint: use String Tokenizer to parse the file and Hash table/Hash Map to store the words and their count, also use File Reader for reading the file contents).	K6
6	<b>Smiley face Applet:</b> Create an applet that will display 3 smiley faces in three different colors.	K6

#### 4. MAPPING (CO, PO, PSO)

	L-Low			M-Moderate					H- High				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	H	M	M	M	L	L	-	-	M	H	-	L	M
CO2	H	M	M	M	M	L	-	-	M	H	-	L	M
CO3	H	H	M	M	M	M	-	-	M	H	-	M	M
CO4	H	H	M	M	M	M	-	-	M	H	-	H	H
CO5	H	M	M	M	H	M	-	-	M	H	M	H	H
CO6	H	H	H	H	H	M	-	-	M	H	M	H	H

#### 5. COURSE ASSESSMENT METHODS

##### DIRECT:

1. Continuous Assessment Test: T1, T2 (Theory & Practical Components): Closed Book
2. Open Book Test.
3. Cooperative Learning Report, Assignment, Group Presentation, Group Discussion, project report, Field Visit Report, Poster Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

##### INDIRECT:

1. Course end survey (Feedback)

**Name of the Course Coordinator: Dr. C. Linda Hepsiba**

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**Core IV: DATABASE DESIGN****SEMESTER: IV****CREDIT:5****CODE:U18CS404****HOURS /WEEK: 6**

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**1. COURSE OUTCOMES**

S. No.	Course Outcomes	Level	Unit
CO1	Design the SQL Queries for selecting and sorting the data from table	K6	1
CO2	Design the SQL sub queries using Join, view and index for table	K6	2
CO3	Apply the DB system development life cycle to business problems	K5	3
CO4	Build the table to create, modify data into table and remove data from the table.	K6	4
CO5	Access the ER diagram for representing conceptual data model.	K5	4
CO6	Adapt the ideas of normalization to handle different kinds of forms	K5	5

**2. A. SYLLABUS****Unit I: Introduction and Structured Query Language Part-I****15**

Physical file based system versus database system approaches – DBMS: terminologies, components, roles, advantages and disadvantages – Database architectures: teleprocessing, file server, 2-tier, 3-tier, N-tier, middleware and Transaction processing monitor – Software components of DBMS and Database Manager – Objectives of SQL and BNF notation to define SQL statements – SELECT statement to retrieve all rows – Selecting rows using WHERE clause – Sorting result using ORDERBY clause – SQL aggregate functions – Grouping results using GROUPBY clause and HAVING clause.

**Unit II: Structured Query Language Part-II****15**

Designing Sub Queries – Using keywords ANY and ALL – JOIN – inner and outer joins for joining relations – EXISTS and NON EXISTS keywords – Combining results of queries using UNION, INTERSECT and EXCEPT – Updating databases using INSERT, UPDATE and DELETE – SQL data types and Integrity control – Creating, altering and removing tables – Indexes: CREATE and REMOVE. Views: CREATE and REMOVE

**Unit III: DBS development life cycle and ER modeling****15**

DBS development lifecycle stages and their activities – DBS development: Requirements analysis – DBS development: Database design – DBS development: DBMS selection and Application design – ER diagram: Entity types and relationship types – Attributes types and keys of ER diagram – Strong and weak entity types; attributes on relationships – Relationship types: One-to-one, One-to-many, Many-to-many – N-ary relationships, cardinality and participation concepts – Connection traps.

**Unit IV: Normalization and Conceptual DB design****15**

Purpose of normalization and its support for DB design – Update anomalies: problems related to redundant data – Functional dependencies: characteristics and identification – Normalizations: 1NF, 2NF and 3NF –

Normalization Example – Overview of DB Design Methodology – Conceptual DB Design Methodology: building conceptual data model (ie. ER diagram) – Identifying entity types, relationship types and attribute types – Determining domain and key attributes (candidate, primary and alternate) – Checking for redundancy, validating ER diagram and reviewing ER diagram with users.

## Unit V: Logical Database design

15

Logical DB Design Methodology: building logical data model (ie. Relational schema) – Creating relations: for strong entity types and weak entity types – Creating relations: for 1-M binary, 1-1 Binary and 1-1 Recursive relationships – Creating relations: Super class/sub class relationship types – Creating relations: for M-M Binary relationships – Creating relations: for complex relationship types and multi valued attributes – Validating relations using normalization – Checking integrity constraints – Reviewing logical data model with user – Merging logical data models into global model.

### B. TOPICS FOR SELF STUDY

S. No.	Topics	Web Links
1	DBMS QB	<a href="https://www.youtube.com/watch?v=ztHopE5Wnpc">https://www.youtube.com/watch?v=ztHopE5Wnpc</a>
2	System Design	<a href="https://www.youtube.com/watch?v=KmAyPUv9gOY">https://www.youtube.com/watch?v=KmAyPUv9gOY</a>
3	Message Queue	<a href="https://www.youtube.com/watch?v=oUJbuFMxBDk">https://www.youtube.com/watch?v=oUJbuFMxBDk</a>
4	Binary Relationship	<a href="https://www.youtube.com/watch?v=xmDYjXAEi1w">https://www.youtube.com/watch?v=xmDYjXAEi1w</a>

### C. TEXT BOOK

1. Thomas M. Connolly and Carolyn E. Begg. Database Systems: “*A Practical Approach to Design, Implementation, and Management*”, 6th Edition, Pearson, 2015. (Chapters 1, 3.1, 3.6, 6, 7, 10, 12, 14, 16, 17 only)

### D. REFERENCES BOOKS

1. Hoffer, J. A., Venkataraman, R., and Topi, H. “*Modern database management*” (12th ed.), Pearson, 2016.
2. Coronel, Morris and Rob. “*Database Systems: Design, Implementation and Management*”, 12<sup>th</sup>ed, Cengage Learning, 2017.

### E. WEB LINKS

- <https://www.edx.org/course/advanced-database-administration>
- <https://www.udemy.com/course/introduction-to-databases-and-sql-querying/>
- <https://www.mygreatlearning.com/academy/learn-for-free/courses/database-management-systems-dbms>

### 3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit	Topics	Unit Learning Outcomes	Level
I	Introduction and Structured Query Language Part-I		
1.1	Physical file based system versus database system approaches	Compare between file based system and database system	K2

1.2	DBMS: terminologies, components, roles, advantages and disadvantages	1. Identify the terminologies of DBMS 2. List the roles of database 3. Summarize the advantages of DBMS	[K1-K3]
1.3	Database architectures: teleprocessing, file server, 2-tier, 3-tier, N-tier, middleware and Transaction processing monitor -- Software components of DBMS and Database Manager	- Build the architecture of database - Classify the software components	[K2, K3]
1.4	Objectives of SQL and BNF notation to define SQL statement	Define the SQL statements - Make use of BNF notation	K3
1.5	SELECT statement to retrieve all rows	- How to retrieve all rows using select statements - Apply where clause for selecting rows	K5
1.6	Sorting result using ORDERBY clause – Grouping results using GROUPBY clause and HAVING clause	- Create orderby clause for sort the values - Create groupby clause for group the values	K3
1.7	SQL aggregate functions	Analyze the various aggregate functions	K4
<b>II</b>	<b>Structured Query Language Part-II</b>		
2.1	Designing Sub Queries – Using keywords ANY and ALL	- Build a sub queries Compare the queries any and all	K4
2.2	JOIN – inner and outer joins for joining relations – EXISTS and NON EXISTS keywords	Apply the join queries	K3
2.3	Combining results of queries using UNION, INTERSECT and EXCEPT – Updating databases using INSERT, UPDATE and DELETE	- Combine the queries - Apply the union, intersect and except in queries - Modify the database	K4
2.4	SQL data types and Integrity control – Creating, altering and removing tables	- Recall data type and integrity control - Changing and deleting the tables	K4
2.5	Indexes: CREATE and REMOVE. Views: CREATE and REMOVE	- Apply index and view - Create and remove the index and view	K5
<b>III</b>	<b>DBS development life cycle and ER modeling</b>		
3.1	DBS development lifecycle stages and their activities – DBS development: Requirements analysis	- Recall the life cycle stages - Apply life cycle activities - Analyze the DBS development	K4
3.2	DBS development: DBMS selection and Application design	- Define DBS development - Choose the DBMS design - Apply the database design	K3
3.3	ER diagram: Entity types and relationship types – Attributes types and keys of ER diagram	- List the entity types - Develop the ER diagram - Explain the ER diagram	K5
3.4	Strong and weak entity types	Identify the strong and weak entity types	K3
3.5	Relationship types: One-to-one, One-to-many, Many-to-many – N-ary relationships, cardinality and participation concepts	- Explain the relationship types - Organize the relationship Analyze the relationship with participation concept	K4
3.6	Connection traps	- Create a connection traps	K4
<b>IV</b>	<b>Normalization and Conceptual DB design</b>		

4.1	Purpose of normalization and its support for DB design	1.Explain normalization 2. Apply normalization in DB	K1,K3
4.2	Update anomalies: problems related to redundant data	Modify anomalies	K5
4.3	Functional dependencies: characteristics and identification	-Identify the functional dependencies	K4
4.4	Normalizations: 1NF, 2NF and 3NF – Normalization Example	Classify normalization -Relate normal forms -Select the correct normal forms	K4
4.5	Overview of DB Design Methodology – Conceptual DB Design Methodology: building conceptual data model	Build the conceptual data model  Explain the DB methodology	K4
4.6	Identifying entity types, relationship types and attribute types Determining domain and key attributes	1.Identify the ER Type 2.Relate entity types and relationship type 3.Categorize the attribute types 4.Determine the domain and key attributes	K1-K5
4.7	– Checking for redundancy, validating ER diagram and reviewing ER diagram with users.	-Test the redundancy -Evaluate ER diagram	K5
<b>V</b>	<b>Logical Database design</b>		
5.1	Logical DB Design Methodology: building logical data model	Build the logical model	K4
5.2	– Creating relations: for strong entity types and weak entity types	Create relations for entity types	K5
5.3	Creating relations: for 1-M binary, 1-1 Binary and 1-1 Recursive relationships	Create relations for binary and recursive relationship	K5
5.4	Creating relations: Super class/sub class relationship types	Create relations for super and sub class	K5
5.5	Creating relations: for M-M Binary relationships – Creating relations: for complex relationship types and multi valued attributes	Create relations for multi valued attributes	K5
5.6	Validating relations using normalization – Checking integrity constraints	-Test the integrity constraint -validate the relations	K5
5.7	Reviewing logical data model with user – Merging logical data models into global model	Combine the logical model into global model	K5

#### 4. MAPPING SCHEME (CO, PO, PSO)

**L-Low**

**M-Moderate**

**H- High**

U18CS404	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	H	M	M	M	L	L	-	-	M	H	-	L	M
CO2	H	M	M	M	M	L	-	-	M	H	-	L	M
CO3	H	H	M	M	M	M	-	-	M	H	-	M	M
CO4	H	H	M	M	M	M	-	-	M	H	-	H	H
CO5	H	M	M	M	H	M	-	-	M	H	M	H	H
CO6	H	H	H	H	H	M	-	-	M	H	M	H	H

## **5. COURSE ASSESSMENT METHODS**

### **DIRECT:**

1. Continuous Assessment Test: T1, T2 (Theory & Practical Components): Closed Book
2. Open Book Test.
3. Cooperative Learning Report, Assignment, Group Presentation, Group Discussion, project report, Field Visit Report, Poster Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

### **INDIRECT:**

1. Course end survey (Feedback)

**Name of the Course Coordinator : R. Cynthia Monica Priya**

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**DATABASE DESIGN LAB**

**SEMESTER: 4**  
**CREDITS: 2**

**COURSE CODE: U18CS4P4**  
**HOURS /WEEK: 3**

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**1. COURSE OUTCOMES**

S. No.	COURSE OUTCOMES	LEVEL	EX. NO.
CO1	Define the basic DDL commands(CREATE ALTER, DROP, TRUNCATE, COMMIT, ROLLBACK and RENAME) in RDBMS	K5	1
CO2	Build the commands of DML and DCL(INSERT, UPDATE, DELETE, MERGE, LOCK, grant and revoke) the table value in RDBMS	K5	2-3
CO3	Create the Cursors, Procedures and Triggers for Database	K6	4-6
CO4	Demonstrate the different kind of embedded systems in SQL.	K5	7
CO5	Create Student information system such as rollno, name, class, mark, total, average and grade and implement in SQL form builder	K5	8
CO6	Develop Employee pay roll processing system and Banking System in sql form builder	K5	9-10

**2. SYLLABUS**

1. DDL commands in RDBMS.
2. DML and DCL commands in RDBMS Part-I.
3. DML and DCL commands in RDBMS Part-II.
4. High level language extensions with cursers.
5. High level language extensions with triggers.
6. Procedures and triggers.
7. Embedded SQL.
8. Design and implementation of Student information system.
9. Design and implementation of Employee pay roll processing system.
10. Design and implementation of Banking system.

**3. SPECIFIC LEARNING OUTCOMES (SLO)**

Ex. No	Title of the Exercises	Level
1.	DDL commands in RDBMS	K1
2.	DML and DCL commands in RDBMS Part-I.	K3
3.	DML and DCL commands in RDBMS Part-II.	K3
4.	High level language extensions with cursers	K3

5.	High level language extensions with triggers	K3
6.	Procedures and triggers	K3
7.	Embedded SQL	K2
8.	Design and implementation of Student information system	K6
9.	Design and implementation of Employee pay roll processing system.	K6
10.	Design and implementation of Banking system	K6

#### 4. MAPPING (CO, PO, PSO)

**L-Low**

**M-Moderate**

**H- High**

U18CS4P4	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	H	M	M	M	L	L	-	-	M	H	-	L	M
CO2	H	M	M	M	M	L	-	-	M	H	-	L	M
CO3	H	H	M	M	M	M	-	-	M	H	-	M	M
CO4	H	H	M	M	M	M	-	-	M	H	-	H	H
CO5	H	M	M	M	H	M	-	-	M	H	M	H	H
CO6	H	H	H	H	H	M	-	-	M	H	M	H	H

#### 5. COURSE ASSESSMENT METHODS

##### **DIRECT:**

1. Continuous Assessment Test: T1, T2 (Practical Components): Closed Book
2. Cooperative Learning Report, Assignment, Group Discussion, project Report, Field Visit Report, Seminar.
3. Pre/Post Test, Viva, Report for each Exercise.
4. Lab Model Examination & End Semester Practical Examination

##### **INDIRECT:**

1. Course end survey (Feedback)

**Name of Course Coordinator: Dr. R. Cynthia Monica Priya**



**1. COURSE OUTCOMES**

S. No.	Course Outcomes	Level	Unit
1	Understand different Computer Peripherals	K4	1
2	Understand and apply different Hardware components	K5	2
3.	Demonstrate about the Software and Operating System	K4	3
4	Develop a product or process by applying knowledge of programming, web, database, human computer interaction	K6	3
5	Learn WWW & Browsers	K5	4
6	Learn E-Commerce architectures and applications.	K5	5

**2. A. SYLLABUS**

**UNIT – I** **6**

Introduction to computers – Classification of computers – Central Processing Unit (CPU).

**UNIT – II** **6**

Computer Memory – Secondary storage devices: - Introduction – Classification of secondary storage devices – Advantages – Magnetic Disks – Optical Disk – Magnetic Tape. Input Devices and Technologies: - Introduction – Keyboard – Mouse – TrackBall-Game controllers – Scanners – Barcode Reader – OCR – Digitizer – Voice Recognition – Web Cams – Digital Cameras – Video Cameras (Camcorders).

**UNIT - III** **6**

Output devices and technologies: - Introduction – Monitor – Printer – Plotter. Computer Software :- Introduction – What is computer software?-Hardware/Software interaction – Software categories – Classification of software – Operating systems – Utilities Compilers and Interpreters – Word processors – Spread sheets – Presentation – Database Management Systems (DBMS)-Image processors.

**UNIT – IV** **6**

Internet and www:- Introduction – Evolution of Internet – What can I do on the Internet? – Internet protocols – Internet addressing – The World Wide Web (www) – Web pages and HTML – Web browsers – Searching the web-Internet code of conduct.

**UNIT -V** **6**

E-Commerce – I: Introduction – Definition – Evolution – Types – Business-to-Business (B2B) E-Commerce Business-to-Consumer (B2C) E-Commerce Benefits of E Commerce for companies – Benefits of E-Commerce for customers. E-Commerce – II: E-Money Types of E-Money and E-Money Systems – Digital cash and E-Cash Credit Cards-Debit cards – Smart Cards – Benefits of E-Money – Credit Cards and Credit Card processing – Legal issues of E-Commerce – Ethical issues of E-Commerce.

**B. TOPICS FOR SELF STUDY**

S.No.	Topics	Web Links
1	Hardware and Software	<a href="https://www.youtube.com/watch?v=8UyJMiYqvs4">https://www.youtube.com/watch?v=8UyJMiYqvs4</a>
2	Servers	<a href="https://www.youtube.com/watch?v=UjCDWCeHCzY">https://www.youtube.com/watch?v=UjCDWCeHCzY</a>
3	Hub,Switch, Router	<a href="https://www.youtube.com/watch?v=1z0ULvg_pW8">https://www.youtube.com/watch?v=1z0ULvg_pW8</a>
4	OCR Digitizer	<a href="https://www.youtube.com/watch?v=AFyadsRkw64">https://www.youtube.com/watch?v=AFyadsRkw64</a>

**C. TEXT BOOK**

1. *“Introduction to Information Technology”* – By P.Rizwan Ahmed, Margham Publications, 2014.

**D. REFERENCE BOOKS**

1. **“Introduction to Computer Science”**– ITL Education Solutions Ltd., Pearson – 2nd Edition- 2013(Units I,II,III,IV)
2. **“Doing Business on the Internet e-commerce”** By S.Jaiswal, Galgotia Publications Pvt., Ltd., 2010(Unit V)

#### E. Web Links

- <https://www.nielit.gov.in/content/basic-computer-course-bcc>
- <https://www.acmecollinsschool.com/basic-computer-course.html>
- [https://www.cdac.in/index.aspx?id=edu\\_pace\\_ccrs](https://www.cdac.in/index.aspx?id=edu_pace_ccrs)

### 3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning outcomes	Blooms Taxonomy Level of Transaction
I	Introduction to computers – Classification of computers - Central Processing Unit (CPU).	<ol style="list-style-type: none"> <li>1) Explain CPU in detail</li> <li>2) Describe the classification of Computers</li> </ol>	K2
II	Computer Memory – Secondary storage devices: - Introduction – Classification of secondary storage devices – Advantages – Magnetic Disks – Optical Disk – Magnetic Tape. Input Devices and Technologies.	<ol style="list-style-type: none"> <li>1) Classify Secondary storage devices</li> <li>2) Explain the advantages of computer memory</li> <li>3) Explain the input devices in detail</li> </ol>	K3
III	Output devices and technologies: - Introduction – Monitor – Printer – Plotter. Computer Software :- Introduction – What is computer software?-Hardware/Software interaction – Software categories – Classification of software	<ol style="list-style-type: none"> <li>1) Describe Printer in detail</li> <li>2) Define Computer Software</li> <li>3) Describe the classification of software</li> </ol>	K3
	Operating systems – Utilities Compilers and Interpreters – Word processors – Spread sheets – Presentation – Database Management Systems (DBMS)-Image processors.	<ol style="list-style-type: none"> <li>1) Describe OS</li> <li>2) Explain utilities of compilers</li> <li>3) Define DBMS</li> <li>4) What do you mean by image processor</li> </ol>	
IV	Internet and www -Introduction – Evolution of Internet – What can I do on the Internet? – Internet protocols – Internet addressing	<ol style="list-style-type: none"> <li>1) What is WWW</li> <li>2) Define Web pages</li> <li>3) Define Internet</li> </ol>	K4
	The World Wide Web (www) – Web pages and HTML – Web browsers – Searching the web-Internet code of conduct.		
V	E-Commerce – I: Introduction – Definition – Evolution – Types – Business-to-Business (B2B) E-Commerce Business-to-Consumer (B2C) E-Commerce Benefits of E Commerce for companies – Benefits of E-Commerce for customers.	<ol style="list-style-type: none"> <li>1) Define types of ecommerce</li> <li>2) Define B2B</li> <li>3) Explain Business to Consumer</li> <li>4) Explain Benefits of Commerce</li> </ol>	K4
	E-Commerce – II: E-Money Types of E-Money and E-Money Systems – Digital cash and E-Cash Credit Cards-Debit cards – Smart	<ol style="list-style-type: none"> <li>1) Define E money</li> <li>2) Explain E money system</li> <li>3) Describe Digital cash and e cash</li> </ol>	

	Cards – Benefits of E-Money – Credit Cards and Credit Card processing – Legal issues of E-Commerce – Ethical issues of E-Commerce.	4) Explain Credit card system 5) Describe the legal issues of ecommerce	
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#### 4. MAPPING (CO, PO, PSO)

U18CS4E2	L-Low			M-Moderate						H- High			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	H	M	M	M	L	L	-	-	M	H	-	L	M
CO2	H	M	M	M	M	L	-	-	M	H	-	L	M
CO3	H	H	M	M	M	M	-	-	M	H	-	M	M
CO4	H	H	M	M	M	M	-	-	M	H	-	H	H
CO5	H	M	M	M	H	M	H	H	M	H	M	H	H
CO6	H	H	H	H	H	M	M	M	M	H	M	H	H

#### 5. COURSE ASSESSMENT METHODS

##### DIRECT:

1. Continuous Assessment Test: T1, T2 (Theory & Practical Components): Closed Book
2. Open Book Test.
3. Cooperative Learning Report, Assignment, Group Presentation, Group Discussion, project Report, Field Visit Report, Poster Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

##### INDIRECT:

1. Course end survey (Feedback)

**Name of the Course Coordinator : Dr. S. Sophia**

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**Core V: Database – Driven Web Design****SEMESTER: V****CODE: U18CS505****CREDITS: 5****HOURS /WEEK: 5**

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**1. COURSE OUTCOMES**

On successful completion of this course, students will be able to:

S. No.	Course Outcomes	Level	Unit
CO1	Illustrate the components of HTML, CSS, Javascript and PHP in Web design.	K4	1
CO2	Categorize appropriate PHP functions and OOP concepts while coding.	K5	2
CO3	Distinguish MYSQL queries for the given problem statement and establish DB connection	K4	3
CO4	Access MYSQL using PHP.	K6	3
CO5	Validate the user inputs, identify user and track session using cookies and session.	K5	4
CO6	Design a website deploying the features of PHP and MYSQL.	K5	5

**2. A. SYLLABUS****Unit I: Fundamentals of PHP**

The structure of PHP, Basic syntax of PHP, Incorporating PHP within HTML - Using Comments, Variables, Variable Assignment - Operators, Multiple line commands - Constants, Predefined constants, The echo and print statements, variable scope – Functions - Expressions, Literals and Variables - Operator Precedence with Examples - Associativity, Relational Operators - Conditionals – ((if,else ..)- check minimum bank balance example)(switch – Menu selection example) - Looping (example for all loops – multiplication tables).

**Unit II: PHP Functions and OOP**

Define Function, Return types(Values, array) - Return global variables, variable scope - Include Statement, Using - (include once, require – once) - OOP – Declaring class, objects - Accessing objects, cloning objects, constructors, Destructor - Methods, Declaring constants - Inheritance - Arrays, For each loop, Accessing array elements - Using Array function - File Handling.

**Unit III: MYSQL Basics**

Database terms, Accessing MYSQL via command line - MYSQL commands – Datatypes – Indexes - Querying MYSQL database - Joining Tables - Using logical operators - MYSQL Functions - Simple example: Student details - Accessing MYSQL via PHPMYADMIN.

**Unit IV: Accessing MYSQL using PHP**

Querying MYSQL database through PHP - The \$\_POST array - Table Processing (Create, describe, drop,..) - Data Manipulation through PHP (Insert, update, select, delete), Using AUTO\_INCREMENT - Simple Example: - Employee details - Performing additional queries - Using Mysqli procedurally - Form Handling: Building forms, Retrieving submitted data - Register globals, Default values, input types, sanitizing input - Example program: program to convert values between Fahrenheit to Celsius.

**Unit V: Cookies, Sessions, Authentication and Validation**

Using cookies in PHP - HTTP Authentication - Using Sessions - Validating user Input - Regular Expression, Matching through metacharacters, fuzzy character matching, grouping - Character classes, Indicating range, Negation - General Modifiers - Simple example: Tracking user session in

online store, login validation - Using regular expression in PHP - Redisplaying a form after PHP validation.

## B. TOPICS FOR SELF-STUDY

S.No.	Topics	Web Links
1	Angular JS	<a href="https://www.coursera.org/courses?query=angularjs">https://www.coursera.org/courses?query=angularjs</a>
2	Node JS	<a href="https://www.coursera.org/courses?query=node%20js">https://www.coursera.org/courses?query=node%20js</a>
3	React JS	<a href="https://reactjs.org/community/courses.html">https://reactjs.org/community/courses.html</a>

## C. TEXT BOOKS

1. “Learning PHP, MySQL & JavaScript With jQuery, CSS & HTML5”, by Robin Nixon, December 2014: Fourth Edition, Copyright © 2015 Robin Nixon. All rights reserved. Published by O’Reilly Media, Inc.

## D. REFERENCES

1. “PHP: The Complete Reference”, Steven Holzner, Publisher: Mc Graw-Hill, 1st Edition, 2007.
2. “PHP and MySQL Web Development” (4th Edition), Luke Welling, Laura Thomson Copyright © 2009, Pearson Education, Inc

## E. WEB LINKS

- <https://www.w3schools.com/php/>
- <https://www.tutorialspoint.com/php/index.htm>
- <https://www.javatpoint.com/php-tutorial>

## 3. SPECIFIC LEARNING OUTCOMES

Unit	Topics	Unit Learning Outcomes	Level
<b>By the end of each topic of a unit, students will be able to</b>			
I	<b>Fundamentals of PHP</b>		
	The structure of PHP, Basic syntax of PHP	Explain the basic structure and Define the syntax	K2
	Incorporating PHP within HTML	Demonstrate the integration process of PHP within HTML	K3
	Using Comments, Variables, Variable Assignment, Expressions, Literals and Variables	Practice different types of comments, identify Expressions, Literals, Variables and assign values to variables.	K5
	Operators, Multiple line commands	Use suitable operators for simple programs with multiple line commands	K3
	Constants, Predefined constants	Distinguish user defined and Predefined constants	K2
	Echo, print statements	Differentiate echo and print statements	K2
	Variable scope	Identify the scope of a variable	K2
	Functions	Define <i>functions</i> to separate out sections of code that perform a particular task.	K2

	Operator Precedence with Examples, Associativity, Relational Operators	Use operators based on their precedence and their associativity.	K3
	Conditionals – ((if,else ..), Looping	Apply conditionals and loops in programs.	K3
II	<b>PHP Functions and OOP</b>		
	Define Function	Create user defined functions and select predefined functions for the given problems.	K5
	Return types(Values, array)	Categorize the return types in functions	K4
	Return global variables	Discriminate global variables	K2
	Variable scope	Declare variables based on their scope	K3
	Include Statement, Using - (include once, require – once)	Differentiate include once and require once statements	K2
	OOP concepts	Apply OOP concepts in given problems.	K5
	Declaring class, objects	Declare class and define objects in programs.	K3
	Accessing objects, cloning objects, constructors, Destructor	Access the defined class using objects, define user defined constructor, and destructor.	K4
	Methods, Declaring constants	Write methods for the given problem with constants	K5
	Inheritance	Create programs with different types of inheritance for the given problems.	K4
	Arrays, For each loop	Include arrays for the given problem and define foreach loop	K3
	Accessing array elements	Access array elements using foreach loop	K5
	Using Array function	Manipulate arrays using different array functions	K5
	File Handling	Use file handling functions to create file, read file line by line, read file character by character, write file, append file, delete file and close file	K5
III	<b>MYSQL Basics</b>		
	Database terms	Explain and identify database terms	K2
	Accessing MYSQL via command line	Access MYSQL database through command line	K5
	MYSQL commands	Issue a wide range of commands from the mysql command-prompt to the database server such as creating and deleting databases and tables, searching for data, adding new rows and much more.	K5
	Datatypes, Indexes	Use MySQL data types effectively in designing databases in MySQL.	K5

		Create and use Indexes to find rows with specific column values quickly.	
	Querying MYSQL database	Write queries to interact with database tables to work around with data	K5
	Joining Tables	Apply various MySQL join clauses in the SELECT statement to retrieve data from two or more tables based on a related column between them.	K5
	Using logical operators	Access data in the database using more than one condition in WHERE clause using different logical operators.	K5
	MYSQL Functions	Categorize MYSQL functions and apply appropriately to acquire the enhanced capabilities of MYSQL	K3
	Accessing MYSQL via PHPMYADMIN	Establish Connection with MYSQL through the user friendly PHPMYADMIN which makes it easy to handle the database.	K6
<b>IV</b>	<b>Accessing MYSQL using PHP</b>		
	Querying MYSQL database through PHP	Use PHP to query MySQL database by entering the MySQL query command in the PHP script or define the command as a variable and use the variable when needed.	K5
	The \$_POST array	Use \$_POST to collect form data after submitting an HTML form with method="post".	K3
	Table Processing (Create, describe, drop,..)	Process tables in the database	K4
	Data Manipulation through PHP (Insert, update, select, delete)	Manipulate the stored data in the database through PHP based on the given problem.	K5
	Using AUTO_INCREMENT	Use MySQL's Auto increment feature to generate primary key	K3
	Performing additional queries	Develop the ability to perform additional queries other than common queries to access database.	K3
	Using Mysqli procedurally	Categorize the mysqli() functions and use to create queries for the given problem.	K3
	Form Handling: Building forms, Retrieving submitted data	Create forms to get user input and retrieve the submitted data for processing.	K6
	Register globals, Default values, input types, sanitizing input	Create forms with disabled register globals for security issues, set default values, and use appropriate	K6

		input types such as text boxes and text areas to checkboxes, radio buttons, and more for getting inputs, validate and sanitize user input.	
V	<b>Cookies, Sessions, Authentication and Validation</b>		
	Using cookies in PHP	Identify a user using cookie and track sessions.	K3
	HTTP Authentication	Manage users and passwords for the application by HTTP Authentication.	K4
	Using Sessions	Use Session variables (which hold information about one single user) to make data accessible across the various pages of an entire website.	K5
	Validating user Input	Create a form with user input validation	K4
	Regular Expression, Matching through metacharacters, fuzzy character matching, grouping	Accomplish pattern matching using regular expression, fuzzy character matching, and grouping.	K4
	Character classes, Indicating range, Negation - General Modifiers	Perform validation using Character classes, Indicating range, Negation - General Modifiers	K4
	Using regular expression in PHP	Apply regular expression functions preg_match, preg_match_all, and preg_replace for matching.	K5
	Redisplaying a form after PHP validation	Redisplay the created form after PHP validation.	K6

#### 4. MAPPING SCHEME (CO, PO & PSO)

U18CS505	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	H				H	H	H				H		H
CO2	H	L	M	M	H	M	H			H	H	H	
CO3	H	M	H	H	H		H			M			
CO4	H	H	H	H	H	M	H		H	H		H	H
CO5	H			M	H	M	H				H	H	M
CO6	H	H	H		H	H	H	H	H	H		H	H

#### 5. COURSE ASSESSMENT METHOD

##### DIRECT

1. Continuous Assessment Test: T1, T2 (Theory & Practical Components): Closed Book
2. Open Book Test.
3. Assignment, Group Discussion, Project Report, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

##### INDIRECT

1. Course end survey (Feedback)

**Name of the Course Coordinator: Dr. Rama Sivakumar**

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**1. COURSE OUTCOMES**

S. NO	COURSE OUTCOMES		UNITS
CO1	Understand the objectives and functions of operating system	K4	1
CO2	Summarize the types of operating system	K5	2
CO3	Contrast contiguous and non-contiguous memory management schemes	K6	3
CO4	Illustrate partition algorithms of memory management and compaction technique	K6	4
CO5	Appraise paging and segmentation techniques memory management schemes	K6	5
CO6	Develop a mobile App using Android OS	K6	5

**2. A. SYLLABUS****Unit I: Memory management System****15**

Operating Systems : Overview – Types of operating system – Single Contiguous Memory management system – Fixed Partition Memory management – Dynamic Partition Memory management – Best Fit, Worst Fit and First fit memory allocation algorithms – Internal Fragmentation and External Fragmentation – Relocatable dynamic partition memory management – Paged memory management – Segmented memory management system.

**Unit II: Virtual Memory Management****15**

Virtual Memory management: overview – Demand paging and Page Fault of virtual memory management system – Paged Memory Allocation memory management – Demand Paging memory management – Page Replacement Policies – First come First Serve page replacement algorithm and Belady Anomaly – Least Recently Used page replacement algorithm – Segmented memory allocation management – Segmented/Demand paged memory allocation management – Virtual memory and Cache memory.

**Unit III: Process Management****15**

Process Management : overview – Process scheduler, Process status – Process control block and process scheduling algorithms – First In First Serve and Shortest Job Next process scheduling algorithms – Priority scheduling and Shortest Remaining Time process scheduling algorithms – Round Robin process scheduling algorithm – Deadlock, conditions for deadlock – Seven cases of deadlock – Semaphores : concurrency mechanism – Threads and concurrent programming.

**Unit IV: Device and File management****15**

Device management and type of devices – Sequential access storage media – Direct access storage devices – Components of I/o sub system of device management – Management of I/O requests of device management – Device Handler seek strategies – FCFS, SSTS disk scheduling algorithms – SCAN, C-SCAN, LOOK , C-LOOK disk scheduling algorithms – File management, file manager – File organization of file management system.

**Unit V: Case Study : Android OS Fundamentals****15**

Android mobile operating system: overview – Android Environment setup – Android architecture – Android Application components – Create android application – Anatomy of android application – The main activity file creation – The manifest file creation – The string file, the R file creation – The layout file, Running the android application.

**B. TOPICS FOR SELF STUDY**

S.No.	Topics	Web Links
1	System Calls	<a href="https://youtu.be/lhToWeuWWfw">https://youtu.be/lhToWeuWWfw</a>
2	Socket in OS	<a href="https://youtu.be/uagKTbohimU">https://youtu.be/uagKTbohimU</a>
3	Shared Memory System	<a href="https://youtu.be/uHtzOFwgD74">https://youtu.be/uHtzOFwgD74</a>
4	Android Architecture	<a href="https://www.youtube.com/watch?v=y3HravY897E">https://www.youtube.com/watch?v=y3HravY897E</a>

### C. TEXT BOOK

1. Ida M. Flynn, Ann MClver MCHocs , "*Understanding Operating Systems, Course Technology*" Cengage Learning,2011, 6<sup>th</sup> Edition, .

### D. REFERENCES BOOK

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, "*Operating System Concepts*", Wiley Publication Inc, 2013,9<sup>th</sup> Edition.

### E. WEB LINKS

- <https://www.coursera.org/courses?query=operating%20system>
- <https://www.edx.org/learn/operating-systems>
- [https://www.tutorialspoint.com/operating\\_system/index.htm](https://www.tutorialspoint.com/operating_system/index.htm)

### 3. SPECIFIC LEARNING OUTCOMES

Unit	Topics	Learning Outcomes	Level
<b>I</b>	<b>Memory management System</b>		
1.1	Types of Operating System	Describe about evolution of operating system?	K1
1.2	Contiguous Memory management system	Summarize different types of Contiguous memory management scheme	K2
1.3	Best Fit, Worst Fit and First fit memory allocation algorithms	Compare the performance of first fit, worst fit and best fit algorithms	K2
1.4	Internal Fragmentation and External Fragmentation	Solve the process of Internal and External Fragmentation queries	K3
1.5	Fixed and Variable Partitions	Use fixed variable partition in a practical scenario	K3
1.6	Paged and Segmented memory management	Discover the paging technique in memory allocation to a particular process	K3
<b>II</b>	<b>Virtual Memory Management</b>		
2.1	Demand paging and Page Fault of virtual memory management system	Describe the performance of paging memory management scheme with variable partitioning	K2
2.2 2.3	Page Replacement Policies	Categorize the various types of page replacement policies algorithms	K4
	Segmented memory allocation management	Discover the segmentation with paging in allocating memory to a particular process	K3
	Virtual memory and Cache memory.	Illustrate the process of virtual and cache memory	K4
<b>III</b>	<b>Process Management</b>		
3.1	Process scheduler	Illustrate the types of process schedulers	K4

3.2	Process status	Appraise the process states and process transitions	K5
3.3	Process control block	Develop process control block with process elements for a particular process	K6
3.4	process scheduling algorithms	Reframe the merits and demerits of pre-empted and non-pre-empted processing scheduling algorithms	K5
3.5	Deadlock	Write the seven cases of deadlock	K6
<b>IV</b>	<b>Device and File management</b>		
4.1	Sequential access storage media	Write about sequential access devices	K6
	Direct access storage devices	Defend the performance of Direct access devices with sequential access devices	K5
4.2	File Manager	Rewrite the responsibilities of File Manager and Summarize the naming conventions of file	K6
4.3	File Organization	Collaborate contrast of logical and physical file organization	K6
4.4	Disk scheduling algorithms	Judge the different type of disk scheduling algorithms	K5
<b>V</b>	<b>Android OS Fundamentals</b>		
5.1	Android Environment setup	Discuss the Android Environment Setup	K5
5.2	Anatomy of android application	Write the Applications of Android	K6
5.3	The manifest file creation	Pivot the performance of manifest file creation	K6

#### 4. MAPPING SCHEME (CO, PO & PSO)

U18CS506	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	H	M	M	-	L	L	-	M	M	H	-	L	M
CO2	H	M	M	-	M	L	-	M	M	H	-	L	M
CO3	H	H	M	-	M	M	-	M	M	H	-	M	M
CO4	H	H	M	-	M	M	-	M	M	H	-	M	M
CO5	H	M	M	-	H	M	-	H	M	H	M	M	M
CO6	H	H	H	-	H	M	-	H	M	H	M	H	M

#### 5. COURSE ASSESSMENT METHODS

##### DIRECT:

1. Continuous Assessment Test: T1, T2 (Theory & Practical Components)
2. Open Book Test.
3. Assignment, Group Presentation, Group Discussion, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

##### INDIRECT:

1. Course end survey (Feedback)

**Name of the Course Coordinator: Dr. P. Thamil Selvan**

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#### COMPUTER GRAPHICS

**1. COURSE OUTCOMES**

S. No.	COURSE OUTCOMES	LEVEL	UNITS
CO1	Apply and Analyze the Scan conversion Algorithms for Point, Line and Circle.	K5	1
CO2	Evaluate the algorithms for Region Filling, Anti-Aliasing and 2D Transformations.	K6	2
CO3	Design the algorithms for 2D Viewing and Clipping	K5	3
CO4	Analyze the different forms of three-dimensional transformations and Solve the issues with hidden surfaces through algorithms.	K6	4
CO5	Analyze the three-dimensional viewing	K5	5
CO6	Judge the need to apply projections and the anomalies that exist.	K6	5

**2. A. SYLLABUS**

**UNIT – I**

**15**

Introduction to computer graphics – Image representation – Display Monitor – Printer – Image files – Setting the color attributes – Scan conversion – Line Drawing Algorithms – Circle Generation Algorithms.

**UNIT – II**

**15**

Region filling – Area filling algorithm – Scan converting a character – Anti aliasing – Recursively defined drawings – Two Dimensional Transformations – Geometric Transformations – Coordinate Transformations – Composite Transformation – Instance Transformations.

**UNIT - III**

**15**

2D viewing and clipping: Window to viewport mapping – Point Clipping – Line Clipping – Cohen Sutherland Algorithm – Midpoint subdivision – Liang Barsky Algorithm – Polygon Clipping – Sutherland Hodgman Algorithm – The Weiler Artherton Algorithm – 2D Graphics pipeline with example.

**UNIT – IV**

**15**

3D Transformations: Geometric Transformations – Coordinate Transformations – Composite Transformation – Instance Transformations – Hidden surfaces – Depth comparisons Z-Buffer Algorithms – Back – Face Removal – The painter’s Algorithm – Scan Line Algorithm – Subdivision Algorithm.

**UNIT – V**

**15**

Mathematics of Projections: Taxonomy of projections – Perspective and Parallel Projections – 3D viewing – Viewing Transformations – 3D Graphics Pipeline.

**B. TOPICS FOR SELF STUDY**

S.No.	Topics	Web Links
1	Introduction to LOGO language	<a href="https://www.tutorialspoint.com/logo/logo_quick_guide.htm">https://www.tutorialspoint.com/logo/logo_quick_guide.htm</a>
2	LOGO Primitives and Basic Commands	<a href="http://cs.brown.edu/people/orgs/artemis/old/2001/lessons/Logo.pdf">http://cs.brown.edu/people/orgs/artemis/old/2001/lessons/Logo.pdf</a>
3	Computer Graphics and Animation	<a href="http://cs.wellesley.edu/~cs110/lectures/M01-color/graphics.pdf">http://cs.wellesley.edu/~cs110/lectures/M01-color/graphics.pdf</a>
4	Virtual Reality in computer graphics	<a href="https://web.mit.edu/16.459/www/VR1.pdf">https://web.mit.edu/16.459/www/VR1.pdf</a>

**C. TEXT BOOK**

1. **“Computer Graphics”** – ZHIGANG XIANG & ROY PLASTOCK, Schaum’s outline series McGraw-Hill International Edition, 2001.

## D. REFERENCE BOOKS

1. *“Computer Graphics”* – Donald Hearn & M. Pauline Baker, Pearson Education, 3<sup>rd</sup> Edition, 2003.
2. *“Principles of Interactive Computer Graphics”* – William M. Newman and Robert F. Sproull Mc Graw Hill International Edition, 1998.

## E. WEB LINKS

- <https://www.javatpoint.com/computer-graphics-tutorial>
- [https://www.tutorialspoint.com/computer\\_graphics/index.htm](https://www.tutorialspoint.com/computer_graphics/index.htm)

## 3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit	Topics	Learning Outcomes	Level
I	Image representation	Provides a representation of images and introduces the concepts like image space and object space.	[K1]
	Display Monitor	1. Illustrate the primary colors and the basic color models 2. Demonstrate the working of a monochromatic and color monitor	[K2]
	Printer and Image files	Understand the techniques in printers and the image file representation	[K2]
	Setting the color attributes	Apply the color attributes for setting and getting the values	[K3]
	Line Drawing Algorithms	Apply the knowledge of scan converting a point to a line.	[K3]
	Circle Generation Algorithms.	Apply the basic knowledge about scan conversion to perform circle generation. Create the Circle using Circle Generation Algorithms	[K3,K6]
II	Region filling – Area filling algorithm	Analyze the need for region filling	[K4]
	Scan converting a character	Apply the basic knowledge of scan conversion to a character	[K3]
	Anti- aliasing	Understand the various anti-aliasing techniques	[K3]
	Two Dimensional Transformations	Categorize the two- dimensional transformations and examine their performance	[K4]
III	Window to viewport mapping	Illustrate the principle of mapping window to viewport	[K3]
	Point Clipping Line Clipping	Recall the concept of clipping Apply clipping on a point and on a line. Examine Point and Line Clipping	[K3,K5]
	Cohen Sutherland Algorithm Midpoint subdivision Liang Barsky Algorithm	Categorize the most suitable algorithm for line clipping by analysing the pros and cons of each algorithm	[K4]
	Polygon Clipping – Sutherland Hodgman Algorithm – The Weiler Artherton Algorithm	Classify the most suitable algorithm for polygon clipping by analysing the pros and cons of each algorithm	[K2,K4]
	2D Graphics pipeline with example	Summarise the concepts through a pipeline	[K2]

IV	Three Dimensional Transformations	Categorise the three-dimensional transformations and analyse their execution	[K4]
	Hidden surfaces Depth comparisons Z-Buffer Algorithms Back – Face Removal The painter’s Algorithm Scan Line Algorithm Subdivision Algorithm	Compare and Examine the hidden surface algorithms by analysing their advantages and disadvantages	[K4-K6]
V	Perspective and Parallel Projections	Classify the types of projections	[K4]
	3D Viewing Transformations	Examine the 3Dimensional viewing transformations	[K5]
	3D Graphics Pipeline.	Create Outline the concepts through a pipeline	[K6]

#### 4. MAPPING SCHEME (CO, PO & PSO)

U18CS507	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	H	H	H		M	L		H	M	H		H	M
CO2	H	M	M	H		H		H		M		H	H
CO3	H	H		M		M		H			H		M
CO4	H		H	M	M	L		H	H	H	H	H	
CO5	H	M	H	H	M	H		H		H		M	
CO6	H		H	H	M	L		H		H		H	H

#### 5. COURSE ASSESSMENT METHODS

##### DIRECT:

- 1.Continuous Assessment Test: T1, T2 (Theory & Practical Components): Closed Book
- 2.Open Book Test.
- 3.Cooperative Learning Report, Assignment, Group Presentation, Group Discussion, project Report, Field Visit Report, Poster Presentation, Seminar, Quiz (written).
- 4.Pre-Semester & End Semester Theory Examination

##### INDIRECT:

- 1.Course end survey (Feedback)

Name of the Course Coordinator : Dr. R. Cynthia Monica Priya

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#### Core Practical V: Database – Driven Web Design Lab

SEMESTER: V

CODE: U18CS5P5

CREDITS: 5

HOURS /WEEK:6

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## 1. COURSE OUTCOMES

S. NO.	COURSE OUTCOMES	LEVEL	Ex. No.
CO1	Distinguish the language features of PHP including strings, regular expressions, files and forms.	K4	1-3
CO2	Experiment the OOP features to given problem scenarios.	K6	4-5
CO3	Select proper controls and built-in functions to create forms with image and file upload.	K5	6-7
CO4	Test MYSQL connection through PHPMYADMIN.	K6	8-9
CO5	Design web pages with Validation.	K6	10-14
CO6	Assemble the features of PHP and MYSQL and create a website.	K6	1-14

## 2. A. SYLLABUS

1. Construct a PHP program that converts given temperature in celcius to Farenheit and vice versa.
2. Develop an application to find the biggest of given three numbers using PHP.
3. Develop an application using String functions of PHP.
4. Develop an application to maintain student records using files.
5. Develop a simple calculator using PHP.
6. Develop a Login form using PHP.
7. Develop an application to display employee details submitted in forms.
8. Develop an application to display customer purchase details stored in MYSQL in table format.
9. Develop an application to manipulate student mark sheet stored in MYSQL via PHP.
10. Develop an application to upload a file that contains salary details of employees and check if the file already exists.
11. Develop a page counter application in PHP using Cookies.
12. Develop an application to track user sessions of an online store.
13. Develop a job application with image upload (photo) with required field validation.
14. Develop an application for digital library access with registration and login validation.

## B. WEB LINKS

- [https://www.youtube.com/watch?v=cGwSm8xDSwI&ab\\_channel=CodeWithDary](https://www.youtube.com/watch?v=cGwSm8xDSwI&ab_channel=CodeWithDary)
- [https://www.youtube.com/watch?v=XBj\\_le81sAc&ab\\_channel=DaniKrossing](https://www.youtube.com/watch?v=XBj_le81sAc&ab_channel=DaniKrossing)
- [https://www.youtube.com/watch?v=U10yvfiStx8&ab\\_channel=DaniKrossing](https://www.youtube.com/watch?v=U10yvfiStx8&ab_channel=DaniKrossing)

## 3. SPECIFIC LEARNING OUTCOMES

Exp. No	Title of the Experiment	K-level
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1.	[Starter Applications]: Using echo and print statements Reversing the Number and string Palindrome Checking	K2
2.	[File Handling]: Displaying the contents of the file stored in the drive.	K3
3.	[Object Oriented Programming]: Demonstrating Constructors and Destructors by calculating the employee's salary.	K3
4.	[Looping and control Structures]: Generating Fibonacci Series of numbers Sorting the given numbers using for loop and if statement.	K3
5.	[Form Handling in PHP]: Creating a form Required field validation in form Validating form data using pattern matching	K5 K6
6.	[Cookies and Session in PHP]: Getting Customer Purchase details using cookies Counting the frequency of web page visit using session	K3
7.	[Image Upload]: Image Upload using PHP	K3
8.	[Database Connectivity- Create Table and Insert data]: Student Registration using PHP and MYSQL	K3 K6
9.	[Database Connectivity - View data]: Displaying employee details stored in database	K3 K6
10.	[Database Connectivity - formatting the data display]: Storing, Retrieving Customer purchase details and displaying in table format from database.	K3 K6

#### 4. MAPPING SCHEME (CO, PO & PSO)

U18CS5P5	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	H				H	H	H				H		H
CO2	H	L	M	M	H	M	H			H	H	H	
CO3	H	M	H	H	H		H			M			
CO4	H	H	H	H	H	M	H		H	H		H	H
CO5	H			M	H	M	H				H	H	M
CO6	H	H	H		H	H	H	H	H	H		H	H

#### 5. COURSE ASSESSMENT METHODS

##### **DIRECT:**

1. Continuous Assessment Test: T1, T2 (Theory & Practical Components): Closed Book
2. Open Book Test.
3. Cooperative Learning Report, Assignment, Group Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

##### **INDIRECT:**

1. Course end survey (Feedback)

**Name of the Course Coordinator : Dr. Rama Sivakumar**

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**Elective - (1a) SOFTWARE ENGINEERING**



## 1. COURSE OUTCOMES

S. NO.	COURSE OUTCOMES	LEVEL	UNIT
CO1	Define terms software, software engineering and the professional behavior.	K1	1
CO2	Experiment with various software process models for real world use-cases	K6	2
CO3	Evaluate the different types of software process models	K6	2
CO4	Develop software requirements specification.	K5	3
CO5	Apply design techniques and handle implementation issues.	K5	4
CO6	Compare various testing strategies and select appropriate one for testing software	K5	5

## 2. A. SYLLABUS

### **Unit I: INTRODUCTION TO SOFTWARE ENGINEERING** **15**

Building a software system: Characteristics of building a system. – Size, complexity, technical considerations – Building hypothetical system – Co-ordination efforts: Process, Product and people. – Engineering of software: Characteristics of software failures. – Software engineering definitions, Relevancy of software engineering and software. – Software engineering Profession and ethics: Code of ethics, Professional behavior – Principle of Software engineering: Davis Early Principle. – Principle of Software engineering: Royces More Principle – Principle of Software engineering: Wassermann's Fundamental Software engineering.

### **Unit II: SOFTWARE PROCESS MODELS** **15**

Software Process : Goal and the simplest process model. – Traditional Process Model: Water Fall Model. – Traditional Process Model: Chief Programmers Team Approach. – Traditional Process Model: Incremental Model. – Traditional Process Model: Spiral Model. – Entry and Exit Criteria: Entry Criteria. – Entry and Exit Criteria: Exit Criteria. – Process Assessment Models: SEI'S Capability Maturity Model. – Process Assessment Models: SEI'S Capability Maturity Model Integrated. – Process Definition and Communication.

### **Unit III: REQUIREMENTS ENGINEERING** **15**

Requirements Processing. – Requirements Elicitation and Gathering: Elicitation of high-level Requirements. – Elicitation of Detailed Requirements. – Requirements Analysis: By Business Flow. – View-Point Oriented Requirements Definitions. – Requirements Analysis and Prioritization. – Requirements Traceability. – Requirements Definitions, Prototyping and Reviews. – Requirements Specifications. – Requirements Agreements.

### **Unit IV: DESIGN AND IMPLEMENTATION** **15**

Introduction To Design: Architectural Design. – Introduction To Design: Detailed Design. – Design Characteristics. – Design Attributes. – Introduction to Implementation: Characteristics of good implementation. – Programming Style. – Coding Guidelines. – Comments. – Debugging. – Performance Optimization

### **Unit V: TESTING AND MAINTENANCE** **15**

Introduction To Testing: Testing and Quality Assurance – Purpose of Testing, Testing Techniques. – Inspections and Reviews. – Formal Methods. – Static Analysis. – Software Support and Maintenance. – Customer Support. – Product Maintenance Updates – Release Cycle. – Change Control.

## B. TOPICS FOR SELF STUDY

S.No.	Topics	Web Links
1	Aspect Oriented programming	<a href="https://www.youtube.com/watch?v=DufPj8MIAVo">https://www.youtube.com/watch?v=DufPj8MIAVo</a>
2	Functional Decomposition	<a href="https://www.youtube.com/watch?v=XuDLUOzwBOs">https://www.youtube.com/watch?v=XuDLUOzwBOs</a>
3	Post Object Programming	<a href="https://www.youtube.com/watch?v=eFCI_F3D7WU">https://www.youtube.com/watch?v=eFCI_F3D7WU</a>
4	Software Maintainence	<a href="https://www.youtube.com/watch?v=8swQr0kckZI">https://www.youtube.com/watch?v=8swQr0kckZI</a>

## C. TEXT BOOK

1. *“Essentials of Software Engineering”*, Frank Tsui, Orlando Karam, Barbara Bernal.3<sup>rd</sup> Edition

## D. REFERENCES BOOK

1. *“Software Engineering”*, Ian Somerville, 10<sup>th</sup> Edition, Pearson Edition.

## E. WEB LINKS

- <https://www.edx.org/learn/software-engineering>
- <https://www.coursera.org/courses?query=software%20engineering>
- <https://www.mygreatlearning.com/software-engineering/courses>

## 3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit	Topics	Learning Outcomes	Level
<b>I</b>	<b>INTRODUCTION TO SOFTWARE ENGINEERING</b>		
1.1	Building a software system: Characteristics of building a system.	Defining the software and finding the characteristics of building a system	K1
1.2	Size, complexity, technical considerations – Building hypothetical system	Illustrate various factors to be considered for building a system	K2
1.3	Co-ordination efforts: Process, Product and people.	Relate the coordination efforts for software system	K2
1.4	Engineering of software: Characteristics of software failures - Software engineering definitions, Relevancy of software engineering and software	Outline the fundamentals of software engineering and explain its characteristics	K2
1.5	Software engineering Profession and ethics: Code of ethics, Professional behavior	Analyse different types of professional behaviour of a software engineer	K4
1.6	Principle of Software engineering: Davis Early Principle - Royces More Principle – Wassermann’s Fundamental Software engineering.	Explain the principles of software engineering through familiar authors	K2
<b>II</b>	<b>SOFTWARE PROCESS MODELS</b>		
2.1	Software Process : Goal and the simplest process model	Illustrate the software process and models	K2
2.2	Traditional Process Model: Water Fall Model - Chief Programmers Team Approach - Incremental Model - Spiral Model	Compare various traditional process models and explain the fitness for various software development	K5
2.3	Entry and Exit Criteria	Interpret the criteria for entry and exit	K2
2.4	Process Assessment Models: SEI’S Capability Maturity Model. – SEI’S Capability Maturity Model Integrated	Demonstrate the process assessment models	K2

2.5	Process Definition and Communication.	Explain the process and the communication	K5
<b>III</b>	<b>REQUIREMENTS ENGINEERING</b>		
3.1	Requirements Processing	Interpret the requirements processing	K2
3.2	Requirements Elicitation and Gathering	Distinguish the high level and detailed elicitation and gathering	K4
3.3	Requirements Analysis	Analyse the requirements by business flow	K4
3.4	View-Point Oriented Requirements Definitions	Understanding the requirement gathering through different view points	K2
3.5	Requirements Analysis and Prioritization	Evaluate the requirements and prioritize the requirements	K5
3.6	Requirements Traceability	Interpret the traceability to track back the issues	K2
3.7	Requirements Definitions, Prototyping and Reviews	Explaining the central activities of requirements	K2
3.8	Requirements Specifications - Agreements	Compile the requirements and compose the specification	K4
<b>IV</b>	<b>DESIGN AND IMPLEMENTATION</b>		
4.1	Introduction To Design: Architectural Design – Detailed Design	Compare the two different designs	K5
4.2	Design Characteristics	Illustrate the characteristics of designing	K2
4.3	Design Attributes	Illustrate various attributes of designing	K2
4.4	Introduction to Implementation: Characteristics of good implementation	Identify various characteristics to be considered while development of a software	K3
4.5	Programming Style and Coding Guidelines	List out different styles and guidelines followed by organizations during software development	K4
4.6	Comments - Debugging	Explain the various ways of commenting and debugging	K5
4.7	Performance Optimization	Discuss optimizing the performance	K5
<b>V</b>	<b>TESTING AND MAINTENANCE</b>		
5.1	Testing, Quality Assurance and Purpose of Testing	Define testing and quality	K1
5.2	Testing Techniques	Demonstrate various techniques of testing	K2
5.3	Inspections and Reviews	Adapt the inspection and review process for testing	K6
5.4	Formal Methods	Interpret the mathematical techniques for testing	K2
5.5	Static Analysis	Apply the static analysis for detecting error-prone conditions	K3
5.6	Software Support and Maintenance - Customer Support	Understand various aspects of customer support after the product delivery	K2
5.7	Product Maintenance Updates	Demonstrate the maintenance of software and updating periodically	K4

5.8	Release Cycle – Change Control	Explain and summarize the releasing of software and outline the change control	K5
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#### 4. MAPPING SCHEME (CO, PO & PSO)

U18CS5:1	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	H	M	M	-	-	M	-	M	M	H	M	L	M
CO2	H	M	M	-	-	H	-	M	M	H	M	L	M
CO3	H	H	M	-	-	H	-	M	M	H	-	M	M
CO4	H	H	M	-	-	H	H	M	M	H	H	M	M
CO5	H	M	M	H	M	H	H	H	M	H	H	M	M
CO6	H	H	H	H	M	H	H	H	M	H	H	H	M

#### 5. COURSE ASSESSMENT METHODS

##### DIRECT:

1. Continuous Assessment Test: T1, T2 (Theory & Practical Components): Closed Book
2. Open Book Test.
3. Cooperative Learning Report, Assignment, Group Presentation, Group Discussion, project Report, Field Visit Report, Poster Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

##### INDIRECT:

1. Course end survey (Feedback)

**Name of the Course Coordinator: Dr. J. Isac Gnanaraj**

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#### SBEC – II Project Proposal

**SEMESTER: V**  
**CREDITS : 2**

**Code: U18CSPS2**  
**HOURS/WEEK : 2**

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## Course Outcomes

Upon completion of this course, students should be able to:

- Identify and define the problem statement
- Define and justify scope of the proposed problem
- Gather and analyze system requirements
- Propose an optimized solution among the existing solutions
- Practice software analysis and design techniques
- Develop technical report writing and oral presentation skills

## Text Book(s):

1. Lynn E. Miner & Jeremy T. Miner, *“Proposal Planning and Writing”*, Third Edition, Greenwood Publishing Group, 2003,

## References Book(s):

1. William Navidi, *“Statistics for Engineers and Scientists”*, 2nd Edition, McGraw-Hill, 2007.

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**SBEC – III: Technical Communication for Computer Scientists**

**SEMESTER: V**

**CREDITS : 2**

**Code: U18CSPS3**

**HOURS/WEEK : 2**

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## 1. COUSE OUTCOMES

Upon completion of this course students should be able to

S. NO.	COURSE OUTCOMES	LEVEL	ACTIVITY NO.
CO1	Exhibit their communication with others through conversion	K5	1
CO2	Demonstrate their interview, discussion and marketing skills	K4	2
CO3	Analyze their reading ability	K5	3
CO4	Inculcate on their reading strategies	K5	4
CO5	Analyze their writing skills on note making, summarizing and essay	K5	5
CO6	Develop and design CV	K6	6

## 2. SYLLABUS

1. **Oral communication:** Starting and ending a conversation, telling and asking people to do things- expressing opinions and ideas- decisions and intentions- offers and invitations- feelings- right and wrong- numbers and money.
2. Purpose and audience- dealing with customers and clients- face to face discussions- meetings and attending meetings- checking understanding- raising questions- giving and receiving feedback- using body language- leading and directing discussions- concluding discussions, using graphics in oral presentation.
3. Reading comprehension and reference skills: Skimming and scanning, factual and inferential comprehension- prediction- guessing meaning of words from context- word reference- comprehending graphics in technical writing.
4. Reading strategies- reading speed, reading between lines for hidden meaning- interpreting graphics- using a dictionary- using an index- using a contents list to find information- choosing the right reference source.
5. **Written Communication:** Note making and note taking- summarizing- notes and memos- developing notes into text- organization of ideas- cohesion and coherence- paragraph writing- ordering information in space and time- short essays- description and argument- comparison and contrast- illustration- using graphics in writing- tables and charts- diagram and flow charts- maps, plans and graphs.
6. Spelling rules and tips- writing a rough draft- editing and proof reading- writing the final draft- styling text- filing in complex forms- standard letters- CV- writing a report- writing leaflets and brochures- writing references- essay writing- expository writing- description of processes and products- classification- the instructional process- arguments and presentation of arguments- narrating events chronologically.

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## Core VIII: COMPUTER NETWORKING

SEMESTER: VI

CODE :U18CS608

## 1. COURSE OUTCOMES

SNO	COURSE OUTCOMES	LEVEL	UNITS
CO1	Understand the fundamental concepts of computer networking.	K5	1
CO2	Analyze advanced networking concepts, preparing the student for entry Advanced courses in computer networking.	K5	2
CO3	Evaluate the OSI layers and working knowledge of datagram and internet socket programming.	K5	3
CO4	Explain network architecture using protocols and interfaces.	K5	4
CO5	Evaluate different encoding and decoding mechanisms involved in different types of transmission media and to measure the transmission impairments.	K6	5
CO6	Explain the different types of Link Layer Protocols	K5	5

## 2. A. SYLLABUS

### Unit I: Introduction of Internet and Networking Protocols

15

Internet (Network Description, Network Services & Protocol) - Components of a Computer Network : Access Network, Physical media - Network Switching : Packet Switching, Circuit Switching - Quantitative QoS( Delay, Loss, Throughput, and Bandwidth) : Overview of Delay and Packet Loss, Queuing Delay and Packet Loss, End-to-End Delay, Throughput in Computer Network - Protocols Layers and their Service Models : Layered Architecture, Encapsulation.

### Unit II: Application Layer

15

Network Application : Application Architectures - Process Communication - The web and HTTP : Overview of HTTP, HTTP Message format, Non persistent and Persistent Connection, Cookies, web caching-File Transfer Protocol (FTP) - Electronic Mail: SMTP, Mail Access Protocol - DNS : Services, Functions, Records and Messages - Peer-to-Peer Applications: File Distributions – Architectures, BitTorrent- Peer-to-Peer Applications : Distributed Hash Table- Socket Programming.

### Unit III: Transport Layer

15

Transport Layer Services - Multiplexing and De multiplexing ( Connectionless & Connection-Oriented) - Connection Less Transport : UDP - Reliable Data Transfer - Connection-Oriented Transport: TCP Connection, TCP Segment Structure, Round-Trip Time Estimation, Reliable Data Transfer (Doubling the Time interval), Reliable data Transfer ( fast Retransmit, Go-Back-N), TCP Connection Management - Congestion Control - TCP Congestion Control.

### Unit IV: The Network Layer

15

Responsibilities of Network Layer ( Forwarding & Routing, Network Service Model) - Virtual Circuit and Datagram Network - Router: Input Processing, Switching, & Output Processing, Routing Control plane, Internet Protocol(IP): Datagram format - Internet Protocol(IP): IPv4 Addressing, ICMP, IPv6, & IP Security - Routing Algorithm: Distance Vector, Link State, Hierarchical - Routing in the Internet: RIP, OSPF, BGP - Broadcast and Multicast Routing.

### Unit V: The Link Layer

15

Link Layer: Services, Implementation - Error-Detection & Correction: Parity, Checksum, & CRC - Multi Access Link and Protocols: Channel Partitioning protocol, Talking-Turns Protocols DOCSIS, Random Access Protocol - Switched Local Area Network: Link-Layer Addressing and ARP, Ethernet, and Link Layer Switches - Link Virtualization - Data Center Networking.

## B. TOPICS FOR SELF STUDY

S.No.	Topics	Web Links
1	Ease of trouble Shooting	<a href="https://www.youtube.com/watch?v=4KUHkBAaD5A">https://www.youtube.com/watch?v=4KUHkBAaD5A</a>
2	Ethical hacking	<a href="https://www.youtube.com/watch?v=dz7Ntp7KQGA">https://www.youtube.com/watch?v=dz7Ntp7KQGA</a>
3	Cyber Security	<a href="https://www.youtube.com/watch?v=PIHnamdwGmw">https://www.youtube.com/watch?v=PIHnamdwGmw</a>
4	Link Virtualization	<a href="https://www.youtube.com/watch?v=3IAJWnAQlhk">https://www.youtube.com/watch?v=3IAJWnAQlhk</a>

### C. TEXT BOOK

1. James F Kurose and Keith W. Ross, “*Computer Networking*” – A Top-Down Approach, Sixth Edition, 2013, Pearson Publication.

### D. REFERENCES BOOK

1. Mani Subramanian; Timothy A. Gonsalves; N. Usha Rani, “*Network Management: Principles and Practice*”, Pearson Education India, 2010

### E. WEB LINKS

- <https://www.coursera.org/courses?query=computer%20network>
- <https://www.edx.org/learn/computer-networking>
- <https://www.udacity.com/course/computer-networking--ud436>

## 3. SPECIFIC LEARNING OUTCOMES

Unit	Learning Outcomes		Level
<b>I</b>	<b>Introduction of Internet and Networking Protocols</b>		
1.1	Internet , Components of a Computer	Provides an internet and network services with real life examples	[K1]
1.2	Network, Network Switching	1. Recall different types of network access. 2.Provides managing network in an Organization	[K1]
1.3	Quantitative QoS	Understand Quality of Service with delay, loss and bandwidth.	[K2]
	Protocols Layers and their service models	Illustrate a protocol and test its efficiency with different layers	[K2]
<b>II</b>	<b>Application Layer</b>		
2.1	Network Application -	Explain network architecture using protocols and interfaces.	[K5]
2.2	Process Communication	Understand the mechanisms of operating system to handle process and threads and their communications.	[K2]
2.3	The web and HTTP	Identify the Delivered data (HTML files, image files, query results, etc.) on the World Wide Web	[K3]
2.4	File Transfer Protocol	1. Apply the internet-based applications using programs on their computer to access and store emails 2. Operate through the reliable connection as a transfer session between the client and server computers..	[K3]
2.5	Electronic Mail, DNS	Find the solutions for network directions on the internet used to resolve host names	[K1]



2.6	File Distributions, Distributed Hass Table, Socket Programming	1. Illustrate the schema of distribution files. 2. Explain Communication between various processes usually running on different systems using client-server environment. 3. Create the server and client program and an example program.	[K6]
<b>III</b>	<b>Transport Layer</b>		
	Transport Layer Services , Multiplexing and De multiplexing, Connection Less Transport	1. Learn the process of multiple data streams from different resources. 2. Illustrate the length of time it takes for a signal to be sent plus the length of time it takes for an acknowledgement of that signal to be received	[K2]
	Reliable Data Transfer, TCP Connection, Congestion Control	1. Summarize delivery of all packets and to enable the receiver to deliver the packets in order to its application layer. 2. Explain the use of process of regulating the total amount of data entering the network	[K2]
<b>IV</b>	<b>The Network Layer</b>		
4.1	Responsibilities of Network Layer, Virtual Circuit and Datagram Network , Router	1. Apply different encoding and decoding mechanisms involved. 2. Recall different types of transmission media and to measure the transmission impairments. 3. Learn the order of packet sending.	[K3]
4.2	Internet Protocol - Routing Algorithm - Routing in the Internet - Broadcast and Multicast Routing	1. Illustrate the principal set of digital message formats and rules for exchanging messages between computers across a single network or a series of interconnected networks. 2. Define set of step-by-step operations used to direct Internet traffic efficiently. 3. Recall broadcasting and multicasting process	[K2]
<b>V</b>	<b>The Link Layer</b>		
5.1	Link Layer - Error-Detection & Correction - Multi Access Link and Protocols	1. Analyse a model internet with various categories of networks and test the transmission rate. 2. Recollect the detection of errors caused by noise or other impairments during transmission from the transmitter to the receiver. 3. Define transmitting node always transmits at the full rate of the channel, namely, R bps using random access protocol	[K4]
5.2	Switched Local Area Network - Link Virtualization - Data Center Networking	1. Understanding Local Area Networking Learning Objectives 2. Learn on what is a Client and a Server 3. Summarize the Switches operations in the data link layer and sometimes the network layer of the OSI Reference Model and therefore support any packet protocol	[K2]

#### 4. MAPPING SCHEME (CO, PO & PSO)

L-Low M-Moderate H-High

U18CS608	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
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<b>CO1</b>	H	M	M	-	-	M	-	M	M	M	M	L	L
<b>CO2</b>	H	M	M	-	-	H	-	M	M	M	M	L	L
<b>CO3</b>	H	H	M	-	-	H	-	M	M	L	-	M	L
<b>CO4</b>	H	H	M	-	-	H	H	M	M	L	H	M	L
<b>CO5</b>	H	M	M	H	M	H	H	H	M	M	H	M	L
<b>CO6</b>	H	H	H	H	M	H	H	H	M	M	H	H	M

## 5. COURSE ASSESSMENT METHODS

### DIRECT:

1. Continuous Assessment Test: T1, T2 (Theory & Practical Components): Closed Book
2. Open Book Test.
3. Cooperative Learning Report, Assignment, Group Presentation, Group Discussion, project Report, Field Visit Report, Poster Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

### INDIRECT:

1. Course end survey (Feedback)

**Name of the Course Coordinator: Dr. B. Karthikeyan**

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### Elective II: MULTIMEDIA TECHNOLOGIES

**SEMESTER: VI**

**CREDITS: 4**

**CODE: U18CS6:1**

**HOURS /WEEK: 6**

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## 1. COURSE OUTCOMES

S.NO	COURSE LEARNING OUTCOMES	LEVEL	UNITS
CO1	Create a simple animation and interaction for multimedia presentation	K5	1
CO2	Differentiate image types and colour models	K5	2
CO3	Make use the concepts regarding the digitization of audio signals	K5	3
CO4	Evaluate the data compression methods to compress images, videos and audios	K6	4
CO5	Inspect the encode videos and audios using MPEG	K4	5
CO6	Compare and Analyze the MPEG Video and Audio Coding	K6	5

## 2. A. SYLLABUS

### Unit I: Introduction to multimedia

12

Getting started with multimedia and its components – World wide web: History of WWW – World wide web: Hyper Text Transfer Protocol – World wide web: Extensible Markup Language – World wide web: Synchronised Multimedia Interaction Protocol – Overview of multimedia software tools – Multimedia authoring: Production – Multimedia authoring: Presentation – Overview of Virtual Reality Modeling Language – Animation and interactions.

### Unit II: Data representations and color representations

12

Graphics data types:1-bit images,8-bit Gray level images – Image Data Types:24Bit Color Images,8 bit Color Images, Color Lookup Tables – File Formats – Color Science: Human Vision, Camera, Systems, Color Matching Functions – Color Models in Images: RGB Color Model for CRT Displays – Color Models in Images: Subtractive Color Model – Color's Models in Images: Transformation from RGB to CMY – Color Models in Images: CMYK System – Color models in video – Types of video signals – Analog video – Digital video.

### Unit III: Basics of digital audio

12

Digitization of sound: definition, Nyquist Theorem – Digitization of sound: Signal to Noise Ratio – Digitization of sound: Signal to quantization noise, Audio Filtering – Musical Instrument Digital Interface Overview – Hardware Aspects of MIDI – Structure of MIDI Messages: Channel Messages – Structure of MIDI Messages: System Messages – Quantization and transmission of audio: Coding of audio, Pulse Code Modulation: General – Quantization and transmission of audio: Pulse Code Modulation in speech compression – Quantization and transmission of audio: Differential Coding Audio.

### Unit IV: Data Compression

12

A general data compression scheme and forms of data compression – Shanon-Fano Algorithm – Huffman Coding-algorithm – Huffman Coding –properties – Dictionary Based-The Lempel-Ziv-Welch (LZW) algorithm – LZW decompression algorithm – Steps in JPEG Image Compression – Steps in JPEG Image Compression – Video Compression – Video Compression.

### Unit V: MPEG Video and Audio Coding

12

Introduction to MPEG -1 – Motion Compensation in MPEG-1 – MPEG-1 Video Bitstream – Introduction to MPEG-2 and its support to interlacing – Differences between MPEG-1 and MPEG -2 – MPEG Layers and Audio Strategy – MPEG Audio Compression Algorithm – MPEG Audio Compression Algorithm – MPEG-2 Advanced Audio Coding– MPEG-4 Audio.

## B. TOPICS FOR SELF STUDY

S.No.	Topics	Web Links
1	Virtual Security	<a href="https://www.youtube.com/results?search_query=virtual+security">https://www.youtube.com/results?search_query=virtual+security</a>
2	File Formats	<a href="https://www.youtube.com/watch?v=ww12lImOJ38">https://www.youtube.com/watch?v=ww12lImOJ38</a>
3	Internet of Things	<a href="https://www.youtube.com/watch?v=LlhmzVL5bm8">https://www.youtube.com/watch?v=LlhmzVL5bm8</a>

4	MPEG Format	<a href="https://www.youtube.com/watch?v=F0ZinF-gTrY">https://www.youtube.com/watch?v=F0ZinF-gTrY</a>
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### C. TEXT BOOK

1. Ze- Nian Li & Mark S Drew, “*Fundamentals of Multimedia*”, Pearson Education,2004.

### D. REFERENCES BOOK

1. Dr. Ashok Banerji & Dr. Ananda Mohan Ghosh ,“*Fundamentals of Multimedia Technology*”,McGraw Hill Education,2010.

### E. WEB LINKS

- <https://www.aonlinetraining.com/>
- <https://www.coursera.org/lecture/android-programming-2/multimedia-part-1-NW4wT>
- <https://www.classcentral.com/course/canvas-network-interactive-multimedia-production-604>

### 3. SPECIFIC LEARNING OUTCOMES (SLO)

S.NO	CONTENT	LEARNING OUTCOMES	LEVEL
<b>I</b>	<b>Introduction to multimedia</b>		
1.1	Getting started with multimedia and its components	Define multimedia and their components	K1
1.2	History of WWW	Summarize the world wide web	K2
1.3	Hyper Text Transfer Protocol	Analyse the HTTP	K4
1.4	Extensible Markup Language	Interpreting the extensible markup language	K2
1.5	Synchronised Multimedia Interaction Protocol	Relating the synchronised multimedia interaction protocol	K1
1.6	Overview of multimedia software tools	Recalling the tools in multimedia software	K1
1.7	Multimedia authoring: production	What is production in multimedia authoring	K1
1.8	Multimedia authoring: presentation	What is presentation in multimedia authoring	K1
1.9	Overview of Virtual Reality Modelling Language	Summarization of virtual reality modelling language	K2
1.10	Animation and interactions.	Classify the various animations and interactions	K2
<b>II</b>	<b>Data representations and colour representations</b>		
2.1	Graphics data types	Recalling the various graphics data types	K1
2.2	Image Data Types	Recalling the various Image data types	K1
2.3	Colour Lookup Tables	Apply the various colour look up tables	K3
2.4	File Formats	Classifying the various file formats	K2
2.5	Colour Science	Analysing the colour science	K4
2.6	Colour Models in Images	Identifying the different colour models in images	K3
2.7	Transformation from RGB to CMY	Testing the transformation from RGB to CMY	K5
2.8	Colour models in video	Relate the various colour models in video	K1
2.9	Types of video signals	Discover the various types of video signals	K4
<b>III</b>	<b>Basics of digital audio</b>		
3.1	Digitization of sound	Adapting the available sound digitization	K5
3.2	Nyquist Theorem	Explaining the usage of Nyquist theorem	K5
3.3	Signal to Noise Ratio	Modifying the signal to Noise ratio	K5
3.4	Signal to quantization noise	Modifying the signal to quantization noise	K5
3.5	Audio Filtering	Inspecting the audio filtering	K4

3.6	Musical Instrument Digital Interface Overview	Recall the MIDI overview	K1
3.7	Hardware Aspects of MIDI	Summarize the MIDI hardware aspects	K2
3.8	Structure of MIDI Messages	Illustrate the MIDI message structures	K2
3.9	Quantization and transmission of audio	Examine the quantization and transmission of audio	K4
<b>IV</b>	<b>Data Compression</b>		
4.1	Data compression scheme and forms of data compression	Identifying the data compression scheme and various forms of data compression	K3
4.2	Shanon- Fano Algorithm	Make use of Shanon-Fano Algorithm	K3
4.3	Huffman Coding-algorithm	Utilize Huffman Coding-algorithm	K3
4.4	Lempel-Ziv-Welch (LZW) algorithm	Identify the usage of Lempel-Ziv-Welch (LZW) algorithm	K3
4.5	LZW decompression algorithm	Utilization of LZW decompression algorithm	K3
4.6	Steps in JPEG Image Compression	Organizing of the JPEG image compression	K3
4.7	Video Compression	Summarizing the video compressions	K2
<b>V</b>	<b>MPEG Video and Audio Coding</b>		
5.1	Motion Compensation in MPEG	Assessing the motion compensation in MPEG	K5
5.2	Video Bitstream	Defining the video bit stream	K1
5.3	Introduction to MPEG-2	Elaborate in MPEG-2 introduction	K5
5.4	Differences between MPEG-1 and MPEG -2	Show the differences of MPEG-1 and MPEG -2	K2
5.5	MPEG Layers and Audio Strategy	Relate the MPEG layers and audio strategy	K2
5.6	MPEG Audio Compression Algorithm	Importance of Audio Compression Algorithm	K5
5.7	MPEG-2 Advanced Audio Coding	Discover the advanced audio coding	K4
5.8	MPEG-4 Audio	Summarizing the MPEG-4 audio	K2

#### 4. MAPPING SCHEME (CO, PO & PSO)

U18CS6:1	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	H	M	M	-	-	M	-	M	M	M	M	L	L
CO2	H	M	M	-	-	H	-	M	M	M	M	L	L
CO3	H	H	M	-	-	H	-	M	M	L	-	M	L
CO4	H	H	M	-	-	H	H	M	M	L	H	M	L
CO5	H	M	M	H	M	H	H	H	M	M	H	M	L
CO6	H	H	H	H	M	H	H	H	M	M	H	H	M

#### 5. COURSE ASSESSMENT METHODS

##### DIRECT:

1. Continuous Assessment Test: T1, T2 (Theory & Practical): Closed Book
2. Open Book Test.

3. Assignment, Group Presentation, Group Discussion, Poster Presentation, Seminar, Quiz (written).
  4. Pre-Semester & End Semester Theory Examination
- INDIRECT:**
1. Course end survey (Feedback)

**Name of the Course Coordinator : Dr. B. Gayathri**

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**Elective – (3a) BUSINESS ANALYTICS**

**SEMESTER: VI**

**CODE: U18CS6:4**

**CREDITS : 5**

**HOURS /WEEK: 6**

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### 1. COURSE OUTCOMES

S. NO	COURSE OUTCOMES	LEVEL	UNITS
CO1	Apply various Excel tools and add-ins for analyzing Business problems.	K5	1
CO2	Compare mathematical formulas with Spreadsheet formulas	K5	2
CO3	Explore, query and summarize business data.	K6	3
CO4	Apply descriptive statistical measures for business decision.	K6	4
CO5	Perform progression analysis and forecasting techniques.	K6	5
CO6	Create trend lines using excel	K6	5

### 2. A. SYLLABUS

#### Unit I: INTRODUCTION TO BUSINESS ANALYTICS

15

What is Business Analytics?- Evolution of Business Analytics-Scope of Business Analytics- Data for Business Analytics-Models in Business Analytics-Problem solving with Analytics.

#### Unit II: ANALYTICS ON SPREADSHEETS

15

Basic Excel skills - Basic Excel Functions - Using Excel Lookup functions for Database Queries - Spreadsheet Add-Ins for Business Analytics.

#### Unit III: DESCRIPTIVE ANALYTICS – Visualizing and Exploring Data

15

Data Visualization - Creating charts in Microsoft Excel - Other Excel visualization tools - Data queries: Tables, Sorting and Filtering – Statistical Methods for Summarizing Data.

#### Unit IV: DESCRIPTIVE STATISTICAL MEASURES

15

Population and Samples - Measures of Location - Measures of Dispersion - Measures of Association - Measures of Shape - Excel Descriptive Statistical Tool - Statistical thinking in Business Decisions.

#### Unit V: PREDICTIVE ANALYTICS –Trend lines and Regression Analysis

15

Trend Lines and Regression Analysis: Modeling Relationships and trends in data- Simple Linear Regression- Forecasting Techniques: Qualitative and Judgmental forecasting-Historical Analogy – The Delphi Method – Statistical Forecasting models – Forecasting models for stationary time series.

### B. TOPICS FOR SELF STUDY

S.No.	Topics	Web Links
1	Data Vs Business Analytics	<a href="https://www.youtube.com/watch?v=AodyW7bhku8">https://www.youtube.com/watch?v=AodyW7bhku8</a>
2	Business analytical Skills	<a href="https://www.youtube.com/watch?v=xybB1tISxpk">https://www.youtube.com/watch?v=xybB1tISxpk</a>
3	Crypto Currency	<a href="https://www.youtube.com/watch?v=8NgVGnX4KOw">https://www.youtube.com/watch?v=8NgVGnX4KOw</a>
4	Forecasting Methods	<a href="https://www.youtube.com/watch?v=fp-1_9mLlbc">https://www.youtube.com/watch?v=fp-1_9mLlbc</a>

### C. TEXT BOOK

1. **“Business Analytics”**, James R. Evans, Second Edition, Pearson Education, 2016. Indian Edition 2017, Pearson India Services.

### D. REFERENCES BOOK

1. **“Essentials of Business Analytics”**, CAMM, COCHRAN, FRY, OHLMANN, ANDERSON, SWEENEY, WILLIAMS, 2015, CENGAGE LEARNING

## E. WEB LINKS

- <https://www.udemy.com/course/excel-for-business-analysts-online-course/>
- <https://www.simplilearn.com/learn-business-analytics-excel-fundamentals-skillup>
- <https://www.coursera.org/courses?query=data%20analysis%20excel>

## 3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning outcomes	Blooms Taxonomy Level of Transaction
<b>I</b>	<b>INTRODUCTION TO BUSINESS ANALYTICS</b>		
1.1	What is Business Analytics?- Data for Business Analytics	Detailed explanation of Business analytics and scope	K3-K4
1.2	Evolution of Business Analytics	Description of Business Analytics	K2
1.3	Scope of Business Analytics	Lists the scope of Business Analytics	K1
1.4	Models in Business Analytics-Problem solving with Analytics.	Explaining the models of Business Analytics	K4-K5
<b>II</b>	<b>ANALYTICS ON SPREADSHEETS</b>		
2.1	Basic Excel skills	Defines the basic Excel skills and functions	K3
2.2	Basic Functions of Excel	Recall basic functions of Excel	K1
2.3	Using Excel Lookup functions for Database Queries	Construct database Queries	K4-K5
2.4	Build spreadsheet Add-Ins for Business Analytics	Spreadsheet Add-Ins for Business Analytics.	K5
<b>III</b>	<b>DESCRIPTIVE ANALYTICS</b>		
3.1	What is data visualization	Visualizing Data	K1
3.2	Illustrate the data charts in MS Excel	Creating charts in Microsoft Excel	K4
3.3	Propose Excel visualization tools	Analyzing and exploring the data's of Excel using different methods and tools	K5-K6
3.4	Construct data queries	Data queries from tables	K3
3.5	Show sorting and filtering of data queries	Sorting and filtering	K2



3.6	Analysis of statistical method for summarized data	Describes the various aspects and the functions of the Exce	K4
<b>IV</b>	<b>DESCRIPTIVE STATISTICAL MEASURES</b>		
4.1	Interpret Population and Samples	Measuring the Population	K2
4.2	<b>How to measure location</b>	Measures of Location	K1
4.3	<b>Evaluate measures of Dispersion</b>	Measuring the Population with different samples and measures	K5
4.4	<b>Originate the Measures of Association</b>	Explain the measures of Association	K6
4.5	<b>Measures of Shape - Excel Descriptive Statistical Tool</b>	Illustrating the measurements of the Statistical dispersion	K4
4.6	<b>Analysis of Statistical thinking in Business Decisions.</b>	Statistical dispersion	K4-K5
<b>V</b>	<b>PREDICTIVE ANALYTICS</b>		
5.1	Trend lines and Regression Analysis, Modeling Relationships and trends in data- Simple Linear Regression	Predicting the data's using analytical methods	K5
5.2	Originate Qualitative and Judgmental forecasting	Forecasting Techniques: Qualitative and Judgmental forecasting	K6
5.3	Recall Historical Analogy	Describes about the Trend Lines and the forecasting models.	K1
5.4	Summarize Delphi Method	Elaborating Delphi method	K2
5.5	Statistical Forecasting models – Forecasting models for stationary time series.	Distinguish Various Forecasting models	K4

#### 4. MAPPING

U18CS6:4	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	H	M	M	-	-	M	-	M	M	M	M	L	L
CO2	H	M	M	-	-	H	-	M	M	M	M	L	L
CO3	H	H	M	-	-	H	-	M	M	L	-	M	L
CO4	H	H	M	-	-	H	H	M	M	L	H	M	L
CO5	H	M	M	H	M	H	H	H	M	M	H	M	L
CO6	H	H	H	H	M	H	H	H	M	M	H	H	M

#### 5. COURSE ASSESSMENT METHODS

##### DIRECT:

1. Continuous Assessment Test: T1, T2 (Theory & Practical): Closed Book

2. Open Book Test.
  3. Assignment, Group Presentation, Group Discussion, Poster Presentation, Seminar, Quiz (written).
  4. Pre-Semester & End Semester Theory Examination
- INDIRECT:**
1. Course end survey (Feedback)

**Name of the Course Coordinator: Dr. D. Suresh Kumar**

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## PROJECT IMPLEMENTATION

**SEMESTER: VI**  
**CREDITS : 5**

**Code: U18CS6PJ**  
**HOURS/WEEK : 6**

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### Course Outcomes

Upon completion of this course, students should be able to:

- Develop a functional application based on the software design
- Apply coding, debugging and testing tools to enhance the quality of the software
- Construct new software system based on the theory and practice gained through this exercise
- Prepare the proper documentation of software projects following the standard guidelines
- Learn technical report and oral presentation skills

### Text Book(s):

1. Lynn E. Miner & Jeremy T. Miner, *“Proposal Planning and Writing”*, Third Edition, Greenwood Publishing Group, 2003.

### References Book(s):

1. William Navidi, *“Statistics for Engineers and Scientists”*, 2nd Edition, McGraw-Hill, 2007.