DEPARTMENT OF COMPUTER SCIENCE

List of Board of Studies Members

S. No	Name of the Staff member, Designation & College	Role	Signature
1	**Sri. Ch. Anil Kumar**, Head, Department of Computer Science, A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru, Mobile No: 9701463015, Email Id: aniltimes13@gmail.com	Chairman	
2	**Dr. M. Babu Reddy**, Assistant Professor, Department of Computer Science, Krishna University, Machilipatnam, Mobile No. 9963436460, Email id: m_babureddy@yahoo.com	University Nominee	*Attended the meeting online*
3	**Dr. D. G. Krishna Mohan,** Associate Professor, Department of CSE (AI & ML), Vishnu Institute of Technology, Bhimavaram, Mobile: 8297313195, Email id: krishnaugcnet@gmail.com	Subject Expert	*Attended the meeting online*
4	**Dr. Yugandhar Garapati**, Assistant Professor, Department of CSE, GITAM deemed to be University, Hyderabad, Mobile: 9866688563, Email id: yugandhar.garapati@gmail.com	Subject Expert	*Attended the meeting online*
5	**Ms. R. Sowjanya**, Senior Developer, Capgemini,Gachibowli, Hyderabad, Mobile: 9542095699,Email id:sowji.rajulapati@gmail.com	Industrial Expert	*Attended the meeting online*
6	**Ms. S. Prabhavathi**, Lecturer in Computer Science, A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru, Mobile No: 9989098703, Email id: s.prabha2424@gmail.com	Member	
7	**Sri. A. Naga Srinivasa Rao**, Lecturer in Computer Science, A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru, Mobile No: 9553539203, Email id: srinu7mca@gmail.com	Member	
8	**Sri. P. Sriram Teja**, Lecturer in Computer Science, A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru Mobile No: 8309922062, Email id: sriramtejapaladugu04@gmail.com	Member	
9	**Ms. O. Teja Sri**, Lecturer in Computer Science, A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru Mobile No: 9182248812, Email id: tejasrioleti77@gmail.com	Member	
10	**Sri. G. Mahesh**, Lecturer in Computer Science, A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru Mobile No: 9618135732, Email id: gajula.mahesh10@gmail.com	Member	
11	**Smt. T. Madhuri**, Lecturer in Computer Science, A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru Mobile No: 7601078195, Email id: madhurithurimella77@gmail.com	Member	
12	**Ms. K. Supriya**, Lecturer in Computer Science, A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru Mobile No: 9959467544, Email id: kunderusupriya@gmail.com	Member	
13	**Ms. Md. Rahethunnisa,** Lecturer in Computer Science, A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru Mobile No: 9297156876, Email id: raheth.123@gmail.com	Member	
14	**Ms. G. Sampoorna**, Student in II M.Sc. (Computer Science), A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru	Member	

Minutes of the meeting of Board of Studies in Computer Science for I-year II Semester &II-year IV Semester of B.Sc. Honours (Computer Science), B.Sc. Honours (Mathematics / Physics /Chemistry), B.Com. Honours (Computer Applications), & B.C.A. Honours Computer Applications of Adusumilli Gopalakrishnaiah & Sugarcane Growers Siddhartha Degree College of Arts & Science, Vuyyuru, Krishna District held on 05-02-2025 at 12.00 Noon in the Department of Computer Science through offline/online mode.

AGENDA

1. To discuss the structure, syllabi, and Model paper of the Fourth semester for B.Sc. Honours (Computer Science), B.Sc. Honours (Mathematics / Physics / Chemistry), B.Com. Honours (Computer Applications) & B.C.A. Honours Computer Applications programs for the students admitted from 2023–24 onwards.

2. To discuss the structure, syllabi, and Model paper of the second semester for B.Sc. Honours (Computer Science), B.Sc. Honours (Mathematics / Physics / Chemistry), B.Com. Honours (Computer Applications) & B.C.A. Honours Computer Applications programs for the students admitted from 2024–25 onwards.

PROPOSALS

1. **It is proposed to continue the existing structure, syllabi, and model papers of the second semester for the B.Sc. Honours (Computer Science), B.Sc. Honours (Mathematics / Physics / Chemistry), B.Com. Honours (Computer Applications), and B.C.A. Honours Computer Applications programs for the students admitted from 2024–25 as detailed below:**

B.Sc. Honours Computer Science – II Semester

a) It is proposed to continue the **23CSMAL121: Problem-Solving using C** as a Computer Science MAJOR Course in the II semester for B.Sc. Honours (Computer Science) program for the batch of students admitted in the academic year 2023–24.

b) It is proposed to continue the **23CSMAP121: Problem-Solving using C Lab** as a Computer Science MAJOR Course in the II semester for B.Sc. Honours (Computer Science) program for the batch of students admitted in the academic year 2023–24.

c) It is proposed to continue the **23DSMIL121: Python Programming** as Data Science MINOR course in the II semester for B.Sc. Honours (Computer Science) program for the batch of students admitted in the academic year 2023–24.

d) It is proposed to continue the **23DSMIP121: Python Programming Lab** as a Data Science MINOR course in the II semester for B.Sc. Honours Computer Science program for the batch of students admitted in the academic year 2023–24.

B.Sc. Honours Mathematics / Physics / Chemistry – II Semester

e) It is proposed to continue the **23CSMIL121: Problem-Solving using C** as a Computer Science MINOR course in the II semester for B.Sc. Honours (Mathematics, Physics, Chemistry) programs for the batch of students admitted in the academic year 2023–24.

f) It is proposed to continue the **23CSMIP121: Problem-Solving using C Lab** as a Computer Science MINOR course in the II semester for B.Sc. Honours (Mathematics, Physics, Chemistry) programs for the batch of students admitted in the academic year 2023–24.

B.Com. Honours Computer Applications – II Semester

g) It is proposed to continue the **23CAMAL121: Office Automation Tools** as Computer Applications MAJOR course in II semester for B.Com. Honours (Computer Applications) program for the batch of students admitted in the academic year 2023–24.

h) It is proposed to continue the **23CAMAP121: Office Automation Tools Lab** as Computer Applications MAJOR course in II semester for B.Sc. Honours (Computer Applications) program for the batch of students admitted in the academic year 2023–24.

i) It is proposed to continue the **23ITMIL121: Problem Solving in C** as Information Technology MINOR course in the II semester for B.Com. Honours (Computer Applications) programmes for the batch of students admitted in academic year 2023–24.

j) It is proposed to continue the **23ITMIL121: Problem Solving in C Lab** as Information Technology MINOR course in II semester for B.Com. Honours (Computer Applications) programmes for the batch of students admitted in academic year 2023–24.

B.C.A. Honours – II Semester

k) It is proposed to continue the **23BCMAL121: Office Automation Tools** as Computer Applications MAJOR course in II semester for B.C.A. Honours programme for the batch of students admitted in academic year 2023–24.

l) It is proposed to continue the **23BCMAL121: Office Automation Tools LAB** as Computer Applications MAJOR course in II semester for B.C.A. Honours programme for the batch of students admitted in academic year 2023–24.

m) It is proposed to continue the **23BCMAL122: Programming in C** as Computer Applications MAJOR course in the II semester for the B.C.A. Honours program for the batch of students admitted in the academic year 2023–24.

n) It is proposed to continue the **23BCMAL122: Programming in C LAB** as a Computer Applications MAJOR course in the II semester for the B.C.A. Honours program for the batch of students admitted in the academic year 2023–24.

o) It is proposed to continue the **23DSMIL121: Python Programming** as Data Science MINOR course in the II semester for the B.C.A. Honours ComputerApplicationsprogram for the batch of students admitted in the academic year 2023–24.

p) It is proposed to continue the **23DSMIP121: Python Programming Lab** as Data Science MINOR course in the II semester for the B.C.A. Honours Computer Applications program for the batch of students admitted in the academic year 2023–24.

2. It is proposed to introduce **23CSSDL121: Digital Literacy** for the Second semester of **B.Com Honours Computer Applications, B.Sc. Honours Computer Science, and B.C.A. Honours Computer Applications**programs for the students admitted from the academic year 2024-25

3. **It is proposed that a new structure, syllabi, and model papers be introduced for the fourth semester of the B.Sc. Honours (Computer Science), B.Sc. Honours (Mathematics / Physics / Chemistry), B.Com. Honours (Computer Applications) & B.C.A. Honours Computer Applications programs for the students admitted from 2023–24 as detailed below:**

B.Sc. Honours Computer Science – IV Semester

a. It is proposed that **23CSMAL241: Database Management Systems** as a Computer Science MAJOR-7 Course be introduced in the IV semester for a **B.Sc. Honours (Computer Science)** program for the students admitted in the academic year 2023–24.

b. It is proposed that **23CSMAP241: Database Management Systems Lab** be introduced as a Computer Science MAJOR-7 Course in the IV semester for a **B.Sc. Honours (Computer Science)** program for the students admitted in the academic year 2023–24.

c. It is proposed that **23CSMAL242: Object-Oriented Software Engineering** as a Computer Science MAJOR-8 Course be introduced in the IV semester for a **B.Sc. Honours (Computer Science)** program for the students admitted in the academic year 2023–24.

d. It is proposed that **23CSMAP242: Object-Oriented Software Engineering Lab** be introduced as a Computer Science MAJOR-8 Course in the IV semester for a **B.Sc. Honours (Computer Science)** program for the students admitted in the academic year 2023–24.

B.Sc. Honours Mathematics / Physics / Chemistry – IV Semester

e. It is proposed that **23CSMIL241: DBMS WITH ORACLE** be introduced as a Computer Science MINOR-3 course in the IV semester for a **B.Sc. Honours (Mathematics / Physics /Chemistry)** programs for students admitted in the academic year 2023–24.

f. It is proposed that **23CSMIP241: DBMS WITH ORACLE LAB** is introduced as a Computer Science MINOR-3 course in the IV semester for a **B.Sc. Honours (Mathematics / Physics / Chemistry)** programs for students admitted in the academic year 2023–24.

g. It is proposed that **23CSMIL242: Software Engineering with Object-oriented Approach** as a **Computer Science MINOR-4** course in the IV semester for **B.Sc. Honours (Mathematics / Physics / Chemistry)** programs for students admitted in the academic year 2023–24.

h. It is proposed that **23CSMIP242: Software Engineering with Object-oriented Approach Lab** as a **Computer Science MINOR-4** course in the IV semester for **B.Sc. Honours (Mathematics / Physics / Chemistry)** programs for students admitted in the academic year 2023–24.

B.Com. Honours Computer Applications – IV Semester

i. It is proposed to introduce **23CAMAL241: Python Programming** as a **Computer Applications MAJOR-4** course in the IV semester for **B.Com. Honours (Computer Applications)** program for the students admitted in the academic year 2023–24.

j. It is proposed to introduce **23CAMAP241: Python Programming Lab** as a **Computer Applications MAJOR-4** course in the IV semester for **B.Com. Honours (Computer Applications)** program for the students admitted in the academic year 2023–24.

k. It is proposed that 23ITMIL241: Web Technologies be introduced as an **Information Technology MINOR-3** course in the IV semester for **B.Com. Honours (Computer Applications)** program for the students admitted in the academic year 2023–24.

l. It is proposed that 23ITMIP241: Web Technologies Lab be introduced as an **Information Technology MINOR-3** course in the IV semester for **B.Com. Honours (Computer Applications)** program for the students admitted in the academic year 2023–24.
m. It is proposed to introduce **23ITMIL242: Object Oriented Programming using Java** as a **Information Technology MINOR-4** course in the IV semester for **B.Com. Honours (Computer Applications)** program for the students admitted in the academic year 2023–24.
n. It is proposed to introduce **23ITMIP242: Object Oriented Programming using Java Lab** as a **Information Technology MINOR-4** course in the IV semester for **B.Com. Honours (Computer Applications)** program for the students admitted in the academic year 2023–24.

B.C.A. Honours Computer Applications– IV Semester

o. It is proposed to introduce **23BCMAL241: Data Science and R Programming** as a **MAJOR-7** course in the IV semester of the **B.C.A. Honours (Computer Applications)** program for the students admitted in the academic year 2023–24.
p. It is proposed to introduce **23BCMAP241: Data Science and R Programming Lab** as a **MAJOR-7** course in the IV semester of the **B.C.A. Honours (Computer Applications)** program for the students admitted in the academic year 2023–24.
q. It is proposed to introduce **23BCMAL242: Operating Systems** as a **MAJOR-8** course in the IV semester of the **B.C.A. Honours (Computer Applications)** program for the students admitted in the academic year 2023–24.
r. It is proposed to introduce **23BCMAP242: Operating Systems Lab** as a **MAJOR-8** course in the IV semester of the **B.C.A. Honours (Computer Applications)** program for the students admitted in the academic year 2023–24.
s. It is proposed to introduce **23BCMAL243: Mobile Application Development using Android** as a **MAJOR-9** course in the IV semester of the **B.C.A. Honours (Computer Applications)** program for the students admitted in the academic year 2023–24.
t. It is proposed to introduce **23BCMAP243: Mobile Application Development using Android Lab** as a **MAJOR-9** course in the IV semester of the **B.C.A. Honours (Computer Applications)** program for the students admitted in the academic year 2023–24.
u. It is proposed to introduce **23DSMIL241: Data Visualization using Tableau** as a **DATA SCIENCE MINOR-3** course in the IV semester of the **B.C.A. Honours (Computer Applications)** program for the students admitted in the academic year 2023–24.
v. It is proposed to introduce **23DSMIP241: Data Visualization using Tableau Lab** as a **DATA SCIENCE MINOR-3** course in the IV semester of the **B.C.A. Honours (Computer Applications)** program for the students admitted in the academic year 2023–24.
w. It is proposed to introduce **23DSMIL242: Data Visualization using Python** as a **DATA SCIENCE MINOR-4** course in the IV semester of the **B.C.A. Honours (Computer Applications)** program for the students admitted in the academic year 2023–24.
x. It is proposed to introduce **23DSMIP242: Data Visualization using Python Lab** as a **DATA SCIENCE MINOR-4** course in the IV semester of the **B.C.A. Honours (Computer Applications)** program for the students admitted in the academic year 2023–24.

4. It is resolved to continue the teaching and evaluation methods to be followed under Autonomous status.

5. It is resolved to continue the panel of paper setters and examiners to the controller of the examinations of autonomous courses of Adusumilli Gopalakrishnaiah & Sugarcane Growers Siddhartha Degree College of Arts & Science College, Vuyyuru.

Teaching methods: Besides the conventional methods of teaching, we use modern technology i.e. using of LMS and LCD projector to display on power board, etc. for better understanding of concepts. Evaluation of a student is done by two components in the Valuation and Assessment of a student – Internal Assessment (IA) Semester Examinations (SE).

For the Batch of Students Admitted from 2023-24. (II &IV Semester): The maximum mark for IA is 30 and SE is 70 for theory; and for practical marks for IA are 15 and 35 Marks for the External Exam.

- Internal Assessment (IA):
  Each IA written examination is of 1 hour 30 minutes duration for 30 marks. The tests will be conducted centrally. The average of two such IA is calculated for 20 marks. Attendance will be for 5 Marks. The other innovative component is for 5 marks, conducted during class hours by the staff member/ in charge of the subject, in the form of assignments / quizzes/seminars / PPT / Online- assignments / Open Book / Viva Voce / Group work / Mini Project/ Exhibition, etc. The topic and time for submission/ presentation will be announced by the staff member/ in charge of the subject in advance. Each student should explain and defend his/her presentation.

- Semester Examinations (SE).
  The semester examination will be of 3 hours with a maximum of 70 marks. A student should register himself/herself to appear for the Semester Examinations by payment of the prescribed fee. The Semester Examinations will be in the form of a comprehensive examination covering the entire syllabus in each subject. It will be of 3 hours duration, if a candidate fails to obtain pass marks even after the due to less mark in the IA examination, the marks of the next examination will be converted to be out of 100. Even though the candidate is absent for two IA exams/obtains zero marks the external marks are considered (if he/she gets 40/100) and the result shall be declared as 'PASS'. The maximum mark for each Paper shall be 100.
- Question paper guidelines for Practical Examinations at the end of Semesters II& IV:
  - Two Practical Programs to be conducted out of 15 programs at the end of Semester II& IV Practical Examinations, time 3Hrs and Maximum Marks 50, Scheme of valuation for Semesters – II of B.Sc. Honours Computer Science, B.Com Honours Computer Applications, B.C.A. Honours.
  - Computer Science Practical's - External (Time: 3 hrs.) Total Marks: 35M
    1. Experiment1 : 10 Marks
    2. Experiment2 : 15 Marks
    3. Viva voice : 10 Marks
  - Computer Science Practical's- Internal Total Marks: 15 M
    1. Experiment : 10 Marks
    2. Record : 5 Marks

6. Discussed and recommended organizing Seminars, Guest lectures, and Workshops to upgrade students' knowledge, for the approval of the Academic Council.

7. Discussed and empowered the HOD to suggest the panel of paper setters and examiners to the controller of the examinations.

8. Suggestions

… Chairman

Course Structure

Program: **B.Sc. Honours Computer Science**

S. No	Course Code	Course Name	Sem	Major / Minor	Hours per week	IA	SEE	Total Marks	Credits
1	23CSMAL121	Problem Solving Using "C"	II	Major-1 Theory	4	30	70	100	3
2	23CSMAP121	Problem Solving Using "C" Lab	II	Major-1 Practical	2	15	35	50	1
3	23MAMAL122	Discrete Mathematics (Offered by Maths Dept)	II	Major-2 Theory	5	30	70	100	4
4	23DSMIL121	Python Programming	II	Minor-1 Theory	4	30	70	100	3
5	23DSMIP121	Python Programming Lab	II	Minor-1 Practical	2	15	35	50	1
6	23CSSDL121	Digital Literacy	II	SEC	2	15	35	50	1
7	23CSMAL241	Database Management Systems	IV	Major-7 Theory	4	30	70	100	3
8	23CSMAP241	Database Management Systems Lab	IV	Major-7 Practical	2	15	35	50	1
9	23CSMAL242	Object Oriented Software Engineering	IV	Major-8 Theory	4	30	70	100	3
10	23CSMAP242	Object Oriented Software Engineering Lab	IV	Major-8 Practical	2	15	35	50	1
11	23MAMAL243	Linear Algebra (Offered by Maths Dept)	IV	Major-9 Theory	4	30	70	100	3

PROBLEM SOLVING Using "C"

Offered to B.Sc. Honours (Computer Science) – Major – II Semester

Course Code	:	**23CSMAL121**	No. Of Lecture Hours per week		:	4
Year of Introduction	:	2023-24	Total No. Of Lecture Hours		:	60
Year of Offering	:	2024-25	CIA Marks		:	30
Year of Revision	:	2024-25	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	3
Course Category	:	Major-1				
Type of Course	:	Skill development				
Course Relate to	:	National				

Course Objective: This course aims to provide exposure to problem-solving through programming and introduce the concepts of the C Programming language.

Course outcomes (based on BTL):

- CO1. Understand Tokens and write basic C programs (PO5)
- CO2. Understand control structures in C. (PO5)
- CO3. Understand arrays and strings and implement them.
- CO4. Understand the right way of using functions, pointers, and structures in C (PO5)
- CO5. Develop and test programs written in C files. (PO5, PO7)

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) & PSOs:

	CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
23CSMAL121	CO1					H		
	CO2					H		
	CO3					H		
	CO4					H		
	CO5					H		M

Syllabus:

Unit No	Syllabus Content	Lecture Hours
I	**Introduction to C:** Introduction – Structure of C Program, Writing the first C Program, File used in C Program, Compiling and Executing C Programs, Using Comments, Keywords, Identifiers, Basic Data Types in C, Variables, Constants, I/O Statements in C, Operators in C, Programming Examples.	12
II	**Decision Control and Looping Statements**: Introduction to Decision Control Statements, Conditional Branching Statements, Iterative Statements, Nested Loops, Break and Continue Statement, goto Statement.	12
III	**Arrays**: Introduction, Declaration of Arrays, accessing elements of the Array, Storing Values in Array, Operations on Arrays, one dimensional, two dimensional and multi-dimensional arrays, character handling and strings.	10
IV	**Functions**: Introduction, using functions, Function declaration/ prototype, Function definition, function call, return statement, Passing parameters, Scope of variables, Storage Classes, Recursive functions. **Structure:** Introduction, Nested Structures, Arrays of Structures, Structures and Functions, Unions.	12
V	**Pointers:** Understanding Computer Memory, Introduction to Pointers, declaring Pointer Variables, Pointer Expressions and Pointer Arithmetic, Null Pointers, Passing Arguments to Functions using Pointer, Pointer and Arrays, Memory Allocation in C Programs, Memory Usage, Dynamic Memory Allocation, Drawbacks of Pointers. **Files:** Introduction to Files, Using Files in C, Reading Data from Files, Writing Data to Files.	14

Textbooks: E Balagurusamy – Programming in ANSIC – Tata McGraw-Hill publications.
Reference Books: Yashavant Kanetkar - Let Us 'C' – BPB Publications.

MODEL QUESTION PAPER

Title of the Course	:	Problem Solving Using C			
Course Code	:	23CSMAL121	Maximum Marks	:	70
Offered to	:	B.Sc. Honours Computer Science	Time	:	3 Hrs

Section A

Answer all Questions **5 x 4=20M**

1. (A) Explain Structure of C. (CO1, L1)

   OR

   (B) Describe Keywords (CO1, L1)

2. (A) Write about the break and continue statements (CO2, L1)

   OR

   (B) Write a c program to print 1 to 10 natural numbers. (CO2, L1)

3. (A) Summarize a dimensional array with a suitable example. (CO3, L2)

   OR

   (B). Define a string with an example program. (CO3, L1)

4. (A) What is the scope of variables in functions? (CO4, L1)

   OR

   (B)Define a function and how to declare a function in c. (CO4, L1)

5. (A) Write about Reading data from files. (CO5, L1)

   OR

   (B) How to declare a pointer variable in c. (CO5, L1)

Section B

Answer all Questions **5 x 10=50M**

6. (A) Explain Datatypes in c with an example. (CO1, L1)

   OR

   (B) Explain about Input and Output statements in C. (CO1, L1)

7. (A) Summarize Looping statements in c with example. (CO2, L2)

   OR

   (B)Summarize iterative statements in c with examples. (CO2, L2)

8. (A) Write a program for the multiplication of 2 3x3 matrices. (CO3, L1)

   OR

   (B) Write a program by using string handling functions. (CO3, L1)

9 (A) Explain Storage Classes in c. (CO4, L2)

   OR

   (B) Explain the array of structures. (CO4, L2)

10 (A) Explain Dynamic memory allocation. (CO5, L2)

   OR

   (B) How to pass arguments to functions using pointers with an example program. (CO5, L2)

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PROBLEM-SOLVING Using "C" LAB
Offered to B.Sc. Honours (Computer Science) – Major – II Semester

Course Code	**:**	**23CSMAP121**	No. Of Lecture Hours per week		:	2
Year of Introduction	:	2023-24	Total No. Of Lecture Hours		:	30
Year of Offering	:	2024-25	CIA Marks		:	15
Year of Revision	:	2024-25	SEE Marks		:	35
Percentage of Revision	:	0%	Total Marks		:	50
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	1
Course Category	:	Major-1				
Type of Course	:	Skill development				
Course Relate to	:	National				

Course Objective: This course aims to provide exposure to problem-solving through programming and introduce the concepts of the C Programming language.

Course outcomes (based on BTL):

- CO1: Demonstration of basic C programs using branching and iterative statements. (PO7)
- CO2: Perform Operations on Arrays. (PO5)
- CO3: Perform passing parameters to functions and recursive functions. (PO5)
- CO4: Demonstration of the concept of pointers. (PO5)
- CO5: Demonstration of Structures and files in C program. (PO5)

List of Programmes:

1) Write a C program to check whether the given two numbers are equal, bigger, or smaller.
2) Write a C program to perform arithmetic operations using Switch...case?
3) Write a program to find the sum of individual digits of a positive integer.
4) Write a program to check whether the given number is Armstrong or not.
5) Write a program to generate the first N terms of the Fibonacci sequence.
6) Write a program to find both the largest and smallest number in a list of integer values.
7) Write a program that uses functions to add two matrices.
8) Write a program for the multiplication of two n X n matrices.
9) Write a program to demonstrate the reflection of parameters in swapping two integer values using Call by Value& Call by Address.
10) Write a program to calculate the factorial of a given integer value using recursive functions.
11) Write a program to search for an element in each list of values.
12) Write a program to illustrate pointer arithmetic.
13) Write a program to sort a given list of integers in ascending order.
14) Write a program to calculate the salaries of all employees using the Employee (ID, Name, Designation, Basic Pay, DA, HRA, Gross Salary, Deduction, Net Salary) structure.
    (a) DA is 30 % of Basic Pay
    (b) HRA is 15% of Basic Pay
    (c) Deduction is 10% of (Basic Pay + DA)
    (d) Gross Salary = Basic Pay + DA+ HRA (e) Net Salary = Gross Salary - Deduction
15) Write a program to perform various string operations.
16) Write a program to read the data character by character from a file.
17) Write a program to create a Book (ISBN, Title, Author, Price, Pages, Publisher) structure and store book details in a file and perform the following operations.
    (a) Add book details.
    (b) Search book details for a given ISBN and display book details, if available
    (c) Update book details using ISBN.
    (d) Delete book details for a given ISBN and display list of remaining Books.

Note: The list of experiments is not limited to the above list. If the existing laboratory experiments completed in advance, the additional laboratory programs can added, and to be executed in the laboratory.

PYTHON PROGRAMMING

Offered to B.Sc. Honours (Comp. Sci.) & BCA Honours (Comp. Appl.) – Minor – II Semester

Course Code	:	**23DSMIL121**	No. Of Lecture Hours per week		:	4
Year of Introduction	:	2023-24	Total No. Of Lecture Hours		:	60
Year of Offering	:	2024-25	CIA Marks		:	30
Year of Revision	:	2024-25	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	3
Course Category	:	Minor-1				
Type of Course	:	Employability				
Course Relate to	:	International				

Course Objective: After taking the course, students will be able to use Python program a Scripting language, and Exposure to various problem-solving approaches of computers.

Course Outcomes:

CO NO	Upon successful completion of this course, the student will be able to	PO NO
CO1	Learn about concepts of programming and python	PO1, PO2
CO2	Understand the Decision making and looping controls available in Python Programs	PO2, PO3
CO3	Determine the process of using functions and modules	PO3, PO4
CO4	Implement the Data structures using Lists, Tuple, Dictionaries	PO4, PO3
CO5	Interpret the OOPs concept in Python.	PO5, PO3

CO-PO MAPPING MATRIX

	CO - PO	PO1	PO2	PO3	PO4	PO5	PO6
23AIMIL121	**CO1**	H	M				
	CO2		H	M			
	CO3			H	L		
	CO4			L	H		
	CO5			H		L	

Syllabus:

Unit No	Syllabus Content	Lecture Hours
I	**Introduction, Data Types, Operators: Introduction to Programming**: Languages, Generations, Programming Paradigms, Debugging and Testing Approaches. **Python**: Introduction, History of Python, Features of Python, Writing and executing Python programs, constants, variables, reserved words, input operation, indentation, **Data types in Python**: integer, string, Boolean, Operators, and expressions.	12
II	**Decision-making and looping: Control Flow**: **Selection or conditional branching**: if, if-else, if-elif- else, nested if. **Loop or iterative statements:** for, while, break, continue, pass. Example programs on control flow.	13
III	**Functions and Modules:** Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Lambda or Anonymous Functions, Global and Local Variables. **Modules**: Creating modules, import statement, from import statement.	12
IV	**Data Structures: Lists**: Creation, accessing values, updating values, list operations, list methods. **Tuple:** tuple creation, accessing values, deleting values, tuple operations. **Sets:** creation, set operations. **Dictionaries:** creation, accessing values, adding, modifying, deleting items, built-in dictionary methods. NumPy, Matplotlib	13
V	**Object Oriented Programming in Python:** Introduction to OOP, Features of OOP, Merit **Error and Exception handling**: Handling Exceptions using try-except block, Raising Exceptions, User Defined Exceptions.	10

TEXTBOOKS

Python Programming: Using Problem Solving approach, Reema Thareja, Oxford University Press 2017

REFERENCE BOOKS:

Python Programming, A Modern Approach, Vamsi Kurama, Pearson Publications, 2017

Recommended Co – Curricular Activities:

(Co-curricular activities shall not promote copying from textbook or from others work and shall encourage self/independent and group learning)

A. Measurable

a. Assignments (in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging).
b. Student seminars (on topics of the syllabus and related aspects (individual activity))
c. Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams))
d. Study projects (by very small groups of students on selected local real- time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (team activity))

B. General

a. Group Discussion
b. Others

RECOMMENDED CONTINUOUS ASSESSMENT METHODS:

Some of the following suggested assessment methodologies could be adopted.

1. The oral and written examinations (Scheduled and surprise tests),
2. Closed-book and open-book tests,
3. Programming exercises,
4. Practical assignments and laboratory reports,
5. Observation of practical skills,
6. Individual and group project reports.
7. Efficient delivery using seminar presentations,
8. Viva voce interviews.
9. Computerized adaptive testing, literature surveys and evaluations,
10. Peers and self-assessment, outputs form individual and collaborative work.

MODEL QUESTION PAPER

Title of the Course	:	Python Programming			
Course Code	:	23DSMIL121	Maximum Marks	:	70
Offered to	:	B.Sc. Honours Computer Science & BCA Honours Computer Applications	Time	:	3 Hrs

NOTE TO PAPER SETTER: IN SECTION A & SECTION B, FOR EACH QUESTION ONE SUB-QUESTION (A) MUST BE A PROGRAM MEANT FOR LOGICAL TESTING, AND ANOTHER SUB-QUESTION (B) IS MEANT FOR DESCRIPTIVE / LOGICAL.

SECTION A

ANSWER THE FOLLOWING QUESTIONS. 5 X 4 = 20 Marks

1. a) Write different types of programming paradigms. (CO1, L1)

   OR

   b) Develop a Python code to print the sum and average marks of three subjects of a student. (CO1, L1)
2. a) Write a Python program to find the factorial of a given number. (CO2, L1)

   OR

   b) Explain if-elif-else statement in python with example (CO2, L2)
3. a) Develop a Python program for the Lambda function. (CO3, L3)

   OR

   b) Explain global and local variables in Python. (CO3, L2)
4. a) Develop a Python program to insert elements into a list, remove elements from a list, and sort elements of the list. (CO4, L3)

   OR

   b) Compare lists and tuples in Python. (CO4, L3)
5. a) Develop a Python program to demonstrate Inheritance. (CO5, L3)

   OR

   b) Explain about classes and objects in Python. (CO5, L2)

SECTION B

ANSWER THE FOLLOWING QUESTIONS .5 X 10 = 50 Marks

6. a) List and explain data types in Python. (CO1, L2)

   OR

   b) Write names of operators in Python and explain them with examples. (CO1, L2)
7. a) Develop a Python program to find whether the number is palindrome or not. (CO2, L3)

   OR

   b) Explain loops in Python with examples. (CO2, L2)
8. a) Explain different categories of arguments used in functions in Python. (CO3, L3)

   OR

   b) Develop a Python program to create a module and import it into another program. (CO3, L2)
9. a) Develop a Python program to create a dictionary and add, modify, and delete values in the dictionary and print them. (CO4, L2)

   OR

   b) Define tuple. Explain about tuples with examples. (CO4, L3)
10. a) Develop a Python program to demonstrate exception handling. (CO5, L3)

    OR

    b) Define method overriding. Explain with an example. (CO5, L2)

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PYTHON PROGRAMMING LAB

Offered to B.Sc. Honours (Comp. Sci.) & BCA Honours (Comp. Appl.) – Minor – II Semester

Course Code	**:**	**23DSMIP121**	No. Of Lecture Hours per week		:	2
Year of Introduction	:	2023-24	Total No. Of Lecture Hours		:	30
Year of Offering	:	2024-25	CIA Marks		:	15
Year of Revision	:	2024-25	SEE Marks		:	35
Percentage of Revision	:	0%	Total Marks		:	50
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	1
Course Category	:	Minor-1				
Type of Course	:	Employability				
Course Relate to	:	International				

Course Outcomes:

CO NO	Upon successful completion of this course, the student will be able to	PO NO
CO1	Write, Test, and Debug Python Programs	**PO1**
CO2	Implement Conditionals and Loops for Python Programs	**PO1, PO2,PO3**
CO3	Organize code into modules for better code organization and reusability.	**PO2,PO3**
CO4	Implement functions and represent Compound data using Lists, Tuples, and Dictionaries	**PO3,PO4**
CO5	Implement OOP concepts and write applications in Python.	**PO5,PO3**

CO-PO MAPPING MATRIX

	CO - PO	PO1	PO2	PO3	PO4	PO5	PO6
23DSMIP121	**CO1**	H					
	CO2	L	H	M			
	CO3		H	M			
	CO4			L	H		
	CO5			H		L	

List of Experiments:

1. Python Program to Find the Square Root
2. Python Program to Swap Two Variables
3. Python Program to Generate a Random Number
4. Python Program to Check if a Number is Odd or Even
5. Python Program to Find the Largest Among Four Numbers
6. Python Program to Check Prime Number
7. Python Program to Check Whether a number is Palindrome or Not
8. Python Program to Display the multiplication Table.
9. Python Program to Print the Fibonacci sequence.
10. Python Program to Check Armstrong Number
11. Python Program to Find the Sum of Natural Numbers
12. Python Program to Find Factorial of Number Using Recursion
13. Python Program to check given number is prime or not using functions.
14. Python Program to demonstrate usage of keyword, default, and variable length arguments.
15. Python Program for lambda functions.
16. Python Program to create module and import it.
17. Python Program to create a list and perform operations on its contents.
18. Python Program to perform operations on tuples.
19. Python Program to create a dictionary and print its content.
20. Python program to perform operations on sets.
21. Python Program for inheritance.
22. Python Program for method overriding.
23. Python Program for exception handling.
24. Python Program to demonstrate exception handling.
25. Python Program to demonstrate user-definedexception.

Note: The list of experiments is not limited to the above list. If the existing laboratory experiments completed in advance, the additional laboratory programs can added, and to be executed in the laboratory.

Database Management Systems
Offered to B.Sc. Honours Computer Science – Major – IV Semester

Course Code	**:**	**23CSMAL241**	No. Of Lecture Hours per week		:	4
Year of Introduction	:	2024-25	Total No. Of Lecture Hours		:	60
Year of Offering	:	2024-25	CIA Marks		:	30
Year of Revision	:	New Course	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	3
Course Category	:	Minor-1				
Type of Course	:	Employability				
Course Relate to	:	Global				

Course Description:
This course introduces students to the fundamentals of database management systems (DBMS). It explores the theory, design, and implementation of databases, focusing on relational databases and SQL. The course also covers the underlying architecture of DBMS, including data storage, indexing, query optimization, and transaction management. This course also covers basic concepts of PL/SQL.

Course Objectives:
By the end of the DBMS with Oracle course, students will understand the fundamentals of database management systems and their importance in storing, organizing, and retrieving data. They will gain hands-on experience with Oracle, learning to design and implement efficient relational databases, write SQL queries, and perform advanced database operations.

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

CO No.	COURSEOUTCOME	BTL	PO	PSO
CO1	Understand the fundamentals of database systems, and data models.	**K1**	**1,2**	**1**
CO2	Understand the relational model, keys, normalization, and how to apply these concepts to design.	**K2**	**2,6**	**1**
CO3	Design ER diagrams to model databases and perform basic SQL operations.	**K3**	**1,2**	**1**
CO4	Develop complex SQL queries using subqueries, joins, and functions.	**K3**	**2,6**	**2**
CO5	Design PL/SQL code, handling exceptions, and automating database actions with triggers.	**K3**	**1,2,6**	**2**

For BTL:K1:Remember; K2:Understand; K3:Apply; K4:Analyse; K5:Evaluate; K6:Create

CO-POMATRIX									
CO NO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CO1	**3**	**3**						**3**	
CO2		**3**				**2**		**3**	
CO3	**3**	**3**						**3**	
CO4		**3**				**2**		**3**	
CO5	**3**	**3**				**2**		**2**	

Use the codes 3, 2, and 1 for High, Moderate, and Low correlation Between CO-PO-PSO respectively.

Syllabus:

Unit No	Syllabus Content	Lecture Hours
I	**Overview of Database Management System:** Introduction to data, information, database, database management systems, file-based system, Drawbacks of file-based System, database approach, Classification of Database Management Systems, advantages of database approach, Various Data Models, Components of Database Management System, three schema architecture of database, costs, and risks of the database approach.	12

II	**Relational Model:** Introduction, CODD Rules, relational data model, concept of key, relational integrity, relational algebra, relational algebra operations, advantages of relational algebra, limitations of relational algebra, relational calculus, tuple relational calculus, domain relational Calculus (DRC), Functional dependencies and normal forms up to 3rd normal form.	12
III	**Entity-Relationship Model:** Introduction, Database design, and ER Diagrams, entities, attributes, and entity sets, attribute classification, relationship degree, relationship classification, reducing ER diagram to tables, conceptual design with the entity-relationship model **EER model:** Generalization and Specialization, IS-A relationship and attribute inheritance, multiple inheritance, constraints on specialization and generalization, advantages of ER modelling.	12
IV	**Structured Query Language:** Introduction, Commands in SQL, Data Types in SQL, basic SQL query, nested queries, Selection Operation, Projection Operation, Aggregate functions, Data Manipulation Language, Table Modification Commands, Join Operation, Set Operations, View, Sub Query.	12
V	**PL/SQL:** Introduction, Shortcomings of SQL, Structure of PL/SQL, PL/SQL Language Elements, Data Types, Operators Precedence, Control Structure, Steps to Create a PL/SQL, Program, Iterative Control, Procedure, Function, Database Triggers, Types of Triggers.	12

Activity:

- Seminar Presentation on Database Management Systems.
- Case Study on the EER Model
- Exercise on Normalization: Assign students a set of un-normalized tables and have them normalize the tables to the third normal form.
- Competition on SQL Query Writing
- Peer Review of PL/SQL code

Specific Resources: (web)

- https://onlinecourses.nptel.ac.in/noc22_cs91/preview
- https://www.geeksforgeeks.org/introduction-of-dbms-database-management-system-set-1/
- https://www.lucidchart.com/pages/erdiagrams#:~:text=An%20Entity%20Relationship%20(ER)%20Diagram,to%20each%20other%20within%20a
- https://onlinecourses.nptel.ac.in/noc19_cs46/preview

Reference Books

1. Database System Concepts by Abraham Silberschatz, Henry F. Korth, and S. Sudarshan, 6th Edition, McGraw-Hill Education, 2010.
2. Database Management Systems by Raghu Ramakrishnan, McGrawhill
3. Principles of Database Systems by J. D. Ullman.
4. Fundamentals of Database Systems by R. Elmasri and S. Navathe.
5. SQL: The Ultimate Beginners Guide by Steve Tale.

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MODEL QUESTION PAPER

Title of the Course	:	Database Management Systems			
Course Code	:	23CSMAL241	Maximum Marks	:	70
Offered to	:	B.Sc. Honours Computer Science	Time	:	3 Hrs

NOTE TO PAPER SETTER: IN SECTION A & SECTION B, FOR EACH QUESTION ONE SUB-QUESTION (A) MUST BE A PROGRAM MEANT FOR LOGICAL TESTING, AND ANOTHER SUB-QUESTION (B) IS MEANT FOR DESCRIPTIVE / LOGICAL.

SECTION A

ANSWER THE FOLLOWING QUESTIONS. 5 X 4 = 20 Marks

1. A) What is the difference between data and information? (K1)

   OR

   B) What are the advantages of using a database approach over a file-based system? (K1)
2. A) Define an entity and an attribute in the context of an ER diagram. (K2)

   OR

   B) What is the purpose of generalization in the Enhanced Entity-Relationship (EER) model? (K3)
3. A) What is the concept of a "key" in the relational model? (K2)

   OR

   B) Explain what relational algebra is and name any two of its operations. (K3)
4. A) What is the purpose of the SELECT statement in SQL? (K2)

   OR

   B) What is the role of the JOIN operation in SQL? (K1)
5. A) What is a cursor in PL/SQL? (K1)

   OR

   B) What is a database trigger in PL/SQL? (K1)

SECTION – B

Answer All the Questions: 5 X 10 = 50M

6. A) Discuss the drawbacks of a file-based system and explain how the database approach addresses these issues. (K2)

   OR

   B) Explain the three-schema architecture of a database and describe its components, highlighting their importance in DBMS design. (K3)
7. A) Discuss the process of converting an ER diagram into relational tables. Why is this transformation important in database design? (K2)

   OR

   B) Explain the concepts of generalization and specialization in the Enhanced Entity-Relationship (EER) model with suitable examples. (K3)
8. A) Explain the concept of relational algebra and discuss its operations, providing examples for at least three operations. (K2)

   OR

   B) Discuss the normalization process and explain how to normalize a table to the third normal form (3NF), using a practical example. (K2)
9. A) Discuss the different types of SQL commands (DML, DDL, DCL, etc.) and provide examples for each, explaining their roles in database manipulation. (K3)

   OR

   B) Write an SQL query using nested queries to solve a problem, and explain the execution process of nested queries. (K2)
10. A) Describe the structure of a PL/SQL block and explain each component with an example.

    OR

    B) Explain the types of triggers in PL/SQL and provide examples of how they are used to automate tasks in a database system. (K3)

DATABASE MANAGEMENT SYSTEMS LAB
Offered to B.Sc. Honours Computer Science - Major

Course Code	**:**	**23CSMAP241**	No. Of Lecture Hours per week		:	2
Year of Introduction	:	2023-24	Total No. Of Lecture Hours		:	30
Year of Offering	:	2024-25	CIA Marks		:	15
Year of Revision	:	2024-25	SEE Marks		:	35
Percentage of Revision	:	0%	Total Marks		:	50
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	1
Course Category	:	Major				
Type of Course	:	Employability				
Course Relate to	:	Global				

Course Description:
This course introduces the core principles and techniques required in the design and implementation of database systems. This introductory application-oriented course covers the relational database systems RDBMS - the predominant system for business scientific and engineering applications at present. It includes Entity-Relational model, Normalization, Relational model, Relational algebra, and data access queries as well as an introduction to SQL. It also covers essential DBMS concepts such as Transaction Processing, Concurrency Control, and Recovery. It also provides students and practical skills in the use of databases and database management systems in information technology applications.

Course Objectives:

S.NO	COURSE OBJECTIVES
1	To explain basic database concepts, applications, data models, schemas, and instances.
2	To demonstrate the use of constraints and relational algebra operations.
3	To emphasize the importance of normalization in databases.
4	To facilitate students in Database design, Describe the basics of SQL and construct queries using SQL
5	To familiarize issues of concurrency control and transaction management.

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

CO NO	COURSE OUTCOME	BTL	PO	PSO
CO1	Apply the basic concepts of Database Systems and Applications.	**K3**	**1,2**	**1**
CO2	Use the basics of SQL and construct queries using SQL in database creation and interaction.	**K6**	**2,6**	**2**
CO3	Design a commercial relational database system (Oracle, MySQL) by writing SQL using the system.	**K3**	**1,2**	**1**
CO4	Analyse and select storage and recovery techniques of database systems.	**K4**	**2,6**	**2**
CO5	Develop PL/SQL code, handle exceptions, and automate database actions with triggers.	**K4**	**1,2, 6**	**1**

For BTL: K1: Remember; K2: Understand; K3: Apply; K4: Analyse; K5: Evaluate; K6: Create

CO-PO MATRIX									
CO NO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CO1	**3**	**3**							**3**
CO2		**3**				**2**			**3**
CO3	**3**	**3**							**3**
CO4		**3**				**2**			**3**
CO5	**3**	**3**				**2**			**3**

Use the codes 3-High, 2-Moderate, and 1-Low correlation between CO-PO-PSO respectively.

List of Experiments:

Lab Cycle – I (Order Tracking Database) - The Order Tracking Database consists of the following defined six relation schemas.

- Employees (eno, ename, zip, hdate)
- Parts (pno, pname, qoh, price, level) (hint: qoh: quality on hand)
- Customers (cno, cname, street, zip, phone)
- Orders (ono, cno, eno, received date, shipped date)
- Odetails (ono, pno, qty)
- Zipcodes (zip, city)

Solve the following queries.

1. Get all pairs of customer numbers for customers based on the same zip code.
2. Get part numbers for parts that have been ordered by at least two different customers.
3. For each odetail row, get ono, pno, pname,qty and price values along with the total price for the item. (total price=price*qty).
4. Get customer name and employee pairs such that the customer with name has placed an order through the employee.
5. Get customer names living in Fort Dodge or liberal.
6. Get cname values of customers who have ordered a product with pno 10506.
7. Get pname values of parts with the lowest price.
8. Get cname values of customers who have placed at least one order through the employee with number 1000.
9. Get the cities in which customers or employees are located.
10. Get the total sales in dollars on all orders.
11. Get part name values that cost more than the average cost of all parts.
12. Get part names of parts ordered by at least two different Customers.
13. Get for each part get pno, pname and total sales.
14. For each part, get pno, pname, total sales, whose total sales exceeds 1000.
15. Get pno, part names of parts ordered by at least two different customers.
16. Get cname values of customers who have ordered parts from any one employee based in Wichita or liberal.

Lab Cycle - II. (Shipment database) - An enterprise wishes to maintain the details about its suppliers and other corresponding details. For that, it uses the following tables.

Table s(sid, sname, address) primary key : sid

Table p(pid, pname, color) primary key : pid

Table cat(sid, pid, cost) primary key: sid+pid, reference key: sid references s.sid,pid references p.pid

Solve the following queries.

1. Find the pnames of parts for which there is some supplier.
2. Find the snames of suppliers who supply every part.
3. Find the snames of suppliers who suppy every red part.
4. Find the pnames of parts supllied by london supplier and by no one else.
5. Find the sids of suppliers who charge more for some part other than the average cost of that part using group by with having clause get the part numbers for all the parts supplied by more than one supplier.
6. Get the names of the suppliers, who do not supply part p2.
7. Find the sids of suppliers who supply a red and a green part.
8. Find the sids of suppliers who supply a red or a green part.
9. Find the total amount that has tobe paid for that supplier by part located from London.

Lab Cycle – III (Employee database) - AN ENTERPRISE WISHES TO MAINTAIN A DATABASE TO AUTOMATE ITS OPERATIONS. ENTERPRISE IS DIVIDED INTO CERTAIN DEPARTMENTS AND EACH DEPARTMENT CONSISTS OF EMPLOYEES. THE FOLLOWING TWO TABLES DESCRIBE THE AUTOMATION SCHEMAS

Dept (deptno, dname, loc)

Emp (empno,ename,job,mgr,hiredate,sal,comm,deptno)

Solve the following queries.

1. Create a view, that contain employee names and their manager names working in the sales department.
2. Determine the names of employee, who earn more than their managers.
3. Determine the names of employees, who take the highest salary in their departments.
4. Determine the employees, who are located at the same place.
5. Determine the employees, whose total salary is like the minimum salary of any department.
6. Update the employee salary by 25%, whose experience is greater than 10 years.
7. Delete the employees, who completed 32 years of service.
8. Determine the minimum salary of an employee and his details, who join on the same date.
9. Determine the count of employees, who are taking commission and not taking Commission.
10. Determine the department does not contain any employees.
11. Find out the details of the top 5 earners of the company.
12. Display themanager's name whose salary is more than the average salary of his employees.
13. Display those employees who joined the company before the 15th of the month.
14. Display the manager who hashadthemaximum number of employees working under him?
15. Print a list of employees displaying “less salary - if less than 1500”,“if exactly 1500 display as exact salary”,“and if greater than 1500 display more salary”?
16. Display those employees whose first 2 characters from hiredate- last 2 characters of salary?

17. Display those employees whose 10% of salary is equal to the year of joining.
18. In which year did most people join the company? Display the year and number of employees.
19. Display half of the enames in upper case and the remaining lower case.
20. Display ename, dname even if there no employees working in a particular department (use outer join).

4. Pl/SQL programs

1. Write a PL/SQL program to check whether the given number is strong or not.
2. Write a PL/SQL program to check whether the given string is palindrome or not.
3. Write a PL/SQL program to swap two numbers without using third variable.
4. Write a PL/SQL program to generate multiplication tables for 2,4,6.
5. Write a PL/SQL program to display the sum of even numbers and the sum of odd numbers in the given range.
6. Write a PL/SQL program to check whether the given number is palindrome or not.
7. write a PL/SQL procedure to prepare an electricity bill by using following table used:
   - name null? Type
   - mno not null number(3)
   - cname varchar2(20)
   - cur_readnumber(5)
   - prev_readnumber(5)
   - no_unitsnumber(5)
   - amount number(8,2)
   - ser_taxnumber(8,2)
   - net_amtnumber(9,2)
8. Write a procedure to update the salary of employee, who belongs to certain department with a certain percentage of raise.
9. Write a PL/SQL program to fire triggers on insert, update and deletecommands.

Note: The list of experiments is not limited to the above list. If the existing laboratory experiments completed in advance, the additional laboratory programs can added, and to be executed in the laboratory.

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Object Oriented Software Engineering
Offered to B.Sc. Honours Computer Science – Major – IV Semester

Course Code	:	**23CSMAL242**	No. Of Lecture Hours per week		:	4
Year of Introduction	:	2024-25	Total No. Of Lecture Hours		:	60
Year of Offering	:	2024-25	CIA Marks		:	30
Year of Revision	:	New Course	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	3
Course Category	:	Minor-1				
Type of Course	:	Employability				
Course Relate to	:	Global				

Course Description:
The course is to assist the student in understanding the basic theory of software engineering, and to apply these basic theoretical principles to a group software development project.

CourseObjectives:

S.NO	COURSEOBJECTIVES
1	Grasp fundamental software engineering concepts, methodologies, and principles
2	Known about ethical responsibilities of software engineers.
3	Gain the ability to design software systems that are modular, scalable, and maintainable
4	Study the cognitive, physical, and social aspects of human interaction with technology
5	Learn techniques for software testing and quality assurance and theoretical knowledge to real-world scenarios through case studies and practical exercises.

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

CO NO	COURSEOUTCOME	BTL	PO	PSO
CO1	Understand the requirements of the software projects.	K2	PO5, PO7	PSO2
CO2	Ability to analyze software requirements with existing tools	K4	PO5, PO7	PSO1, PSO2
CO3	Apply different testing methodologies	K3	PO5, PO7	PSO1, PSO2
CO4	Understand and apply the basic project management practices in real-life projects	K2,	PO5, PO7	PSO1, PSO2
CO5	Apply to software projects	K4	PO5, PO7	PSO1, PSO2

For BTL: K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

CO-POMATRIX									
CO NO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CO1					3		2		1
CO2					3		2	3	2
CO3					3		2	2	
CO4					3		2	2	2
CO5					3		2	3	2

Use the codes 3-High, 2-Moderate, and 1-Low correlation between CO-PO-PSO respectively.

Syllabus:

Unit No	Syllabus Content	Lecture Hours
I	**Introduction to Software Engineering**: Software Engineering, Software Development Projects, Emergence of Software Engineering, Computer Systems Engineering. **Software Life cycle models**: Need for life Cycle model, classical waterfall model, Iterative waterfall model, V-model, Prototyping model, Evolutionary model, Spiral model, Agile Development Models	12

II	**Software Project Management**: Responsibilities of a Software Project Manager, Project planning. **Requirement Analysis**: Requirements gathering and analysis, Software Requirements Specification contents of the SRS document, Traceability, Characteristics of good SRS DOCUMENT, Organization of the SRS document.	12
III	**Software design**: Desirable characteristics of a good software design, Cohesion and coupling, Layer Arrangement of Modules **Function-oriented software Design**: Overview of SA/SD methodology, structured analysis, Data Flow Diagrams, Structured Design and Detailed Design.	12
IV	**User interface design**: Characteristics of good user interface design, Basic concepts, Types of user interfaces, component-based GUI development, A user interface Design Methodology	12
V	**Software quality and testing**: Software Quality Assurance - Quality metrics - Software Reliability-Software testing Control Structures Testing- Black Box testing- Integration, Validation, and system testing. **CASE Tools**: Projects management, tools- analysis, and design tools–programming tools- integration and testing tool - Case studies.	12

Exercises

- Analyse the size factors of a software project building online stores, payment gateways
- Detailed Explanation of the COCOMO Model, the basic COCOMO formula is: Effort=a×(KLOC)b Where:
  - Effort is the number of person-months.
  - KLOC is the estimated number of thousands of lines of code.
  - a and b are coefficients that vary depending on the project type (organic, semi-detached, or embedded).
  - For example, for an organic project: a=2.4, b=1.05 a=2.4, b=1.05 a=2.4, b=1.05 Suppose we estimate the size of the software to be 50 KLOC
- Represent design notations for e-commerce platform. UML Diagrams:
  - Class Diagrams: Represent classes and relationships in each module.
  - Sequence Diagrams: Show interactions between objects during user registration, product search, order placement, and payment processing.
  - Data Flow Diagrams (DFDs): Illustrate how data flows through the system, from user inputs to database storage and retrieval.
- Example Interface Design:
  - Dashboard:
    - Patient List: A list of all monitored patients with summary information (name, room number, key vital signs).
    - Critical Alerts: A section for critical alerts, sorted by severity and time.
    - Navigation: Easy access to patient detail views, settings, and system logs.
  - Patient Detail View:
    - Vital Signs Graphs: Real-time graphs showing trends for heartrate, blood pressure, temperature, etc.
    - Alerts History: A log of all alerts for the patient, with time stamps and statuses.
    - Actions: Buttons for common actions, such as acknowledging alerts, adding notes, or calling for assistance.
  - Settings and Customization:
    - Alert Thresholds: Interface for setting and adjusting alert thresholds for different vital signs.
    - Display Options: Options for customizing the layout, themes, and data visibility.
- Client: A large online retailer looking to improve software quality and reduce testing time.
- Project: Implement a test automation framework for functional, regression, and performance testing of their e-commerce platform.

Example:

Software Design for an E-Commerce Platform
User Interface Design for a Real-Time Patient Monitoring System
Implementing Test Automation for an E-commerce Platform

Specific Resources: (web)

https://youtu.be/Ln_LP7c23WM
https://youtu.be/ilHPCbkZLV4
https://youtu.be/3fLahzQr8EI?list=PLDW872573QAZNlUzWVzoU8cCadXg1NUGK
https://youtu.be/uFYuHHglC6U?list=PLwdnzlV3ogoVKbbd4bwgSoga7EEuX5kFf

Choose any two of above case studies and do the following exercises for that Case Study

1. Write the software requirements specification document.
2. Draw the entity relationship diagram.
3. Draw the data flow diagrams.
4. Draw use case diagrams.
5. Draw activity diagrams for all use cases.
6. Draw sequence diagrams for all use cases.
7. Draw collaboration diagram.
8. Assign objects in sequence diagrams to classes and make class diagram.

Student Activity:

1. Visit any financial organization nearby and prepare requirement analysis report.
2. Visit any industrial organization and prepare risk chart.

Textbooks:

Fundamentals of Software Engineering, Fourth Edition, Rajib Mall, PHI

References:

1. R.Fairley, Software Engineering Concepts, Tata McGraw-Hill,1997.
2. Software Engineering, H. SommervillIan, Addition Wesley Pub. Co.
3. Software Engineering: An object-Oriented Perspective by Braude, E.J., Willey, 2001

MODEL QUESTION PAPER

Title of the Course	:	Object Oriented Software Engineering			
Course Code	:	23CSMAL242	Maximum Marks	:	70
Offered to	:	B.Sc. Honours Computer Science	Time	:	3 Hrs

NOTE TO PAPER SETTER: IN SECTION A & SECTION B, FOR EACH QUESTION ONE SUB-QUESTION (A) MUST BE A PROGRAM MEANT FOR LOGICAL TESTING, AND ANOTHER SUB-QUESTION (B) IS MEANT FOR DESCRIPTIVE / LOGICAL.

SECTION A

ANSWER THE FOLLOWING QUESTIONS. **5 X 4 = 20 Marks**

1 (a)Why Software Engineering is required? (K2)

OR

(b)What are the phases of the waterfall model? (K1)

2 (a)Summarize responsibilities of software manager. (K3)

OR

(b)Summarize Characteristics of SRS Document. (K3)

3 (a)What is DFD? Explain with an example. (K2)

OR

(b) Write about Modular Design. (K1)

4 (a)Differentiate Graphical user interface and text-based user interface. (K3)

OR

(b)List and explain various types of user interfaces. (K2)

5 (a)Write about Glass Box testing. (K1)

OR

(b)Summarize Quality metrics (K3)

SECTION B

ANSWER THE FOLLOWING QUESTIONS **5 X 10 = 50 Marks**

6 (a) Compare different software development life cycle modes. (K3)

OR

(b)Explain about spiral model. (K2)

7 (a) What are the reasons to spend time and resources to develop a SRS document. (K1)

OR

(b)Explain metrics for project size estimation. (K2)

8 (a)Explain about coupling and cohesion. (K2)

OR

(b)Write about overview of SA/SD methodologies. (K1)

9 (a)Explain different types of user interfaces (K2)

OR

(b)Explain IJML class diagrams with an example (K2)

10 (a)What is program testing? Briefly explain the following tests:

a) Unit testing. b) Block box testing c) White box testing (K1)

OR

(b)Discuss analysis and design tools. (K2)

OBJECT-ORIENTED SOFTWARE ENGINEERING LAB
Offered to B.Sc. Honours Computer Science - Major

Course Code	**:**	**23CSMAP242**	No. Of Lecture Hours per week		:	2
Year of Introduction	:	2023-24	Total No. Of Lecture Hours		:	30
Year of Offering	:	2024-25	CIA Marks		:	15
Year of Revision	:	2024-25	SEE Marks		:	35
Percentage of Revision	:	0%	Total Marks		:	50
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	1
Course Category	:	Major				
Type of Course	:	Employability				
Course Relate to	:	Global				

Course Description: This course provides the basic opportunity to implement various OOSE concepts using case studies. It also enables students to analyze and design the system in an object-oriented manner using the Eclipse tool.

Course Objectives:

S.NO	COURSE OBJECTIVES
1	Understand the basics and planning of a software project
2	Analyze software cost estimation and its techniques
3	Software Design
4	User interface design
5	Software testing and validations

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

CO NO	Course Outcome	BTL	POS	PSO
CO1	Understand the requirements of the software projects	K2	6,7	2
CO2	Ability to analyze software requirements with existing tools	K4	6,7	1,2
CO3	Apply different testing methodologies	K3	6,7	1,2
CO4	Understand and apply the basic project management practices in real-life projects	K2, K4	6,7	1,2
CO5	Apply to software projects	K4	6,7	1,2

For BTL: K1: Remember; K2: Understand; K3: Apply; K4: Analyse; K5: Evaluate; K6: Create

CO-PO MATRIX									
CONO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1						3	2		1
CO2						3	2	3	2
CO3						3	2	2	
CO4						3	2	2	2
CO5						3	2	3	2

Use the codes 3-High, 2-Moderate, and 1-Low correlation between CO-PO-PSO respectively.

This lab list covers the key areas of a Software Engineering course, providing hands-on practice with Eclipse UML2/any other Open-Source Tools

Design Following Systems in Object Oriented Approach using UML with open source tools (Eclipse UML2 or any other Open source tools):

- Online Examination System.
- Online Railway Reservation.
- Library Maintenance System.
- Any E-Commerce Portal.
- Biometric Attendance System.

1. Write down the problem statement for a suggested system of relevance.
2. Do requirement analysis and develop a Software Requirement Specification Sheet (SRS) for the suggested system.
3. To perform the function-oriented diagram: Data Flow Diagram (DFD) and Structured chart.
4. To perform the user's view analysis for the suggested system: Use case diagram.
5. To draw the structural view diagram for the system: Class diagram, object diagram.
6. To draw the behavioral view diagram: State-chart diagram, Activity diagram

7. To perform the behavioral view diagram for the suggested system: Sequence diagram, Collaboration diagram.
8. To perform the implementation view diagram: Component diagram for the system.
9. To perform the environmental view diagram: Deployment diagram for the system.
10. To perform various testing using the testing tool unit testing, and integration testing for a sample code of the suggested system.
11. Perform Estimation of effort using FP Estimation for the chosen system.
12. To Prepare a timeline chart/Gantt Chart/PERT Chart for the selected software project

Note: Student is expected to analyze the system in an object-oriented manner and design the system in object-oriented approach using UML with open-source tools

Note: The list of experiments is not limited to the above list. If the existing laboratory experiments completed in advance, the additional laboratory programs can added, and to be executed in the laboratory.

References:
1. Fundamentals of Software Engineering, Fourth Edition, Rajib Mall, PHI
2. R.S. Pressman, Software Engineering a practitioner's approach, Fourth Ed., McGraw Hill, 1997

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DIGITAL LITERACY
Offered to B.Com (Comp. Appl), B.Sc (Comp. Sci.), and BCA – SEC – II Semester

Course Code	:	**23CSSDL121**	No. Of Lecture Hours per week		:	2
Year of Introduction	:	2024-25	Total No. Of Lecture Hours		:	30
Year of Offering	:	2024-25	CIA Marks		:	15
Year of Revision	:	New Course	SEE Marks		:	50
Percentage of Revision	:	0%	Total Marks		:	50
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	1
Course Category	:	SEC				
Type of Course	:	Skill Development, Employability				
Course Relate to	:	Global				

Course Description:
The Digital Literacy course equips students with the essential knowledge and skills needed to navigate and thrive in the digital age. This course emphasizes the foundational principles of using digital tools, understanding online communication, and ensuring safe and ethical participation in digital environments. Students will gain proficiency in operating common software, managing online resources, and critically evaluating digital content. Additionally, the course introduces basic concepts of data privacy, cybersecurity, and digital collaboration to foster responsible and effective digital citizenship.

Course Objectives:

S.NO	COURSE OBJECTIVES
1	Develop a foundational understanding of digital technologies, their applications, and their role in modern society.
2	Enable students to use computers, mobile devices, and internet resources effectively for communication, learning, and problem-solving.
3	Teach the use of productivity software (e.g., word processors, spreadsheets, presentation tools) for academic and professional tasks.
4	Equip students with the ability to critically evaluate online information for credibility, accuracy, and relevance.
5	Encourage responsible and ethical behavior when using digital technologies, including respecting intellectual property, and understanding privacy concerns.

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

CO NO	COURSE OUTCOME	BTL	PO	PSO
CO1	Perform operations on the computer	K2	PO5, PO7	PSO2
CO2	Access the Internet and finding information of interest	K4	PO5, PO7	PSO1, PSO2
CO3	Register for an E-mail account and operating it	K3	PO5, PO7	PSO1, PSO2
CO4	Make bill payments and use other applications of Internet	K2,	PO5, PO7	PSO1 ,PSO2
CO5	Create, edit and format documents using a word processor	K4	PO5, PO7	PSO1, PSO2

For BTL: K1: Remember; K2: Understand; K3:Apply; K4:Analyze; K5:Evaluate; K6: Create

CO-POMATRIX									
CO NO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CO1					3		2		1
CO2					3		2	3	2
CO3					3		2	2	
CO4					3		2	2	2
CO5					3		2	3	2

Use the codes 3-High, 2-Moderate, and 1-Low correlation between CO-PO-PSO respectively.

Syllabus:

Unit No	Syllabus Content	Lecture Hours
I	**Operate the elements of a computer and performing operations on the computer:** Operate the elements of a computer including power cord, power switch, network connecting cable, USB ports, Mouse operations, Keyboard operations, interface icons, GUI elements, Editing options, perform operations including switching on the computer, logging in, locating a file, opening a file, printing a document, storing a file with proper extension, creating a folder/ sub folder in a volume on hard disk and desktop, shifting files from one folder to another, shutting off the computer.	10
II	**Access the Internet to browse information and E-mail operation:** Access the Internet, use a search engine, find information on the topic of interest, register for a web-based E-mail account, access E-mail with attachments, reply to an E-mail, forward an E-mail, and delete an E-mail message.	10
III	**Make bill payments, other applications using Internet and word processing:** Make utility bill payments, booking bus/train tickets, bank transactions, personal transactions, job search through employment portals, mobile/DTH recharge, word processing basics, creating, editing and formatting of text, saving and printing of word document.	10

Exercise:

1) Describe the steps to:
   - Create a new folder on the desktop.
   - Move a file from one folder to another.
   - Save a document with a specific extension (e.g., .docx, .pdf).
   - Safely shut down the computer.
2) Perform the following tasks:
   - Use a search engine to find information about "Digital Literacy Programs in India."
   - List the first five links and describe their relevance.
   - Explain how to register for a free web-based email account (e.g., Gmail).
3) Perform the following:
   - Use an online portal to check electricity bill details and make the payment.
   - Create a Word document summarizing the bill details, including customer name, bill amount, and payment date.
   - Format the document with a bold title, bullet points for the summary, and save it as a PDF.

Case Study:

1) A student is using a computer for the first time and needs to complete the following tasks:
   - Create a folder named "Assignments" on the desktop.
   - Save a Word document inside this folder with the name "MathHomework.docx."
   - Print the document and then log out of the system.
2) A professional has received an email with an attachment containing their travel itinerary. They need to download the attachment, forward the email to their manager, and delete unnecessary emails from their inbox.
3) A working professional needs to recharge their mobile phone and create a formal letter for a job application. They also need to format and print the letter.

Prescribed readings:

Appreciation of Digital Literacy Handbook published by Department of Electronics & Information Technology, Ministry of Communications & Information Technology, Government of India

Web Resources:

1. https://youtu.be/b2X_j5Bz-VM
2. https://youtu.be/jln3-P6L2ro
3. https://youtu.be/cfDisqUMIvw
4. https://youtu.be/3h_PyURcdrc
5. https://youtu.be/EqN0LBcydBg

MODEL QUESTION PAPER

Title of the Course	:	Digital Literacy			
Course Code	:	23CSSDL121	Maximum Marks	:	35
Offered to	:	B.Com (CA), B.Sc (Comp Sci.), and BCA	Time	:	1 ½ Hrs

SECTION A

ANSWER ANY THREE OF THE FOLLOWING QUESTIONS. 3 X 5 = 15 Marks

1. What are the steps to safely shut down a computer?
2. Describe the purpose of a USB port and give two examples of devices that use it.
3. What is the difference between a web browser and a search engine? Provide examples of each.
4. How do you attach a file to an email and send it?
5. List the steps required to make a mobile recharge using an online payment platform.

SECTION B

ANSWER ANY TWO OF THE FOLLOWING QUESTIONS 2 X 10 = 20 Marks

6. Explain the process of creating a folder on the desktop, saving a file with a proper extension, and moving the file into the folder. Include step-by-step instructions.
7. Describe the process of creating a new email account, sending an email with an attachment, and organizing the inbox by deleting unnecessary emails.
8. Discuss the steps involved in booking a train ticket online. Explain how you would download and print the ticket after booking.
9. Write a detailed guide on creating, formatting, and saving a Word document with headings, bullet points, and a table. Include an explanation of how to print the document.

Course Structure

Program: **B.Sc. Honours Mathematics / Physics / Chemistry**

S. No	Course Code	Course Name	Sem	Major / Minor	Lecture Hours per week	IA	SEE	Total Marks	Credits
1	23CSMIL121	Problem-Solving using C	II	Minor-1 Theory	4	30	70	100	3
2	23CSMIP121	Problem-Solving using C Lab	II	Minor-1 Practical	2	15	35	50	1
3	23CSMIL241	DBMS with Oracle	IV	Minor-3 Theory	4	30	70	100	3
4	23CSMIP241	DBMS with Oracle Lab	IV	Minor-3 Practical	2	15	35	50	1
5	23CSMIL242	Software Engineering with Object-oriented approach	IV	Minor-4 Theory	4	30	70	100	3
6	23CSMIP242	Software Engineering with Object-oriented Approach Lab	IV	Minor-4 Practical	2	15	35	50	1

PROBLEM SOLVING Using "C"

Offered to B.Sc. Honours (Mathematics / Physics / Chemistry) – Minor – II Semester

Course Code	**:**	**23CSMIL121**	No. Of Lecture Hours per week		:	4
Year of Introduction	:	2023-24	Total No. Of Lecture Hours		:	60
Year of Offering	:	2024-25	CIA Marks		:	30
Year of Revision	:	2024-25	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	3
Course Category	:	Minor-1				
Type of Course	:	Skill Development				
Course Relate to	:	National				

Course Objective: This course aims to provide exposure to problem-solving through programming and introduce the concepts of the C Programming language.

Course outcomes (based on BTL):

- CO1. Understand Tokens and write basic C programs. (PO5)
- CO2. Understand control structures in C. (PO5)
- CO3. Understand arrays and strings and implement them.
- CO4. Understand the right way of using functions, pointers, and structures in C(PO5)
- CO5. Develop and test programs written in C files (PO5, PO7)

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) & PSOs:

	CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
23CSMAL121	CO1					H		
	CO2					H		
	CO3					H		
	CO4					H		
	CO5					H		M

Unit No	Syllabus Content	Lecture Hours
I	**Introduction to C:** Introduction – Structure of C Program, Writing the first C Program, File used in C Program, Compiling and Executing C Programs, Using Comments, Keywords, Identifiers, Basic Data Types in C, Variables, Constants, I/O Statements in C, Operators in C, Programming Examples.	12
II	**Decision Control and Looping Statements**: Introduction to Decision Control Statements, Conditional Branching Statements, Iterative Statements, Nested Loops, Break and Continue Statement, goto Statement.	12
III	**Arrays**: Introduction, Declaration of Arrays, accessing elements of the Array, Storing Values in Array, Operations on Arrays, one dimensional, two dimensional and multi-dimensional arrays, character handling and strings.	10
IV	**Functions**: Introduction, using functions, Function declaration/ prototype, Function definition, function call, return statement, Passing parameters, Scope of variables, Storage Classes, Recursive functions. **Structure:** Introduction, Nested Structures, Arrays of Structures, Structures and Functions, Unions.	12
V	**Pointers:** Understanding Computer Memory, Introduction to Pointers, declaring Pointer Variables, Pointer Expressions and Pointer Arithmetic, Null Pointers, Passing Arguments to Functions using Pointer, Pointer and Arrays, Memory Allocation in C Programs, Memory Usage, Dynamic Memory Allocation, Drawbacks of Pointers. **Files:** Introduction to Files, Using Files in C, Reading Data from Files, Writing Data to Files.	14

Textbooks: E Balagurusamy – Programming in ANSIC – Tata McGraw-Hill publications.
Reference Books: Yashavant Kanetkar - Let Us 'C' – BPB Publications.

MODEL QUESTION PAPER

Title of the Course	:	Problem Solving using C			
Course Code	:	23CSMIL121	Maximum Marks	:	70
Offered to	:	B.Sc Honours (Mat / Phy / Che)	Time	:	3 Hrs

Section A

Answer all Questions **5 x 4=20M**

1. (A) Explain Structure of C. (CO1, L1)

   OR

   (B) Describe Keywords (CO1, L1)

2. (A) Write about the break and continue statements (CO2, L1)

   OR

   (B) Write a c program to print 1 to 10 natural numbers. (CO2, L1)

3. (A) Summarize one-dimensional array with a suitable example. (CO3, L2)

   OR

   (B). Define a string with an example program. (CO3, L1)

4. (A) What is the scope of variables in functions. (CO4, L1)

   OR

   (B) Define a function and how to declare a function in c. (CO4, L1)

5. (A) Write about Reading data from files. (CO5, L1)

   OR

   (B) How to declare a pointer variable in C. (CO5, L1)

Section B

Answer all Questions **5 x 10=50M**

1. (A) Explain Datatypes in c with an example. (CO1, L1)

   OR

   (B) Explain about Input and Output statements in C. (CO1, L1)

2. (A) Summarize Looping statements in c with example. (CO2, L2)

   OR

   (B)Summarize iterative statements in c with examples. (CO2, L2)

8. (A) Write a program for the multiplication of 2 3x3 matrices. (CO3, L1)

   OR

   (B) Write a program by using string handling functions. (CO3, L1)

9 (A) Explain Storage Classes in C. (CO4, L2)

   OR

   (B) Explain the array of structures. (CO4, L2)

10 (A) Explain Dynamic memory allocation. (CO5, L2)

   OR

   (B) How to pass arguments to functions using pointers with an example program. (CO5, L2)

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PROBLEM-SOLVING Using "C" LAB

Offered to B.Sc. Honours (Mathematics / Physics / Chemistry) – Minor – II Semester

Course Code	**:**	**23CSMIP121**	No. Of Lecture Hours per week		:	2
Year of Introduction	:	2023-24	Total No. Of Lecture Hours		:	30
Year of Offering	:	2023-24	CIA Marks		:	15
Year of Revision	:	New Course	SEE Marks		:	35
Percentage of Revision	:	0%	Total Marks		:	50
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	1
Course Category	:	Minor-1				
Type of Course	:	Skill Development				
Course Relate to	:	National				

Course Objective: This course aims to provide exposure to problem-solving through programming and introduce the concepts of the C Programming language.

Course outcomes (based on BTL):

- CO1: Demonstration of basic C programs using branching and iterative statements. (PO7)
- CO2: Perform Operations on Arrays. (PO5)
- CO3: Perform passing parameters to functions and recursive functions. (PO5)
- CO4: Demonstration of the concept of pointers. (PO5)
- CO5: Demonstration of Structures and files in C program. (PO5)

List of Programmes:

1) Write a C program to check whether the given two numbers are equal, bigger, or smaller.
2) Write a C program to perform arithmetic operations using Switch...case?
3) Write a program to find the sum of individual digits of a positive integer.
4) Write a program to check whether the given number is Armstrong or not.
5) Write a program to generate the first N terms of the Fibonacci sequence.
6) Write a program to find both the largest and smallest number in a list of integer values.
7) Write a program that uses functions to add two matrices.
8) Write a program for the multiplication of two n X n matrices.
9) Write a program to demonstrate the reflection of parameters in the swapping of two integer values using Call by Value& Call by Address.
10) Write a program to calculate the factorial of a given integer value using recursive functions.
11) Write a program to search for an element in each list of values.
12) Write a program to illustrate pointer arithmetic.
13) Write a program to sort a given list of integers in ascending order.
14) Write a program to calculate the salaries of all employees using the Employee (ID, Name, Designation, Basic Pay, DA, HRA, Gross Salary, Deduction, Net Salary) structure.
    (a) DA is 30 % of Basic Pay
    (b) HRA is 15% of Basic Pay
    (c) Deduction is 10% of (Basic Pay + DA)
    (d) Gross Salary = Basic Pay + DA+ HRA (e) Net Salary = Gross Salary - Deduction
15) Write a program to perform various string operations.
16) Write a program to read the data character by character from a file.
17) Write a program to create Book (ISBN, Title, Author, Price, Pages, Publisher) structure and store book details in a file and perform the following operations.
    (a) Add book details.
    (b) Search book detail for a given ISBN and display book details, if available
    (c) Update a book detail using ISBN.
    (d) Delete book details for a given ISBN and display list of remaining Books.

Note: The list of experiments is not limited to the above list. If the existing laboratory experiments completed in advance, the additional laboratory programs can added, and to be executed in the laboratory.

DBMS with Oracle

Offered to B.Sc. Honours (Maths/Physics/Chemistry) – Minor – IV Semester

Course Code	**:**	**23CSMIL241**	No. Of Lecture Hours per week		:	4
Year of Introduction	:	2024-25	Total No. Of Lecture Hours		:	60
Year of Offering	:	2024-25	CIA Marks		:	30
Year of Revision	:	New Course	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	3
Course Category	:	Minor-3				
Type of Course	:	Employability				
Course Relate to	:	Global				

Course Description:
This course introduces students to the fundamentals of database management systems (DBMS). It explores the theory, design, and implementation of databases, focusing on relational databases and SQL. The course also covers the underlying architecture of DBMS, including data storage, indexing, query optimization, and transaction management. This course also covers basic concepts of PL/SQL.

Course Objectives:
By the end of the DBMS with Oracle course, students will understand the fundamentals of database management systems and their importance in storing, organizing, and retrieving data. They will gain hands-on experience with Oracle, learning to design and implement efficient relational databases, write SQL queries, and perform advanced database operations.

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

CO No.	COURSE OUTCOME	BTL	PO	PSO
CO1	Understand the fundamentals of database systems, and data models.	**K1**	**1,2**	**1**
CO2	Understand the relational model, keys, normalization, and how to apply these concepts to design.	**K2**	**2,6**	**1**
CO3	Design ER diagrams to model databases and perform basic SQL operations.	**K3**	**1,2**	**1**
CO4	Develop complex SQL queries using subqueries, joins, and functions.	**K3**	**2,6**	**2**
CO5	Design PL/SQL code, handling exceptions, and automating database actions with triggers.	**K3**	**1,2,6**	**2**

For BTL: K1: Remember; K2: Understand; K3: Apply; K4: Analyse; K5: Evaluate; K6: Create

CO-POMATRIX									
CO NO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CO1	**3**	**3**						**3**	
CO2		**3**				**2**		**3**	
CO3	**3**	**3**						**3**	
CO4		**3**				**2**		**3**	
CO5	**3**	**3**				**2**		**2**	

Use the codes 3, 2, and 1 for High, Moderate, and Low correlation Between CO-PO-PSO respectively.

Syllabus:

Unit No	Syllabus Content	Lecture Hours
I	**Overview of Database Management System:** Introduction to data, information, database, database management systems, file-based system, Drawbacks of file-based System, database approach, Classification of Database Management Systems, advantages of database approach, Various Data Models, Components of Database Management System, three schema architecture of database, costs, and risks of the database approach.	12

II	**Relational Model:** Introduction, CODD Rules, relational data model, concept of key, relational integrity, relational algebra, relational algebra operations, advantages of relational algebra, limitations of relational algebra, relational calculus, tuple relational calculus, domain relational Calculus (DRC), Functional dependencies and normal forms up to 3rd normal form.	12
III	**Entity-Relationship Model:** Introduction, Database design, and ER Diagrams, entities, attributes, and entity sets, attribute classification, relationship degree, relationship classification, reducing ER diagram to tables, conceptual design with the entity-relationship model **EER model:** Generalization and Specialization, IS-A relationship and attribute inheritance, multiple inheritance, constraints on specialization and generalization, advantages of ER modelling.	12
IV	**Structured Query Language:** Introduction, Commands in SQL, Data Types in SQL, basic SQL query, nested queries, Selection Operation, Projection Operation, Aggregate functions, Data Manipulation Language, Table Modification Commands, Join Operation, Set Operations, View, Sub Query.	12
V	**PL/SQL:** Introduction, Shortcomings of SQL, Structure of PL/SQL, PL/SQL Language Elements, Data Types, Operators Precedence, Control Structure, Steps to Create a PL/SQL, Program, Iterative Control, Procedure, Function, Database Triggers, Types of Triggers.	12

Activity:

- Seminar Presentation on Database Management Systems.
- Case Study on the EER Model
- Exercise on Normalization: Assign students a set of un-normalized tables and have them normalize the tables to the third normal form.
- Competition on SQL Query Writing
- Peer Review of PL/SQL code

Specific Resources: (web)

- https://onlinecourses.nptel.ac.in/noc22_cs91/preview
- https://www.geeksforgeeks.org/introduction-of-dbms-database-management-system-set-1/
- https://www.lucidchart.com/pages/erdiagrams#:~:text=An%20Entity%20Relationship%20(ER)%20Diagram,to%20each%20other%20within%20a
- https://onlinecourses.nptel.ac.in/noc19_cs46/preview

Reference Books

1. Database System Concepts by Abraham Silberschatz, Henry F. Korth, and S. Sudarshan, 6th Edition, McGraw-Hill Education, 2010.
2. Database Management Systems by Raghu Ramakrishnan, McGrawhill
3. Principles of Database Systems by J. D. Ullman.
4. Fundamentals of Database Systems by R. Elmasri and S. Navathe.
5. SQL: The Ultimate Beginners Guide by Steve Tale.

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MODEL QUESTION PAPER

Title of the Course	:	DBMS with Oracle			
Course Code	:	23CSMIL241	Maximum Marks	:	70
Offered to	:	B.Sc Honours (Mat / Phy / Che)	Time	:	3 Hrs

NOTE TO PAPER SETTER: IN SECTION A & SECTION B, FOR EACH QUESTION ONE SUB-QUESTION (A) MUST BE A PROGRAM MEANT FOR LOGICAL TESTING, AND ANOTHER SUB-QUESTION (B) IS MEANT FOR DESCRIPTIVE / LOGICAL.

SECTION A

ANSWER THE FOLLOWING QUESTIONS. 5 X 4 = 20 Marks

1. A) What is the difference between data and information? (K1)

   OR

   B) What are the advantages of using a database approach over a file-based system? (K1)
2. A) Define an entity and an attribute in the context of an ER diagram. (K2)

   OR

   B) What is the purpose of generalization in the Enhanced Entity-Relationship (EER) model? (K3)
3. A) What is the concept of a "key" in the relational model? (K2)

   OR

   B) Explain what relational algebra is and name any two of its operations. (K3)
4. A) What is the purpose of the SELECT statement in SQL? (K2)

   OR

   B) What is the role of the JOIN operation in SQL? (K1)
5. A) What is a cursor in PL/SQL? (K1)

   OR

   B) What is a database trigger in PL/SQL? (K1)

SECTION – B

Answer All the Questions: 5 X 10 = 50M

6. A) Discuss the drawbacks of a file-based system and explain how the database approach addresses these issues. (K2)

   OR

   B) Explain the three-schema architecture of a database and describe its components, highlighting their importance in DBMS design. (K3)
7. A) Discuss the process of converting an ER diagram into relational tables. Why is this transformation important in database design? (K2)

   OR

   B) Explain the concepts of generalization and specialization in the Enhanced Entity-Relationship (EER) model with suitable examples. (K3)
8. A) Explain the concept of relational algebra and discuss its operations, providing examples for at least three operations. (K2)

   OR

   B) Discuss the normalization process and explain how to normalize a table to the third normal form (3NF), using a practical example. (K2)
9. A) Discuss the different types of SQL commands (DML, DDL, DCL, etc.) and provide examples for each, explaining their roles in database manipulation. (K3)

   OR

   B) Write an SQL query using nested queries to solve a problem, and explain the execution process of nested queries. (K2)
10. A) Describe the structure of a PL/SQL block and explain each component with an example.

    OR

    B) Explain the types of triggers in PL/SQL and provide examples of how they are used to automate tasks in a database system. (K3)

DBMS WITH ORACLE LAB

Offered to B.Sc. Honours (Maths / Physics / Chemistry) – Minor

Course Code	**:**	**23CSMIP241**	No. Of Lecture Hours per week		:	2
Year of Introduction	:	2023-24	Total No. Of Lecture Hours		:	30
Year of Offering	:	2024-25	CIA Marks		:	15
Year of Revision	:	2024-25	SEE Marks		:	35
Percentage of Revision	:	0%	Total Marks		:	50
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	1
Course Category	:	Minor-3				
Type of Course	:	Employability				
Course Relate to	:	Global				

Course Description:

This course introduces the core principles and techniques required in the design and implementation of database systems. This introductory application-oriented course covers the relational database systems RDBMS - the predominant system for business scientific and engineering applications at present. It includes Entity-Relational model, Normalization, Relational model, Relational algebra, and data access queries as well as an introduction to SQL. It also covers essential DBMS concepts such as Transaction Processing, Concurrency Control, and Recovery. It also provides students and practical skills in the use of databases and database management systems in information technology applications.

Course Objectives:

S.NO	COURSE OBJECTIVES
1	To explain basic database concepts, applications, data models, schemas, and instances.
2	To demonstrate the use of constraints and relational algebra operations.
3	To emphasize the importance of normalization in databases.
4	To facilitate students in Database design, Describe the basics of SQL and construct queries using SQL
5	To familiarize issues of concurrency control and transaction management.

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

CO NO	COURSE OUTCOME	BTL	PO	PSO
CO1	Apply the basic concepts of Database Systems and Applications.	**K3**	**1,2**	**1**
CO2	Use the basics of SQL and construct queries using SQL in database creation and interaction.	**K6**	**2,6**	**2**
CO3	Design a commercial relational database system (Oracle, MySQL) by writing SQL using the system.	**K3**	**1,2**	**1**
CO4	Analyse and select storage and recovery techniques of database systems.	**K4**	**2,6**	**2**
CO5	Develop PL/SQL code, handle exceptions, and automate database actions with triggers.	**K4**	**1,2,6**	**1**

For BTL: K1: Remember; K2: Understand; K3: Apply; K4: Analyse; K5: Evaluate; K6: Create

CO-PO MATRIX									
CO NO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CO1	**3**	**3**							**3**
CO2		**3**				**2**			**3**
CO3	**3**	**3**							**3**
CO4		**3**				**2**			**3**
CO5	**3**	**3**				**2**			**3**

Use the codes 3-High, 2-Moderate, and 1-Low correlation between CO-PO-PSO respectively.

List of Experiments:

Lab Cycle – I (Order Tracking Database) - The Order Tracking Database consists of the following defined six relation schemas.

- Employees(eno,ename,zip,hdate)
- Parts(pno,pname,qoh,price,level) (hint: qoh: quality on hand)
- Customers(cno,cname,street,zip,phone)
- Orders(ono,cno,eno,receiveddate,shipped date)
- Odetails(ono,pno,qty)
- Zipcodes(zip,city)

Solve the following queries.

1. Get all pairs of customer numbers for customers based on the same zip code.
2. Get part numbers for parts that have been ordered by at least two different customers.
3. For each odetail row, get ono, pno, pname,qty and price values along with the total price for the item. (total price=price*qty).
4. Get customer name and employee pairs such that the customer with name has placed an order through the employee.
5. Get customer names living in Fort Dodge or liberal.
6. Get cname values of customers who have ordered a product with pno 10506.
7. Get pname values of parts with the lowest price.
8. Get cname values of customers who have placed at least one order through the employee with number 1000.
9. Get the cities in which customers or employees are located.
10. Get the total sales in dollars on all orders.
11. Get part name values that cost more than the average cost of all parts.
12. Get part names of parts ordered by at least two different Customers.
13. Get for each part get pno, pname and total sales.
14. For each part, get pno, pname, total sales, whose total sales exceeds 1000.
15. Get pno, part names of parts ordered by at least two different customers.
16. Get cname values of customers who have ordered parts from any one employee based in Wichita or liberal.

Lab Cycle - II. (Shipment database) - An enterprise wishes to maintain the details about its suppliers and other corresponding details. For that, it uses the following tables.

Table s(sid,sname,address) primary key : sid

Table p(pid,pname,color) primary key : pid

Table cat(sid,pid,cost) primary key: sid+pid, reference key: sid references s.sid,pid references p.pid

Solve the following queries.

1. Find the pnames of parts for which there is some supplier.
2. Find the snames of suppliers who supply every part.
3. Find the snames of suppliers who suppy every red part.
4. Find the pnames of parts supllied by london supplier and by no one else.
5. Find the sids of suppliers who charge more for some part other than the average cost of that part using group by with having clause get the part numbers for all the parts supplied by more than one supplier.
6. Get the names of the suppliers, who do not supply part p2.
7. Find the sids of suppliers who supply a red and a green part.
8. Find the sids of suppliers who supply a red or a green part.
9. Find the total amount that has tobe paid for that supplier by part located from London.

Lab Cycle – III (Employee database) - AN ENTERPRISE WISHES TO MAINTAIN A DATABASE TO AUTOMATE ITS OPERATIONS. ENTERPRISE IS DIVIDED INTO CERTAIN DEPARTMENTS AND EACH DEPARTMENT CONSISTS OF EMPLOYEES. THE FOLLOWING TWO TABLES DESCRIBE THE AUTOMATION SCHEMAS

Dept (deptno, dname, loc)

Emp (empno,ename,job,mgr,hiredate,sal,comm,deptno)

Solve the following queries.

1. Create a view, that contain employee names and their manager names working in the sales department.
2. Determine the names of employee, who earn more than their managers.
3. Determine the names of employees, who take the highest salary in their departments.
4. Determine the employees, who are located at the same place.
5. Determine the employees, whose total salary is like the minimum salary of any department.
6. Update the employee salary by 25%, whose experience is greater than 10 years.
7. Delete the employees, who completed 32 years of service.
8. Determine the minimum salary of an employee and his details, who join on the same date.

9. Determine the count of employees, who are taking commission and not taking Commission.
10. Determine the department does not contain any employees.
11. Find out the details of the top 5 earners of the company.
12. Display themanager's name whose salary is more than the average salary of his employees.
13. Display those employees who joined the company before the 15th of the month.
14. Display the manager who has/hadthemaximum number of employees working under him?
15. Print a list of employees displaying “less salary - if less than 1500”,“if exactly 1500 display as exact salary”,“and if greater than 1500 display more salary”?
16. Display those employees whose first 2 characters from hiredate- last 2 characters of salary?
17. Display those employees whose 10% of salary is equal to the year of joining.
18. In which year did most people join the company? Display the year and number of employees.
19. Display half of the enames in upper case and the remaining lower case.
20. Display ename, dname even if there no employees working in a particular department (use outer join).

4. Pl/SQL programs

1. Write a PL/SQL program to check whether the given number is strong or not.
2. Write a PL/SQL program to check whether the given string is palindrome or not.
3. Write a PL/SQL program to swap two numbers without using third variable.
4. Write a PL/SQL program to generate multiplication tables for 2,4,6.
5. Write a PL/SQL program to display the sum of even numbers and the sum of odd numbers in the given range.
6. Write a PL/SQL program to check whether the given number is palindrome or not.
7. write a PL/SQL procedure to prepare an electricity bill by using following table used:
   - name null? Type
   - mno not null number(3)
   - cname varchar2(20)
   - cur_readnumber(5)
   - prev_readnumber(5)
   - no_unitsnumber(5)
   - amount number(8,2)
   - ser_taxnumber(8,2)
   - net_amtnumber(9,2)
8. Write a procedure to update the salary of employee, who belongs to certain department with a certain percentage of raise.
9. Write a PL/SQL program to fire triggers on insert, update and deletecommands.

Note: The list of experiments is not limited to the above list. If the existing laboratory experiments completed in advance, the additional laboratory programs can added, and to be executed in the laboratory.

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Software Engineering with Object-Oriented Approach
Offered to B.Sc. Honours (Maths / Physics / Chemistry) – Minor – IV Semester

Course Code	:	**23CSMIL242**	No. Of Lecture Hours per week		:	4
Year of Introduction	:	2024-25	Total No. Of Lecture Hours		:	60
Year of Offering	:	2024-25	CIA Marks		:	30
Year of Revision	:	New Course	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	3
Course Category	:	Minor-4				
Type of Course	:	Employability				
Course Relate to	:	Global				

Course Description:
The course is to assist the student in understanding the basic theory of software engineering, and to apply these basic theoretical principles to a group software development project.

Course Objectives:

S.NO	COURSEOBJECTIVES
1	Grasp fundamental software engineering concepts, methodologies, and principles
2	Known about ethical responsibilities of software engineers.
3	Gain the ability to design software systems that are modular, scalable, and maintainable
4	Study the cognitive, physical, and social aspects of human interaction with technology
5	Learn techniques for software testing and quality assurance and theoretical knowledge to real-world scenarios through case studies and practical exercises.

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

CO NO	COURSE OUTCOME	BTL	PO	PSO
CO1	Understand the requirements of the software projects.	K2	PO5, PO7	PSO2
CO2	Ability to analyze software requirements with existing tools	K4	PO5, PO7	PSO1, PSO2
CO3	Apply different testing methodologies	K3	PO5, PO7	PSO1, PSO2
CO4	Understand and apply the basic project management practices in real-life projects	K2,	PO5, PO7	PSO1, PSO2
CO5	Apply to software projects	K4	PO5, PO7	PSO1, PSO2

For BTL: K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

CO-POMATRIX									
CO NO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CO1					3		2		1
CO2					3		2	3	2
CO3					3		2	2	
CO4					3		2	2	2
CO5					3		2	3	2

Use the codes 3-High, 2-Moderate, and 1-Low correlation between CO-PO-PSO respectively.

Syllabus:

Unit No	Syllabus Content	Lecture Hours
I	**Introduction to Software Engineering**: Software Engineering, Software Development Projects, Emergence of Software Engineering, Computer Systems Engineering. **Software Life cycle models**: Need for life Cycle model, classical waterfall model, Iterative waterfall model, V-model, Prototyping model, Evolutionary model, Spiral model, Agile Development Models	12

II	**Software Project Management**: Responsibilities of a Software Project Manager, Project planning. **Requirement Analysis**: Requirements gathering and analysis, Software Requirements Specification contents of the SRS document, Traceability, Characteristics of good SRS DOCUMENT, Organization of the SRS document.	12
III	**Software design**: Desirable characteristics of a good software design, Cohesion and coupling, Layer Arrangement of Modules **Function-oriented software Design**: Overview of SA/SD methodology, structured analysis, Data Flow Diagrams, Structured Design and Detailed Design.	12
IV	**User interface design**: Characteristics of good user interface design, Basic concepts, Types of user interfaces, component-based GUI development, A user interface Design Methodology	12
V	**Software quality and testing**: Software Quality Assurance - Quality metrics - Software Reliability-Software testing Control Structures Testing- Black Box testing- Integration, Validation, and system testing. **CASE Tools**: Projects management, tools- analysis, and design tools–programming tools- integration and testing tool - Case studies.	12

Exercises

- Analyse the size factors of a software project building online stores, payment gateways
- Detailed Explanation of the COCOMO Model, the basic COCOMO formula is: Effort=a×(KLOC)b Where:
  - Effort is the number of person-months.
  - KLOC is the estimated number of thousands of lines of code.
  - a and b are coefficients that vary depending on the project type (organic, semi-detached, or embedded).
  - For example, for an organic project: a=2.4, b=1.05 a=2.4, b=1.05 a=2.4, b=1.05 Suppose we estimate the size of the software to be 50 KLOC
- Represent design notations for e-commerce platform. UML Diagrams:
  - Class Diagrams: Represent classes and relationships in each module.
  - Sequence Diagrams: Show interactions between objects during user registration, product search, order placement, and payment processing.
  - Data Flow Diagrams (DFDs): Illustrate how data flows through the system, from user inputs to database storage and retrieval.
- Example Interface Design:
  - Dashboard:
    - Patient List: A list of all monitored patients with summary information (name, room number, key vital signs).
    - Critical Alerts: A section for critical alerts, sorted by severity and time.
    - Navigation: Easy access to patient detail views, settings, and system logs.
  - Patient Detail View:
    - Vital Signs Graphs: Real-time graphs showing trends for heartrate, blood pressure, temperature, etc.
    - Alerts History: A log of all alerts for the patient, with time stamps and statuses.
    - Actions: Buttons for common actions, such as acknowledging alerts, adding notes, or calling for assistance.
  - Settings and Customization:
    - Alert Thresholds: Interface for setting and adjusting alert thresholds for different vital signs.
    - Display Options: Options for customizing the layout, themes, and data visibility.
- Client: A large online retailer looking to improve software quality and reduce testing time.
- Project: Implement a test automation framework for functional, regression, and performance testing of their e-commerce platform.

Example:

Software Design for an E-Commerce Platform
User Interface Design for a Real-Time Patient Monitoring System
Implementing Test Automation for an E-commerce Platform

Specific Resources: (web)

https://youtu.be/Ln_LP7c23WM
https://youtu.be/ilHPCbkZLV4
https://youtu.be/3fLahzQr8EI?list=PLDW872573QAZNlUzWVzoU8cCadXg1NUGK
https://youtu.be/uFYuHHglC6U?list=PLwdnzlV3ogoVKbbd4bwgSoga7EEuX5kFf

Choose any two of above case studies and do the following exercises for that Case Study

1. Write the software requirements specification document.
2. Draw the entity relationship diagram.
3. Draw the data flow diagrams.
4. Draw use case diagrams.
5. Draw activity diagrams for all use cases.
6. Draw sequence diagrams for all use cases.
7. Draw collaboration diagram.
8. Assign objects in sequence diagrams to classes and make class diagram.

Student Activity:

1. Visit any financial organization nearby and prepare requirement analysis report.
2. Visit any industrial organization and prepare risk chart.

Textbooks:

Fundamentals of Software Engineering, Fourth Edition, Rajib Mall, PHI

References:

4. R.Fairley, Software Engineering Concepts, Tata McGraw-Hill,1997.
5. Software Engineering, H. SommervilIlan, Addition Wesley Pub. Co.
6. Software Engineering: An object-Oriented Perspective by Braude, E.J., Willey, 2001
1.

MODEL QUESTION PAPER

Title of the Course	:	Software Engineering with Object Oriented approach			
Course Code	:	23CSMIL242	Maximum Marks	:	70
Offered to	:	B.Sc. Honours (Mat / Phy / Che)	Time	:	3 Hrs

NOTE TO PAPER SETTER: IN SECTION A & SECTION B, FOR EACH QUESTION ONE SUB-QUESTION (A) MUST BE A PROGRAM MEANT FOR LOGICAL TESTING, AND ANOTHER SUB-QUESTION (B) IS MEANT FOR DESCRIPTIVE / LOGICAL.

SECTION A

ANSWER THE FOLLOWING QUESTIONS. **5 X 4 = 20 Marks**

1 (a)Why Software Engineering is required? (K2)

OR

(b)What are the phases of the waterfall model? (K1)

2 (a)Summarize responsibilities of software manager. (K3)

OR

(b)Summarize Characteristics of SRS Document. (K3)

3 (a)What is DFD? Explain with an example. (K2)

OR

(b) Write about Modular Design. (K1)

4 (a)Differentiate Graphical user interface and text-based user interface. (K3)

OR

(b)List and explain various types of user interfaces. (K2)

5 (a)Write about Glass Box testing. (K1)

OR

(b)Summarize Quality metrics (K3)

SECTION B

ANSWER THE FOLLOWING QUESTIONS **5 X 10 = 50 Marks**

6 (a) Compare different software development life cycle modes. (K3)

OR

(b)Explain about spiral model. (K2)

7 (a) What are the reasons to spend time and resources to develop a SRS document. (K1)

OR

(b)Explain metrics for project size estimation. (K2)

8 (a)Explain about coupling and cohesion. (K2)

OR

(b)Write about overview of SA/SD methodologies. (K1)

9 (a)Explain different types of user interfaces (K2)

OR

(b)Explain IJML class diagrams with an example (K2)

10 (a)What is program testing? Briefly explain the following tests:

a) Unit testing. b) Block box testing c) White box testing (K1)

OR

(b)Discuss analysis and design tools. (K2)

SOFTWARE ENGINEERING WITH OBJECT ORIENTED APPROACH LAB
Offered to B.Sc. Honours Computer Science - Minor

Course Code	**:**	**23CSMIP242**	No. Of Lecture Hours per week		:	2
Year of Introduction	:	2023-24	Total No. Of Lecture Hours		:	30
Year of Offering	:	2024-25	CIA Marks		:	15
Year of Revision	:	2024-25	SEE Marks		:	35
Percentage of Revision	:	0%	Total Marks		:	50
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	1
Course Category	:	Minor				
Type of Course	:	Employability				
Course Relate to	:	Global				

Course Description: This course provides the basic opportunity to implement various OOSE concepts using case studies. It also enables students to analyze and design the system in an object-oriented manner using the Eclipse tool.

Course Objectives:

S.NO	COURSE OBJECTIVES
1	Understand the basics and planning of a software project
2	Analyze software cost estimation and its techniques
3	Software Design
4	User interface design
5	Software testing and validations

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

CO NO	Course Outcome	BTL	POS	PSO
CO1	Understand the requirements of the software projects	K2	6,7	2
CO2	Ability to analyze software requirements with existing tools	K4	6,7	1,2
CO3	Apply different testing methodologies	K3	6,7	1,2
CO4	Understand and apply the basic project management practices in real-life projects	K2, K4	6,7	1,2
CO5	Apply to software projects	K4	6,7	1,2

For BTL: K1: Remember; K2: Understand; K3: Apply; K4: Analyse; K5: Evaluate; K6: Create

CO-PO MATRIX									
CONO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1						3	2		1
CO2						3	2	3	2
CO3						3	2	2	
CO4						3	2	2	2
CO5						3	2	3	2

Use the codes 3-High, 2-Moderate, and 1-Low correlation between CO-PO-PSO respectively.

This lab list covers the key areas of a Software Engineering course, providing hands-on practice with Eclipse UML2/any other Open-Source Tools

Design Following Systems in Object Oriented Approach using UML with open source tools (Eclipse UML2 or any other Open source tools):

- Online Examination System.
- Online Railway Reservation.
- Library Maintenance System.
- Any E-Commerce Portal.
- Biometric Attendance System.

1. Write down the problem statement for a suggested system of relevance.
2. Do requirement analysis and develop a Software Requirement Specification Sheet (SRS) for the suggested system.
3. To perform the function-oriented diagram: Data Flow Diagram (DFD) and Structured chart.
4. To perform the user's view analysis for the suggested system: Use case diagram.
5. To draw the structural view diagram for the system: Class diagram, object diagram.
6. To draw the behavioral view diagram: State-chart diagram, Activity diagram

7. To perform the behavioral view diagram for the suggested system: Sequence diagram, Collaboration diagram.
8. To perform the implementation view diagram: Component diagram for the system.
9. To perform the environmental view diagram: Deployment diagram for the system.
10. To perform various testing using the testing tool unit testing, and integration testing for a sample code of the suggested system.
11. Perform Estimation of effort using FP Estimation for the chosen system.
12. To Prepare a timeline chart/Gantt Chart/PERT Chart for the selected software project

Note: Student is expected to analyze the system in an object-oriented manner and design the system in object-oriented approach using UML with open-source tools

Note: The list of experiments is not limited to the above list. If the existing laboratory experiments completed in advance, the additional laboratory programs can added, and to be executed in the laboratory.

References:
1. Fundamentals of Software Engineering, Fourth Edition, Rajib Mall, PHI
2. R.S. Pressman, Software Engineering a practitioner's approach, Fourth Ed., McGraw Hill, 1997

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Course Structure

Program : B.Com. Honours (Computer Applications)

S. No	Course Code	Course Name	Sem	Major / Minor	Hours per week	IA	SEE	Total Marks	Credits
1	23CAMAL121	Office Automation Tools	II	Major-1 Theory	3	30	70	100	3
2	23CAMAP121	Office Automation Tools Lab	II	Major-1 Practical	2	15	35	50	1
3	23ITMIL121	Problem-Solving in “C”	II	Minor-1 Theory	3	30	70	100	3
4	23ITMIP121	Problem-Solving in “C” Lab	II	Minor-1 Practical	2	15	35	50	1
5	23CSSDL121	Digital Literacy	II	SEC	2	15	35	50	1
6	23CAMAL241	Problem Solving Using Python	IV	Major-4 Theory	3	30	70	100	3
7	23CAMAP241	Problem Solving Using Python Lab	IV	Major-4 Practical	2	15	35	50	1
8	23ITMIL241	Web Technologies	IV	Minor-3 Theory	3	30	70	100	3
9	23ITMIP241	Web Technologies Lab	IV	Minor-3 Practical	2	15	35	50	1
10	23ITMIL242	Object Oriented Programming using Java	IV	Minor-4 Theory	3	30	70	100	3
11	23ITMIP242	Object Oriented Programming using Java Lab	IV	Minor-4 Practical	2	15	35	50	1

OFFICE AUTOMATION TOOLS
Offered to B.Com. (Computer Applications) - Major – II Semester

Course Code	**:**	**23CAMAL121**	No. Of Lecture Hours per week		:	3
Year of Introduction	:	2023-24	Total No. Of Lecture Hours		:	60
Year of Offering	:	2024-25	CIA Marks		:	30
Year of Revision	:	2024-25	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	3
Course Category	:	Major-2				
Type of Course	:	Skill Development				
Course Relate to	:	International				

Course Objectives:

1. To understand basic knowledge of the various office automation tools.
1. To apply the basic concepts of the internet and internet tools.
2. To analyse the concepts of Excel formulae easily.
3. To analyse the advanced features in Excel sort, filters, and charts
4. To evaluate about Features of PowerPoint, templates, and wizard adding subheadings, editing text, formatting text, using master slide.

Learning Outcomes:

The students will be able to:

- Understand the concept of Word Processor and use its features.
- To use the advanced features of Ms-Word to make day-to-day usage easier.
- To work comfortably with Ms-Excel Environment.
- To create worksheets and user-advanced features of Excel.
- To create presentations and insert multimedia in them.

Course Outcomes:

CO No	Upon successful completion of this course, the student will be able to	PO No
CO1	Understand the in-depth training in the use of office automation.	PO1, PO2
CO2	Apply and Develop spreadsheets.	PO1, PO2
CO3	Implement basic knowledge of the various office automation tools and their application in the various areas of business.	PO2, PO3
CO4	Evaluate the methods of Office automation leverages technology to optimize tasks, enhancing efficiency and productivity.	PO2, PO3
CO5	Create improved collaboration, time savings, accuracy, and enhanced customer service.	PO2, PO3

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) & PSOs:

	CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
23CAMAL121	CO1	L	L					
	CO2	L	M					
	CO3		L	M				
	CO4		M	M				
	CO5		M	H				

Syllabus:

Unit No	Syllabus Content	Lecture Hours
I	**Introduction to MS Office & MS Word:** MS-Word: Features of MS Word, MS Word Window components, working with formatted text, Shortcut keys, Formatting documents: Selecting text, Copying &moving data, formatting characters, changing cases, Paragraph formatting, Indents, Drop Caps Using format painter, Page formatting, Header & footer, Bullets & numbering, Tabs, Forming tables. To find & replace text, go to (F5) command, proofing text (Spell-check, Autocorrect)	14
II	**MS Word Advanced features:** Difference between Wizard and Template - Customize the Quick Access Tool Bar - Macros: Purpose - Creating Macro - Using Macro - Storing Macro - Inserting pictures: From Computer, Online Pictures Insert 3d Models Insert Shapes Insert Text Box - Insert Equation, Hyperlinks, Tables Insert tables Mail merging, Printing documents, Tables Insert tables, Mathematical calculations on tables data. Insert Text Box etc.	12
III	**Introduction to MS Excel & Its features:** MS Excel: Excel Features, Spreadsheets, workbooks, creating, saving & editing a workbook, Renaming sheets, cell entries (numbers, labels, and formulas), spell checking, find and replace, Adding and deleting rows and columns Filling series, fill with drag, data sort, Formatting worksheet, Functions and its parts, Some useful Functions in Excel (SUM, AVERAGE, COUNT, MAX,MIN, IF)	12
IV	**Ms-Excel Advanced Features:** Cell referencing (Relative, Absolute, Mixed), What-if analysis, Introduction to charts: types of charts, creation of charts, printing a chart, printing worksheet - Sort - Filters - View Menu	12
V	**Ms-PowerPoint and its Applications:** MS-Power Point: Features of PowerPoint, Uses, components of slide, templates, and wizards, using a template, choosing an auto layout, using outlines, adding subheadings, editing text, formatting text, using a master slide, adding slides, changing the colour scheme, changing background and shading, adding header and footer, adding clipart and auto shapes. Various presentations, working in slide sorter view (deleting, duplicating, rearranging slides), adding transitions and animations to slide shows, inserting music or sound on a slide, viewing slide shows, and Printing slides.	10

Case Study:

1. Create a document to write a letter to the DM&HO of the district complaining about Hygienic conditions in your area.
2. Create a document to share your experience of your recent vacation with your family.
3. Create a document to send holiday intimation to all the parents at the time of Dasara's Vacation.
4. Create a document to create a Timetable for your class using tables.
5. Create a worksheet with your class marks displaying total, average, top marks in the class, and least marks in the class.
6. Prepare a chart with the height and weights of your classmates in at least 3 types of charts.
7. Demonstrate the use of Filter with the attendance data of your class.
8. Prepare a presentation with your achievements and experiences in college

Textbooks:

1. Computer Fundamentals-Pradeep. K. Sinha: BPB Publications.
2. Fundamentals of Computers -Reema Thareja, Oxford University Press India

Reference Books:

1. Fundamentals of Computer - V. Rajaraman, Printice Hell of India.
2. Introduction to Computers-Peter Norton McGraw-Hill.

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MODEL QUESTION PAPER

Title of the Course	:	OFFICE AUTOMATION TOOLS			
Course Code	:	23CAMAL121	Maximum Marks	:	70
Offered to	:	B.Com Honours Computer Applications	Time	:	3 Hrs

Section-A

ANSWER ALL QUESTIONS **5X4M=20M**

1. (A). Explain the MS-Word Features (CO1, L2)
   (OR)
   (B). Explain the concepts of page formatting, header and footer (CO1, L2)

9. (A). Compare between wizard and Template. (CO2, L2)
   (OR)
   (B). Explain how to insert 3d models and shapes (CO2, L2)

3. (A) Illustrate how to create, saving and editing workbook? (CO3, L1)
   (OR)
   (B). Demonstrate how to adding and deleting rows, columns. (CO3, L1)

4. (A). Explain cell referencing (Relative, Absolute, Mixed) (CO4, L2)
   (OR)
   (B)Demonstrate the steps in What-if analysis (CO4, L2)

5. (A)Explain the features of Power Point and its uses (CO5, L1)
   (OR)
   (B). Explain the components of slide (CO5, L1)

Section-B

ANSWER THE FOLLOWING QUESTIONS **5X10M=50M**

6. (A) Explain shortcut keys, finding and replacing text (CO1, L2)
   (OR)
   (B) Explain selecting text, copying and moving data and formatting charters (CO1, L2)

7. (A) Illustrate how to hyperlink, tables and insert table components. (CO2, L2)
   (OR**)**
   (B) Explain how to create Macro, and how to use Macro (CO2, L2)

8. (A) Explain useful functions in Excel with examples (CO3, L1)
   (OR)
   (B) Explain how to renaming sheet, cell entries, spell check? (CO3, L1)

9. (A) Demonstrate the concept of types of charts (CO4, L2)
   (OR**)**
   (B) Demonstrate the of sort and filers with one suitable example? (CO4, L1)

10. (A) Explain the steps in slide sorter view (deleting, duplicating, rearranging slides) (CO5, L1)
    (OR)
    (B) How to add transition and animation to slide show, and how to insert music and sound on a slide (CO5, L1)

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OFFICE AUTOMATION TOOLS
Offered to B. Com (Computer Applications) - Major – II Semester

Course Code	**:**	**23CAMAP121**	No. Of Lecture Hours per week		:	2
Year of Introduction	:	2023-24	Total No. Of Lecture Hours		:	30
Year of Offering	:	2024-25	CIA Marks		:	15
Year of Revision	:	2024-25	SEE Marks		:	35
Percentage of Revision	:	0%	Total Marks		:	50
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	1
Course Category	:	Major-2				
Type of Course	:	Skill Development &Employability				
Course Relate to	:	Global				

LIST OF EXPERIMENTS

1) Design a visiting card for the Managing Director of a company as per the following specifications.
- Size of visiting card is 32×2
- Name of the company with a big font
- Phone number, Fax number, and E-mail address with appropriate symbols.
- Office and Residence address separated by a line.

2) Create a table with the following columns and display the result in separate cells for the following
- Emp Name, Basic pay, DA, HRA, Total salary.
- Sort all the employees in ascending order with the name as the key.
- Calculate the total salary of the employee.
- Calculate the total salary of the employee.
- Finding the highest salary and
- Find the Lowest salary.

3) Prepare an advertisement to a company requiring software professionals with the following
- Attractive page border
- Design the name of the company using WordArt.
- Use at least one clipart.
- Give details of the company (use bullets etc)
- Give details of the Vacancies in each category of employee (Business manager, Software engineers, System administrators, Programmers, Data entry operators)
- qualification required.

4) Create a letter having the following specifications
- Name ofthecompanyonthetopofthepage2with a bigfontandgoodstyle.
- Phone no, Fax no, and E-mail address with symbols.
- Main products manufactured by the company.
- Slogans if any should be specified in bold at the bottom.

5) Create two pages of curriculum vitae of a graduate with the following specifications
- Table to show qualifications with proper headings.
- Appropriate left and right margins
- Format 1⁄2 page using two-column approach about yourself
- Name on each page at the top right side.
- Page no.in the footer on the right side.

6) Write a macro format document below
- Line spacing "2" (double)
- Paragraph indent of 0.1
- Justification formatting style
- Arial font andBold14pt-size

7) Create a letter as the main document and create 10 records for the 10 persons User mail merge to create letters for selected persons among 10.

8) Create an electronic spreadsheet in which you enter the following decimal numbers and convert them into octal, Hexa decimal, and binary numbers and vice-versa.

Decimal Numbers:35,68,95,78,165,225,355,375,465
Binary numbers: 101,1101,11101,11111,10001,11101111

9) Calculate the net pay of the employees following the conditions below.

	A	B	C	D	E	F	G	H	I
1	Employee name	Employee id	Basic	DA	HRA	GPF	Gross Pay	Income	Net Worth

DA: -56% of the basic pay if Basic pay is greater than 20000 or else 44%.
HRA: -15% of the Basic pay subject to maximum of Rs.4000.
GPF: -10% of the basic pay.
INCOMETAX: -10%of basic if Basic pay is greaterthan20000.
Find who is getting the highest salary & who is getting the lowest salary.

10) The ABC Company shows the sales of different products for 5 years. Create BAR Graph, 3D and Pie chart for the following.

A	B	C	D	E	F
S.No.	**Year**	**Pro1**	**Pro2**	**Pro3**	**Pro4**
1	1989	1000	800	90	1000
2	1990	800	80	50	900
3	1991	1200	190	40	800
4	1992	400	200	30	1000
5	1993	1800	400	40	1200

11) Create a suitable examination database and find the sum of the marks (total) of each student and the respective, class secured by the student.

Pass: if marks in each subject>=35
Distinction: if average>=75
First-class: if average>=60but<75
Second class: if average>=50butlessthan60
Third class: if average>=35butlessthan50
Fail: if marks in any subject<35

12) Enter the following data into the sheet.

Name	Department	Salary
Anusha	Accounts	12000
Rani	Engineering	24000
Lakshmi	Accounts	9000
Purnima	Marketing	20000
Bindu	Accounts	4500
Tejaswi	Accounts	11000
Swetha	Engineering	15000
Saroja	Marketing	45000
Sunitha	Accounts	5600
Sandhya	Engineering	24000
Harika	Marketing	8000

- Extract records for the department in Accounts and Salary >10000.
- Sort the data by salary with the department using "sort commands".
- Calculate the total salary for a department using Subtotals.

13) Enter the following data into the sheet.

	Raju	Rani	Mark	Rosy	Ismail	Reshma
English	76	89	43	51	76	87
2nd Lang	55	85	78	61	47	33
Maths	65	82	34	58	52	65
Computers	45	91	56	72	49	56
Human Values	51	84	54	64	32	64

Apply the conditional formatting for marks.

- 35 below Red
- 35 to 50 Blue
- 51 to 70 Green
- 71 to 100 Yellow

14) Create a presentation using templates.

15) Create a Custom layout or Slide Master for professional presentation.
16) Create a presentation with slide transitions and animation effects.
17) Create a table in PPT and apply a graphical representation.

Note: The list of experiments is not limited to the above list. If the existing laboratory experiments completed in advance, the additional laboratory programs can added, and to be executed in the laboratory.

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Problem Solving in "C"

Offered to B.Com (Computer Applications) – Minor– II Semester

Course Code	**:**	**23ITMIL121**	No. Of Lecture Hours per week		:	3
Year of Introduction	:	2023-24	Total No. Of Lecture Hours		:	60
Year of Offering	:	2023-24	CIA Marks		:	30
Year of Revision	:	New Course	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	3
Course Category	:	Minor-1				
Type of Course	:	Skill Development				
Course Relate to	:	International				

LEARNING OUTCOMES:

Upon successful completion of the course, a student will be able to:

1. Understand the functionality of a Digital Computer and fundamental constructs of programming.
2. 2.Analyse and develop solutions to a given problem using control statements.
3. Work with arrays and textual information.
4. Understand the concept of functional hierarchical code organization.
5. Gain knowledge on derived data types and file handling.

Unit No	Syllabus Content	Lecture Hours
I	**Introduction to Computer and Programming**: Introduction, Block diagram of a computer, Hardware and Software, Generations of Programming Languages, Algorithms, Flowcharts. **Introduction to C**: Introduction, Structure of C Program, Writing the first C Program, File used in C Program, Compiling and Executing C Programs, Using Comments, Keywords, Identifiers, Basic Data Types in C, Variables, Constants, I/O Statements in C, Operators in C.	14
II	**Decision making statements**: if, else if, else if ladder, switch statements. **Loop Control Statements**: while, do-while, for loop; break, continue and goto statements.	10
III	**Arrays**: Introduction, One Dimensional Arrays, Declaration, Initialization and Memory representation, Two Dimensional Arrays, Declaration, Initialization and Memory Representation. **Strings**: Declaring and Initializing string variables, character and string handling functions.	11
IV	**Functions**: Introduction, Function declaration, prototype, Function definition, function call, return statement, Categories of functions, Recursion, Parameter Passing techniques, Scope of variables, Storage Classes. **Pointers**: Introduction to Pointers, declaring and initializing pointer Variables, accessing values using pointers, Pointer Arithmetic, Dynamic Memory Allocation.	13
V	**Structures and Unions**: Introduction, Structure definition, accessing structure members, Array of Structures, union definition, difference between structures and unions. **Files**: Introduction to Files, Using Files in C, Reading Data from Files, Writing Data to Files, Detecting the End-of-file, Accepting Command Line Arguments.	12

TEXTBOOKS:

1. E. Balagurusamy, Programming in ANSI C, Tata McGraw Hill Publications
2. Computer Fundamentals and Programming in C, Reema Thareja, Oxford University Press

REFERENCE BOOKS:

Brain W Kernighan and Dennis M Ritchie - The 'C' Programming language – Pearson Publications.
Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson Edition Publications.
Yashavant Kanetkar - Let Us 'C' – BPB Publications.

SUGGESTED CO-CURRICULAR ACTIVITIES:

1. Assignments (in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging)
2. Student seminars (on topics of the syllabus and related aspects (individual activity))
   a. Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams))
   b. Study projects (by very small groups of students on selected local real-time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (team activity))

MODEL QUESTION PAPER

Title of the Course	:	Problem Solving in C			
Course Code	:	23ITMIL121	Maximum Marks	:	70
Offered to	:	B.Com Honours Computer Applications	Time	:	3 Hrs

Section A

Answer all Questions **5 x 4=20M**

1. (A) Explain Structure of C. (CO1,L1)

OR

(B) Describe Keywords (CO1,L1)

2. (A) Write about break and continue statements (CO2,L1)

OR

(B) Write a c program to print 1 to 10 natural numbers. (CO2, L1)

3. (A) Summarize one dimensional array with suitable example. (CO3, L2)

OR

(B). Define a string with example program.(CO3, L1)

4. (A) What is scope of variables in functions. (CO4, L1)

OR

(B)Define a function and how to declare a function in c . (CO4, L1)

5. (A) Write about Reading data from files. (CO5, L1)

OR

(B) How to declare a pointer variable in c. (CO5, L1)

Section B

Answer all Questions **5 x 10=50M**

6. (A) Explain Datatypes in c with example. (CO1,L1)

OR

(B) Explain about Input and Output statements in C. (CO1, L1)

7. (A) Summarize Looping statements in c with example.(CO2, L2)

OR

(B)Summarize iterative statements in c with example. (CO2, L2)

8. (A) Write a program for multiplication of 2 3x3 matrices. (CO3, L1)

OR

(B) Write a program by using string handling functions. (CO3, L1)

9. (A) Explain Storage Classes in c . (CO4, L2)

OR

(B) Explain 'array of structures'. (CO4, L2)

10 (A) Explain Dynamic memory allocation. (CO5, L2)

OR

(B) How to pass arguments to functions using pointers with example program. (CO5, L2)

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Problem Solving in "C" Lab
Offered to B.Com. (Computer Applications) – Minor – II Semester

Course Code	**:**	**23ITMIP121**	No. Of Lecture Hours per week		:	2
Year of Introduction	:	2023-24	Total No. Of Lecture Hours		:	30
Year of Offering	:	2024-25	CIA Marks		:	15
Year of Revision	:	2024-25	SEE Marks		:	35
Percentage of Revision	:	0%	Total Marks		:	50
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	1
Course Category	:	Minor-1				
Type of Course	:	Skill Development				
Course Relate to	:	International				

LIST OF EXPERIMENTS

1. Write a program to find the area of circle and triangle.
2. Write a program to find simple and compound interest.
3. Write a program to convert temperature from Celsius to Fahrenheit
4. Write a program to find whether a number is even or odd
5. Write a program to find sum and average of 5 numbers
6. Write a program to check whether the given number is Armstrong or not.
7. Write a program to find the sum of individual digits of a positive integer.
8. Write a program to generate the first n terms of the Fibonacci sequence.
9. Write a program to find both the largest and smallest number in a list of integer values
10. Write a program to calculate the factorial of a given integer value using recursive functions
11. Write a program for addition of two matrices.
12. Write a program for multiplication of two matrices.
13. Write a program to perform various string operations.
14. Write a program to search for an element in each list of values.
15. Write a C program to write and read data into/from a File.

Note: The list of experiments is not limited to the above list. If the existing laboratory experiments completed in advance, the additional laboratory programs can added, and to be executed in the laboratory.

Problem Solving using Python.
Offered to B.Com. (Computer Applications) – Major– IV Semester

Course Code	:	**23CAMAL241**	No. Of Lecture Hours per week		:	3
Year of Introduction	:	2024-25	Total No. Of Lecture Hours		:	60
Year of Offering	:	2024-25	CIA Marks		:	30
Year of Revision	:	New Course	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	3
Course Category	:	Major				
Type of Course	:	Skill Development, Employability				
Course Relate to	:	Global				

Course Objective:
After taking the course, students will be able to use Python program a Scripting language and Exposure of various problems soling approaches of computer.

Course Outcomes:

CO NO	Upon successful completion of this course, the student will be able to	PO NO
CO1	Learn about concepts of programming and python	PO1, PO2
CO2	Understand the Decision making and looping controls available in Python Programs	PO2, PO3
CO3	Determine the process of using functions and modules	PO3, PO4
CO4	Implement the Data structures using Lists, Tuple, Dictionaries	PO4, PO3
CO5	Interpret the OOPs concept in Python.	PO5, PO3

CO-PO MAPPING MATRIX

	CO - PO	PO1	PO2	PO3	PO4	PO5	PO6
23CAMAL241	**CO1**	H	M				
	CO2		H	M			
	CO3			H	L		
	CO4			L	H		
	CO5			H		L	

Unit No	Syllabus Content	Lecture Hours
I	**Introduction, Data types, Operators:** **Introduction to Programming**: Languages, Generations, Programming Paradigms, Debugging and Testing Approaches. **Python**: Introduction, History of Python, Features of Python, Writing and executing python programs, constants, variables, reserved words, input operation, indentation, **Data types in python**: integer, string, Boolean, Operators, and expressions.	12
II	**Decision making and looping.** **Control Flow**: **Selection or conditional branching**: if, if-else, if-elif- else, nested if. **Loop or iterative statements:** for, while, break, continue, pass. Example programs on control flow.	13
III	**Functions and Modules:** Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Lambda or Anonymous Functions, Global and Local Variables. **Modules**: Creating modules, import statement, from import statement.	12
IV	**Data Structures:** **Lists**: Creation, accessing values, updating values, list operations, list methods. **Tuple:** tuple creation, accessing values, deleting values, tuple operations. **Sets:** creation, set operations. **Dictionaries:** creation, accessing values, adding, modifying, deleting items, built-in dictionary methods. NumPy, Matplotlib	13

V	**Object Oriented Programming in Python:** Introduction to OOP, Features of OOP, Merits and Demerits, Classes and Objects, Class method and self-Argument, Public and Private, the init method(constructor), Inheritance, polymorphism and Method Overriding. **Error and Exception handling**: Handling Exception using try-except block, Raising Exceptions, User Defined Exceptions.	10

TEXTBOOKS

Python Programming: Using Problem Solving approach, ReemaThareja, Oxford University Press 2017

REFERENCE BOOKS:

Python Programming, A Modern Approach, VamsiKurama, Pearson Publications, 2017

Recommended Co – Curricular Activities:

(Co-curricular activities shall not promote copying from textbook or from others work and shall encourage self/independent and group learning)

C. Measurable

e. Assignments (in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging).
f. Student seminars (on topics of the syllabus and related aspects (individual activity))
g. Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams))
h. Study projects (by very small groups of students on selected local real- time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (team activity))

D. General

c. Group Discussion
d. Others

RECOMMENDED CONTINUOUS ASSESSMENT METHODS:

Some of the following suggested assessment methodologies could be adopted.

1. The oral and written examinations (Scheduled and surprise tests),
2. Closed-book and open-book tests,
3. Programming exercises,
4. Practical assignments and laboratory reports,
5. Observation of practical skills,
6. Individual and group project reports.
7. Efficient delivery using seminar presentations,
8. Viva voce interviews.
9. Computerized adaptive testing, literature surveys and evaluations,
10. Peers and self-assessment, outputs form individual and collaborative work.

MODEL QUESTION PAPER

Title of the Course	:	PROBLEM SOLVING USING PYTHON			
Course Code	:	23CAMAL241	Maximum Marks	:	70
Offered to	:	B.Com Honours Computer Applications	Time	:	3 Hrs

NOTE TO PAPER SETTER: IN SECTION A & SECTION B, FOR EACH QUESTION ONE SUB QUESTION (A) MUST BE A PROGRAM MEANT FOR LOGICAL TESTING AND ANOTHER SUB QUESTION (B) IS MEANT FOR DESCRIPTIVE / LOGICAL.

SECTION A

ANSWER THE FOLLOWING QUESTIONS. 5 X 4 = 20 Marks

1. a) Write different types of programming paradigms. (CO1, L1)

   OR

   b) Develop a python code to print sum and average marks of three subjects of a student. (CO1, L1)
2. a) Write a python program to find the factorial of a given number. (CO2, L1)

   OR

   b) Explain if-elif-else statement in python with example (CO2, L2)
3. a) Develop a python program for Lambda function. (CO3, L3)

   OR

   b) Explain about global and local variables in python. (CO3, L2)
4. a) Develop a python program to insert elements into a list, remove elements from a list and sort elements of the list. (CO4, L3)

   OR

   b) Compare lists and tuples in python. (CO4, L3)
5. a) Develop a python program to demonstrate Inheritance. (CO5, L3)

   OR

   b) Explain about classes and objects in python. (CO5, L2)

SECTION B

ANSWER THE FOLLOWING QUESTIONS .5 X 10 = 50 Marks

6. a) List and explain data types in python. (CO1, L2)

   OR

   b) Write names of operators in python and explain them with examples. (CO1, L2)
7. a) Develop a python program to find whether the number is palindrome or not. (CO2, L3)

   OR

   b) Explain loops in Python with examples. (CO2, L2)
8. a) Explain different categories of arguments used in functions in python. (CO3, L3)

   OR

   b) Develop a python program to create a module and import it in another program. (CO3, L2)
9. a) Develop a python program to create a dictionary and add, modify, delete values in the dictionary and print them. (CO4, L2)

   OR

   b) Define tuple. Explain about tuples with examples. (CO4, L3)
10. a) Develop a python program to demonstrate exception handling. (CO5, L3)

    OR

    b) Define method overriding. Explain with an example. (CO5, L2)

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PROBLEM SOLVING USING PYTHON LAB
Offered to B.Com (Computer Applications) - Major

Course Code	**:**	**23CSMAP241**	No. Of Lecture Hours per week		:	2
Year of Introduction	:	2024-25	Total No. Of Lecture Hours		:	30
Year of Offering	:	2024-25	CIA Marks		:	15
Year of Revision	:	New Course	SEE Marks		:	35
Percentage of Revision	:	0%	Total Marks		:	50
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	1
Course Category	:	Major				
Type of Course	:	Skill Development, Employability				
Course Relate to	:	Global				

Course Outcomes:

CO NO	Upon successful completion of this course, the student will be able to	PO NO
CO1	Write, Test and Debug Python Programs	PO1
CO2	Implement Conditionals and Loops for Python Programs	PO1, PO2, PO3
CO3	Organize code into modules for better code organization and reusability.	PO2, PO3
CO4	Implement functions and represent Compound data using Lists, Tuples and Dictionaries	PO3, PO4
CO5	Implement OOP concepts and write applications in python.	PO5, PO3

CO-PO MAPPING MATRIX

	CO - PO	PO1	PO2	PO3	PO4	PO5	PO6
23CAMAL241	**CO1**	H					
	CO2	L	H	M			
	CO3		H	M			
	CO4			L	H		
	CO5			H		L	

List of Experiments:

1. Python Program to Find the Square Root
2. Python Program to Swap Two Variables
3. Python Program to Generate a Random Number
4. Python Program to Check if a Number is Odd or Even
5. Python Program to Find the Largest Among Four Numbers
6. Python Program to Check Prime Number
7. Python Program to Check Whether a number is Palindrome or Not
8. Python Program to Display the multiplication Table.
9. Python Program to Print the Fibonacci sequence.
10. Python Program to Check Armstrong Number
11. Python Program to Find the Sum of Natural Numbers
12. Python Program to Find Factorial of Number Using Recursion
13. Python Program to check given number is prime or not using functions.
14. Python Program to demonstrate usage of keyword, default, and variable length arguments.
15. Python Program for lambda functions.
16. Python Program to create module and import it.
17. Python Program to create a list and perform operations on its contents.
18. Python Program to perform operations on tuples.
19. Python Program to create a dictionary and print its content.
20. Python program to perform operations on sets.
21. Python Program for inheritance.
22. Python Program for method overriding.
23. Python Program for exception handling.
24. Python Program to demonstrate exception handling.
25. Python Program to demonstrate user defined exception.

Note: The list of experiments is not limited to the above list. If the existing laboratory experiments completed in advance, the additional laboratory programs can added, and to be executed in the laboratory.

Web Technologies
Offered to B.Com. (Computer Applications) – Minor– IV Semester

Course Code	**:**	**23ITMIL241**	No. Of Lecture Hours per week		:	3
Year of Introduction	:	2024-25	Total No. Of Lecture Hours		:	60
Year of Offering	:	2024-25	CIA Marks		:	30
Year of Revision	:	New Course	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	3
Course Category	:	Minor				
Type of Course	:	Skill Development, Employability				
Course Relate to	:	Global				

Course Objective: The objective of the Web Technology course is to provide students with a comprehensive understanding of the technologies, tools, and frameworks used in the development of modern websites and web applications.

Course Outcomes:

CO NO	Upon successful completion of this course, the student will be able to	PO NO
CO1	Understand the fundamental concepts of web technologies, including HTML, CSS, and JavaScript, and their role in building websites.	PO1, PO2
CO2	Develop interactive and responsive web pages using HTML5, CSS3, and JavaScript, with an understanding of design principles.	PO2, PO3
CO3	Apply client-side and server-side programming techniques to build dynamic web applications using JavaScript, and server-side technologies.	PO3, PO4
CO4	Implement web forms, handle user input, and perform client-server communication using JavaScript, AJAX, and web APIs.	PO4, PO3
CO5	Understand and apply key web development frameworks and libraries such as React, Angular, or Node.js to enhance web application functionality.	PO5, PO3

CO-PO MAPPING MATRIX

	CO - PO	PO1	PO2	PO3	PO4	PO5	PO6
23ITMIL241	**CO1**	H	M				
	CO2		H	M			
	CO3			H	L		
	CO4			L	H		
	CO5			H		L	

Unit No	Syllabus Content	Lecture Hours
I	Internet Language, Understanding HTML, HTML document structure, create a Web Page, PublishingHTML Pages, Tags in HTML, title tag, Text Alignment tags, Text Formatting tags, heading tags, horizontalrule tag, paragraph tag, break tag.HTML Lists - Ordered List, Unordered List & Definition List – Using colors – Using Images	12
II	Horizontal Rule Tag - HTML Tables – Nested Tables - Hyperlinks: Textual, Graphical Links to sections –Multimedia Objects – Frames – Nested Frames – Forms – Form Controls: textbox, password, checkbox, radio button, select, text area - Processing of forms.	13
III	JavaScript- Introduction, simple programming, Obtaining User Input with prompt Dialogs, Operators (arithmetic, Decision making, assignment, logical, increment and decrement) Control Structures - if… else selection statement, while, do… while repetitions statement, for statement, switch statement, break and continue statements.	12

IV	Functions – program modules in JavaScript, programmer defined functions, function definition, scoperules, global functions, and recursion JavaScript: Arrays, declaring arrays, accessing elements of an array.	13
V	Cascading Style Sheets: Introduction – Using Styles: As an attribute, tag & external file – Defining yourown styles Properties and values: properties related to Fonts, Backgrounds & colors, text, boxes & bordersFormatting blocks of information: Classes - Divisions – Spans - Layers with suitable examples.	10

Exercise:

- Research the history and purpose of HTML.
- Write a short paragraph explaining why HTML is the foundation of web development.
- Provide an overview of the different versions of HTML, such as HTML4, HTML5, and how HTML5 has enhanced the structure and multimedia capabilities of web pages.
- Create a simple webpage that demonstrates the use of the <hr> tag to separate sections of content.
- Create a webpage with a simple HTML table displaying student data such as Name, Age, and Grade.
- Create a nested table within one of the table cells to show subjects.
- Create a program that asks for the user's name using the prompt() method and displays a personalized greeting message.
- Create a program that takes a number input from the user (1, 2, or 3) and displays a corresponding message based on the number (e.g., "Option 1 selected").
- Create a program that loops through numbers from 1 to 10, breaks the loop when the number reaches 6, and skips the even numbers using the continue statement.
- Create a simple program with a function that adds two numbers and returns the result.
- Create a program that demonstrates the difference between global and local scope in JavaScript.
- Create a program that declares an array of numbers and displays the first element.
- Create a basic webpage that uses inline, internal, and external CSS styles.
- Create a webpage where styles are applied as an attribute, within the <style> tag, and through an external CSS file.
- Create a page with custom styling for fonts, backgrounds, colors, text alignment, borders, and boxes.

Case Study:

- Discuss the importance of optimizing images for web use and demonstrate how to use different file formats (JPG, PNG, SVG) for various image types. Show how to embed an image with both local file paths and URLs.
- HTML Forms in Real-World Applications
- JavaScript Control Structures in Real-World Applications
- Building a Simple To-Do List Using Arrays and Functions
- Creating a Simple Web Layout with CSS

TEXTBOOKS

Internet & World Wide Web - H.M.Deitel, P.J.Deitel, A.B.Goldberg-5th Edition

REFERENCE BOOKS:

1. Programming Worldwide Web by RW Sebesta (Pearson)
2. An Introduction to Web Design + Programming by Wang & Katia (Pearson)
3. HTML & XML An Introduction NIIT(PHI)
4. HTML for the WWW with XHTML & CSS by Wlizabeth Castro (Pearson)
5. Fundamentals of the Internet and the World Wide Web by Raymond Green Law And Ellen Hepp (TMH)
6. Internet and Web Technologies by RajKamal(TMH)
7. Internet and Web Basics by NedSnell, Bob Temple,TMClark(Pearson)

SUGGESTEDCO-CURRICULARACTIVITIES:

1. Build a website with 10 pages for the case study identified.
2. Training of students by related industrial experts.
3. Assignments
4. Seminars, Group discussions, Quiz, Debates etc.(on related topics).
5. Presentation by students on best websites

MODEL QUESTION PAPER

Title of the Course	:	WEB TECHNOLOGIES			
Course Code	:	23ITMIL241	Maximum Marks	:	70
Offered to	:	B.Com Honours Computer Applications	Time	:	3 Hrs

NOTE TO PAPER SETTER: IN SECTION A & SECTION B, FOR EACH QUESTION ONE SUB QUESTION (A) MUST BE A PROGRAM MEANT FOR LOGICAL TESTING AND ANOTHER SUB QUESTION (B) IS MEANT FOR DESCRIPTIVE / LOGICAL.

SECTION A

ANSWER THE FOLLOWING QUESTIONS. 5 X 4 = 20 Marks

1. a) What is the structure of an HTML document? (CO1, L1)

   OR

   b) What is the difference between an ordered list and an unordered list in HTML?(CO1, L1)
2. a) What is the purpose of the <hr> tag in HTML? (CO2, L1)

   OR

   b) What are the different types of form controls available in HTML, and how are they used? (CO2, L2)
3. a) What are the different types of operators in JavaScript? (CO3, L3)

   OR

   b) Explain the syntax and usage of the if...else statement in JavaScript. (CO3, L2)
4. a) What is a recursive function in JavaScript? Provide an example. (CO4, L3)

   OR

   b) How do you declare and access elements of an array in JavaScript? (CO4, L3)
5. a) What are the different ways to apply CSS to an HTML document? (CO5, L3)

   OR

   b) What is the difference between the and tags in HTML? (CO5, L2)

SECTION B

ANSWER THE FOLLOWING QUESTIONS 5 X 10 = 50 Marks

6. a) Explain the HTML document structure, including the roles of the <html>, <head>, and <body> tags. (CO1, L2)

   OR

   b) Discuss the different types of HTML tags used for text formatting. Provide examples of the <b>, <i>, <u>, and tags. (CO1, L2)
7. a) Explain the concept of hyperlinks in HTML. How do you create a textual link and a graphical link in HTML? Provide examples. (CO2, L3)

   OR

   b) Describe how HTML tables are structured. What are nested tables, and how are they created? Provide examples. (CO2, L2)
8. a) Describe the control structures in JavaScript (CO3, L3)

   OR

   b) How user input can be obtained in JavaScript using the prompt() function. (CO3, L2)
9. a) Differentiate global functions and local functions in JavaScript. (CO4, L2)

   OR

   b) Discuss the concept of scope in JavaScript. (CO4, L3)
10. a) Explain the concept of CSS. Discuss how to define styles in an external file and link it to an HTML document. (CO5, L3)

    OR

    b) Describe the usage of different CSS properties related to fonts, backgrounds, colors, and borders. Provide examples of each. (CO5, L2)

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WEB TECHNOLOGIES LAB
Offered to B.Com (Computer Applications) – Minor

Course Code	**:**	**23ITMIP241**	No. Of Lecture Hours per week		:	2
Year of Introduction	:	2024-25	Total No. Of Lecture Hours		:	30
Year of Offering	:	2024-25	CIA Marks		:	15
Year of Revision	:	New Course	SEE Marks		:	35
Percentage of Revision	:	0%	Total Marks		:	50
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	1
Course Category	:	Major				
Type of Course	:	Skill Development, Employability				
Course Relate to	:	Global				

Course Outcomes:

CO NO	Upon successful completion of this course, the student will be able to	PO NO
CO1	This outcome focuses on students learning HTML and creating static web pages.	**PO1**
CO2	This outcome involves dynamic interactions on the web using JavaScript	**PO2, PO3**
CO3	Understanding and implementing CSS for layout and visual design	**PO2, PO4**
CO4	This focuses on multimedia integration, which enhances the user experience on web pages	**PO3, PO4**
CO5	This involves using JavaScript and advanced topics such as functions, arrays, and the DOM (Document Object Model) for building interactive web applications	**PO3, PO5**

CO-PO MAPPING MATRIX

	CO - PO	PO1	PO2	PO3	PO4	PO5	PO6
23ITMIP241	**CO1**	H					
	CO2	L	H	M			
	CO3		H	M			
	CO4			L	H		
	CO5			H		L	

List of Experiments:

1. Write an HTML program to create a simple webpage with a heading, paragraph, and an image.
2. Create an HTML page where you use different text formatting tags like <b>, <i>, <u>, and .
3. Design an HTML page that demonstrates both ordered and unordered lists. Include at least three items in each list.
4. Write an HTML program to create a webpage with textual and graphical links (images as links) to other webpages or sections.
5. Use different heading tags (<h1>, <h2>, <h3>, etc.) to create a webpage with multiple sections and sub-sections.
6. Write an HTML program to create a table with at least 3 rows and 3 columns. Include header cells and data cells.
7. Design an HTML page with a main table containing nested tables inside some of its cells.
8. Write an HTML form that contains a text box, password field, checkbox, radio button, drop-down select list, and a submit button.
9. Create a webpage using <hr>, <br>, and <p> to break content into sections with lines and spacing.
10. Design a form that takes user input (e.g., name, email, etc.), and display the submitted data using the GET method.
11. Write a JavaScript program that outputs a greeting message like "Hello, World!" in an alert box.
12. Create a JavaScript program that uses the prompt() function to get the user's name and display it in an alert box.
13. Write a JavaScript program that accepts two numbers from the user and performs basic arithmetic operations (addition, subtraction, multiplication, division).
14. Create a JavaScript program that checks if a given number is even or odd using an if...else statement.
15. Write a JavaScript program to demonstrate the use of the switch statement for determining the day of the week based on user input.
16. Write a recursive JavaScript function to calculate the factorial of a number.
17. Create a JavaScript function that takes two parameters and returns their sum. Call this function and display the result.
18. Write a JavaScript program to declare an array of 5 numbers, access the elements, and display the sum of the numbers.

19. Create a recursive JavaScript function to print the Fibonacci series up to the nth term, where n is entered by the user.
20. Write a JavaScript program that demonstrates the usage of various array methods like push(), pop(), shift(), and unshift().

Note: The list of experiments is not limited to the above list. If the existing laboratory experiments completed in advance, the additional laboratory programs can added, and to be executed in the laboratory.

Object Oriented Programming using JAVA
Offered to B.Com. (Computer Applications) – Minor– IV Semester

Course Code	**:**	**23ITMIL242**	No. Of Lecture Hours per week		:	3
Year of Introduction	:	2024-25	Total No. Of Lecture Hours		:	60
Year of Offering	:	2024-25	CIA Marks		:	30
Year of Revision	:	New Course	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	3
Course Category	:	Minor				
Type of Course	:	Skill Development				
Course Relate to	:	Global				

Course Objective: These objectives focus on ensuring that students gain a solid understanding of both the theoretical and practical aspects of object-oriented programming using Java. They will be equipped to write efficient, reusable, and maintainable Java code while solving real-world problems.

Course Outcomes:

CO NO	Upon successful completion of this course, the student will be able to	PO NO
CO1	Understand the fundamental concepts of OOP (classes, objects, inheritance, polymorphism, encapsulation, abstraction) in Java.	PO1, PO2
CO2	Develop Java programs using OOP principles to solve real-world problems efficiently.	PO2, PO3
CO3	Implement inheritance, interfaces, and exception handling in Java applications.	PO3, PO4
CO4	Develop Java applications using collections, file handling, and multi-threading for high-performance solutions.	PO4, PO3
CO5	Apply design patterns and best practices to build scalable, maintainable Java applications.	PO5, PO3

CO-PO MAPPING MATRIX

	CO - PO	PO1	PO2	PO3	PO4	PO5	PO6
23ITMIL242	**CO1**	H	M				
	CO2		H	M			
	CO3			H	L		
	CO4			L	H		
	CO5			H		L	

Unit No	Syllabus Content	Lecture Hours
I	**Introduction to Java**: Features of Java, The Java virtual Machine, Structure of Java Program, NamingConventions, and Data Types, Literals, **Operators in Java:** Operators **Control Statements in Java**: if... else Statement, do... while Statement, while Loop, for Loop, for each loop, switch Statement, break Statement, continue Statement, return Statement **Input and Output**: Accepting Input from the Keyboard, Reading Input with Scanner and Buffered Reader class, Displaying Output with System.out.Printf(), Displaying Formatted Output with String. Format()	12
II	**Arrays:** Types of Arrays, array name. length, Command Line Arguments, **Strings**: Creating Strings, String Class Methods. **Introduction to OOPs**: Problems in Procedure Oriented Approach, Features of Object-Oriented Programming System (OOPS) **Classes and Objects**: Object Creation, Initializing the InstanceVariables, Access Specifiers, **Constructors Methods in Java**: Method Header or Method Prototype, MethodBody, Understanding Methods, Static Methods, The keyword 'this', Instance Methods.	12

III	**Inheritance**: Inheritance, The keyword 'super', The Protected Specifier, Types of Inheritance, **Polymorphism**: Polymorphism with Variables, Polymorphism using Methods, Polymorphism with Final Methods, final Class, **Type Casting**: Casting Primitive Data Types, Casting Referenced Data Types, TheObject Class, **Abstract Classes**: Abstract Method and Abstract Class, **Interfaces**: Interface, Multiple Inheritance using Interfaces, **Packages**: Package, Different Types of Packages, Interfaces in a Package.	12
IV	**Exception Handling**: Errors in Java Program, Exceptions, throws Clause, throw Clause, Types of Exceptions, re–throwing an Exception, **Streams**: Stream, creating a File using File Output Stream, Reading Data from a File Using File Input Stream, creating a File using File Writer, Reading a File using, File Reader.	12
V	**Threads**: Introduction, Thread Life Cycle, creating a Thread and Running it, Terminating the Thread. **Applets**: Introduction, Creating an Applet, Uses of Applets, <APPLET> tag, A Simple Applet, AppletParameters. **Java Database Connectivity**: Database Servers, Database Clients, JDBC (Java Database Connectivity), Working with Oracle Database, Stages in a JDBC Program.	12

Examples

- Java Program to Demonstrate Control Statements
- Java Program to Read Input Using Scanner and Display Formatted Output.
- Write a Java program on working with Arrays in Java
- Write a Java program to creating and Manipulating Strings in Java
- Write a Java program on Classes, Objects, and Methods in Java
- Demonstrate single inheritance using the super keyword to access parent class members.
- Use the protected access specifier to allow access to class members in subclasses.
- Demonstrate casting between primitive data types.
- Demonstrate type casting with reference data types.
- Demonstrate how to handle compile-time and runtime errors in Java, including common errors like syntax errors and logical errors.
- Demonstrate how to use the throws keyword to declare an exception that a method might throw, allowing it to be handled outside the method.
- Demonstrate the basic concept of threads by creating a simple thread in Java and printing "Thread Running" in a loop.
- Demonstrate the creation of a basic Java Applet and display a message on the applet window using paint() method.
- Write a simple applet that draws a shape, such as a rectangle or circle, on the applet window.

Case Study:

- E-commerce Product Pricing System
- Library Management System
- Employee Management System Using Inheritance and Interfaces
- File Handling and Exception Management in a Simple Banking System
- Multi-threaded Banking Application with Database Connectivity

TEXTBOOKS

Core Java: An Integrated Approach, Authored by Dr. R. Nageswara Rao &Kogent Learning SolutionsInc.

REFERENCE BOOKS:

1. E.Balaguruswamy, Programming with JAVA, A primer, 3e, TATA McGraw-Hill Company
2. John R.Hubbard, Programming with Java, Second Edition, Schaum' soutlineSeries,TMH.
3. Deitel&Deitel. JavaTM: How to Program, PHI(2007)

SUGGESTEDCO-CURRICULARACTIVITIES:

1. Conduct coding competitions focused on object-oriented programming concepts in Java.
2. Provide students with real-world scenarios and ask them to solve the given problems.
3. Assign group projects that require students to work together to create Java programs usingOOP concepts.

MODEL QUESTION PAPER

Title of the Course	:	OBJECT ORIENTED PROGRAMMING USING J AVA			
Course Code	:	23ITMIL242	Maximum Marks	:	70
Offered to	:	B.Com Honours Computer Applications	Time	:	3 Hrs

NOTE TO PAPER SETTER: IN SECTION A & SECTION B, FOR EACH QUESTION ONE SUB QUESTION (A) MUST BE A PROGRAM MEANT FOR LOGICAL TESTING AND ANOTHER SUB QUESTION (B) IS MEANT FOR DESCRIPTIVE / LOGICAL.

SECTION A

ANSWER THE FOLLOWING QUESTIONS. 5 X 4 = 20 Marks

1. a) What are the key features of Java? (CO1, L1)

   OR

   b) Explain the difference between Scanner and Buffered Reader classes in Java. (CO1, L1)
2. a) How can you create a string in Java and display its value? (CO2, L1)

   OR

   b) What is the purpose of constructors in Java and how do they work? (CO2, L2)
3. a) What is the role of the super keyword in inheritance in Java? (CO3, L3)

   OR

   b) Explain the concept of method overriding in Java with an example of polymorphism. (CO3, L2)
4. a) What is the difference between throws and throw in exception handling? (CO4, L3)

   OR

   b) How can you write data to a file in Java using File Output Stream? (CO4, L3)
5. a) What is the life cycle of a thread in Java? (CO5, L3)

   OR

b) What is the purpose of the <applet> tag in Java applets? (CO5, L2)

SECTION B

ANSWER THE FOLLOWING QUESTIONS 5 X 10 = 50 Marks

6. a) Explain the structure of a Java program with an example. (CO1, L2)

   OR

   b) Discuss the different types of operators in Java and give examples of each. (CO1, L2)
7. a) Explain the different types of arrays in Java with examples. How do you access and modify elements in an array? (CO2, L3)

   OR

   b) Describe the features of Object-Oriented Programming (OOP) and how they overcome the limitations of the procedure-oriented approach. (CO2, L2)
8. a) Discuss method overloading and method overriding with examples. (CO3, L3)

   OR

   b) Differentiate abstract classes and interfaces in Java. (CO3, L2)
9. a) Explain exception handling in Java with an example. How does the try-catch block work? (CO4, L2)

   OR

   b) What are streams in Java? Explain how FileInputStream and FileWriter can be used for reading and writing files. (CO4, L3)
10. a) Explain how threads are created and managed in Java. What is thread synchronization and why is it important? (CO5, L3)

    OR

    b) Describe how to establish a JDBC connection to an Oracle database and perform a simple query to fetch data. (CO5, L2)

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Object Oriented Programming Using LAB
Offered to B.Com (Computer Applications) – Minor

Course Code	**:**	**23ITMIP242**	No. Of Lecture Hours per week		:	2
Year of Introduction	:	2024-25	Total No. Of Lecture Hours		:	30
Year of Offering	:	2024-25	CIA Marks		:	15
Year of Revision	:	New Course	SEE Marks		:	35
Percentage of Revision	:	0%	Total Marks		:	50
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	1
Course Category	:	Major				
Type of Course	:	Skill Development				
Course Relate to	:	Global				

Course Objective: The objective this course focus on equipping students with practical skills to write, debug, and manage Java programs while understanding core object-oriented concepts.

Course Outcomes:

CO NO	Upon successful completion of this course, the student will be able to	PO NO
CO1	This outcome focuses on students learning the fundamentals of Java, including variables, operators, and control structures.	PO1
CO2	This outcome involves understanding and implementing object-oriented concepts such as classes, objects, inheritance, and polymorphism in Java.	PO2, PO3
CO3	This outcome focuses on applying Java methods, constructors, and access modifiers to create well-structured code in Java.	PO2, PO4
CO4	This outcome emphasizes understanding and implementing exception handling, file I/O, and basic multithreading in Java.	PO3, PO4
CO5	This outcome involves using Java to design and implement simple applications with real-world problem-solving using object-oriented principles.	PO3, PO5

CO-PO MAPPING MATRIX

	CO - PO	PO1	PO2	PO3	PO4	PO5	PO6
23ITMIP242	**CO1**	H					
	CO2	L	H	M			
	CO3		H	M			
	CO4			L	H		
	CO5			H		L	

List of Experiments:

1. Write a program to read Student Name, Reg.No, Marks [5], and calculate Total, Percentage, Result. Display all the details of students.
2. Write a program to perform the following String Operations
   a. Read a string.
   b. Find out whether there is a given sub string or not.
   c. Compare existing string by another string and display status.
   d. Replace existing string character with another character.
   e. Count number of characters in a string
3. JavaprogramtoimplementsAdditionandMultiplicationoftwoNxNmatrices.
4. Java program to demonstrated use of Constructor.
5. Calculate area of the following shapes using method overloading.
   a. Triangle
   b. Rectangle
   c. Circle
   d. Square
6. Implement inheritance between Person (Aadhar, Surname, Name, DOB, and Age) and Student (Admission Number, College, Course, Year)classes where read Data(),display Data()areoverriding methods.
7. Java program for implementing Interfaces.
8. Java program on Multiple Inheritance.
9. JavaprogramfortodisplaySerialNumberfrom1toNbycreating two Threads.
10. Java program to demonstrate the following exception handlings.

a. DividedbyZero
b. ArrayIndexOutofBound
c. ArithmeticException
d. UserDefinedException

11. Create an Applet to display different shapes such as Circle, Oval, Rectangle, Square, and Triangle.
12. Write a program to create Book (ISBN, Title, Author, Price, Pages, Publisher) table and perform the following operations.
    a. Add book details.
    b. Search a book detail for a given ISBN and display book details, if available
    c. Update a book detail using ISBN.
    d. Delete book details for a given ISBN and display list of remaining Books.

Note: The list of experiments is not limited to the above list. If the existing laboratory experiments completed in advance, the additional laboratory programs can added, and to be executed in the laboratory.

Course Structure

Program : B.C.A. Honours

S. No	Course Code	Course Name	Sem	Major / Minor	Hours per week	IA	SEE	Total Marks	Credits
1	23BCMAL121	Office Automation Tools	II	Major-1 Theory	3	30	70	100	3
2	23BCMAP121	Office Automation Tools Lab	II	Major-1 Practical	2	15	35	50	1
3	23BCMAL122	Programming In 'C'	II	Major-2 Theory	3	30	70	100	3
4	23BCMAL122	Programming In 'C' Lab	II	Major-2 Practical	2	15	35	50	1
5	23DSMIL121	Python Programming	II	Minor-1 Theory	3	30	70	100	3
6	23DSMIP121	Python Programming Lab	II	Minor-1 Practical	2	15	35	50	1
7	23CSSDL121	Digital Literacy	II	SEC	2	15	35	50	1
8	23BCMAL241	Data Science and R Programming	IV	Major-7 Theory	3	30	70	100	3
9	23BCMAP241	Data Science and R Programming Lab	IV	Major-7 Practical	2	15	35	50	1
10	23BCMAL242	Operating Systems	IV	Major-8 Theory	3	30	70	100	3
11	23BCMAP242	Operating Systems Lab	IV	Major-8 Practical	2	15	35	50	1
12	23BCMAL243	Mobile application development using Android	IV	Major-9 Theory	3	30	70	100	3
13	23BCMAP243	Mobile application development using Android Lab	IV	Major-9 Practical	2	15	35	50	1
14	23DSMIL241	Data Visualization using Tableau	IV	Minor-3 Theory	3	30	70	100	3
15	23DSMIP241	Data Visualization using Tableau lab	IV	Minor-3 Practical	2	15	35	50	1
16	23DSMIL242	Data Visualization using Python	IV	Minor-4 Theory	3	30	70	100	3
17	23DSMIP242	Data Visualization using Python Lab	IV	Minor-4 Practical	2	15	35	50	1

OFFICE AUTOMATION TOOLS

Offered to B.C.A. Honours – Major – II Semester

Course Code	**:**	**23BCMAL121**	No. Of Lecture Hours per week		:	3
Year of Introduction	:	2023-24	Total No. Of Lecture Hours		:	60
Year of Offering	:	2024-25	CIA Marks		:	30
Year of Revision	:	2024-25	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	3
Course Category	:	Major-1				
Type of Course	:	Skill Development, employability				
Course Relate to	:	Global				

Course Objectives:

1. To understand basic knowledge in the various office automation tools.
1. To apply the basic concepts of internet and internet tools.
2. To analyze the concepts about Excel formulae in easy way.
3. To analyze the advanced features in Excel sort, filters, and charts
4. To evaluating about Features of Power Point, templates, and wizards adding subheadings, editing text.

Course Outcomes:

CO No	Upon successful completion of this course, the student will be able to	PO No
CO1	Understand the in-depth training in use of office automation.	PO1, PO2
CO2	Apply and Develop internet and internet tools.	PO1, PO2
CO3	Implement this course aims to acquire basic knowledge in the various office automation tools and its application in the various areas of business.	PO2, PO3
CO4	Evaluate the methods of Office automation leverages technology to optimize tasks, enhancing efficiency and productivity.	PO2, PO3
CO5	Create to improved collaboration, time savings, accuracy, and enhanced customer service.	PO2, PO3

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) & PSOs:

	CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
23BCMAL121	CO1	L	L					
	CO2	L	M					
	CO3		L	M				
	CO4		M	M				
	CO5		M	H				

Syllabus:

Unit No	Syllabus Content	Lecture Hours
I	**Introduction to MS Office & MS Word:** MS-Word: Features of MS Word, MS Word Window components, working with formatted text, Shortcut keys, Formatting documents: Selecting text, Copying &moving data, formatting characters, changing cases, Paragraph formatting, Indents, Drop Caps Using format painter, Page formatting, Header & footer, Bullets & numbering, Tabs, Forming tables. To find & replace text, go to (F5) command, proofing text (Spell-check, Autocorrect)	14
II	**MS Word Advanced features:** Difference between Wizard and Template - Customize the Quick Access Tool Bar - Macros: Purpose - Creating Macro - Using Macro - Storing Macro - Inserting pictures: From Computer, Online Pictures Insert 3d Models Insert Shapes Insert Text Box - Insert Equation, Hyperlinks, Tables Insert tables Mail merging, Printing documents, Tables Insert tables, Mathematical calculations on tables data. Insert Text Box etc.	12

III	**Introduction to MS Excel & Its features:** MS Excel: Excel Features, Spreadsheets, workbooks, creating, saving & editing a workbook, Renaming sheets, cell entries (numbers, labels, and formulas), spell checking, find and replace, Adding and deleting rows and columns Filling series, fill with drag, data sort, Formatting worksheet, Functions and its parts, Some useful Functions in Excel (SUM, AVERAGE, COUNT, MAX,MIN, IF)	12
IV	**Ms-Excel Advanced Features:** Cell referencing (Relative, Absolute, Mixed), What-if analysis, Introduction to charts: types of charts, creation of charts, printing a chart, printing worksheet - Sort - Filters - View Menu	12
V	**Ms-PowerPoint and its Applications:** MS-Power Point: Features of PowerPoint, Uses, components of slide, templates, and wizards, using a template, choosing an auto layout, using outlines, adding subheadings, editing text, formatting text, using a master slide, adding slides, changing the colour scheme, changing background and shading, adding header and footer, adding clipart and auto shapes. Various presentations, working in slide sorter view (deleting, duplicating, rearranging slides), adding transitions and animations to slide shows, inserting music or sound on a slide, viewing slide shows, and Printing slides.	10

Case Study:

1. Create a document to write a letter to the DM&HO of the district complaining about Hygienic conditions in your area.
2. Create a document to share your experience of your recent vacation with your family.
3. Create a document to send holiday intimation to all the parents at the time of Dasara's Vacation.
4. Create a document to create a Timetable for your class using tables.
5. Create a worksheet with your class marks displaying total, average, top marks in the class, and least marks in the class.
6. Prepare a chart with the height and weights of your classmates in at least 3 types of charts.
7. Demonstrate the use of Filter with the attendance data of your class.
8. Prepare a presentation with your achievements and experiences in college

Textbooks:

1. Computer Fundamentals-Pradeep. K. Sinha: BPB Publications.
2. Fundamentals of Computers -Reema Thareja, Oxford University Press India

Reference Books:

1. Fundamentals of Computer - V. Rajaraman, Printice Hell of India.
2. Introduction to Computers-Peter Norton McGraw-Hill.

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MODEL QUESTION PAPER

Title of the Course	:	OFFICE AUTOMATION TOOLS			
Course Code	:	23BCMAL121	Maximum Marks	:	70
Offered to	:	BCA Honours Computer Applications	Time	:	3 Hrs

Section-A

ANSWER ALL QUESTIONS **5X4M=20M**

1. (A). Explain the MS-Word Features (CO1, L2)
   (OR)
   (B). Explain the concepts of page formatting, header, and footer (CO1, L2)

2. (A). Compare between wizard and Template. (CO2, L2)
   (OR)
   (B). Explain how to insert 3d models and shapes (CO2, L2)

3. (A)Illustrate how to create, saving and editing workbook? (CO3, L1)
   (OR)
   (B). Demonstrate how to be adding and deleting rows, columns. (CO3, L1)

4. (A). Explain cell referencing (Relative, Absolute, Mixed) (CO4, L2)
   (OR)
   (B)Demonstrate the steps in What-if analysis (CO4, L2)

5. (A)Explain the features of Power Point and its uses (CO5, L1)
   (OR)
   (B). Explain the components of slide (CO5, L1)

Section-B

ANSWER THE FOLLOWING QUESTIONS **5X10M=50M**

6. (A) Explain shortcut keys, finding and replacing text (CO1, L2)
   (OR)
   (B) Explain selecting text, copying, and moving data and formatting charters (CO1, L2)

7. (A) Illustrate how to hyperlink, tables and insert table components. (CO2, L2)
   (OR**)**
   (B) Explain how to create Macro, and how to use Macro (CO2, L2)

8. (A) Explain useful functions in Excel with examples (CO3, L1)
   (OR)
   (B) Explain how to rename sheet, cell entries, spell check? (CO3, L1)

9. (A) Demonstrate the concept of types of charts (CO4, L2)
   (OR**)**
   (B) Demonstrate the of sort and filers with one suitable example? (CO4, L1)

10. (A) Explain the steps in slide sorter view (deleting, duplicating, rearranging slides) (CO5, L1)
    (OR)
    (B) How to add transition and animation to slide show, and how to insert music and sound on a slide (CO5, L1)

OFFICE AUTOMATION TOOLS LAB
Offered to: B.C.A. Honours – II Semester

Course Code	**:**	**23BCMAP121**	No. Of Lecture Hours per week		:	2
Year of Introduction	:	2023-24	Total No. Of Lecture Hours		:	30
Year of Offering	:	2023-24	CIA Marks		:	15
Year of Revision	:	New Course	SEE Marks		:	35
Percentage of Revision	:	0%	Total Marks		:	50
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	1
Course Category	:	Major-1				
Type of Course	:	Skill Development, employability				
Course Relate to	:	Global				

1) Design a visiting card for the Managing Director of a company as per the following specifications.
   - Size of visiting card is 32×2
   - Name of the company with a big font
   - Phone number, Fax number, and E-mail address with appropriate symbols.
   - Office and Residence address separated by a line.

2) Create a table with the following columns and display the result in separate cells for the following
   - Emp Name, Basic pay, DA, HRA, Total salary.
   - Sort all the employees in ascending order with the name as the key.
   - Calculate the total salary of the employee.
   - Calculate the total salary of the employee.
   - Finding the highest salary and
   - Find the Lowest salary.

3) Prepare an advertisement to a company requiring software professionals with the following
   - Attractive page border
   - Design the name of the company using WordArt.
   - Use at least one clipart.
   - Give details of the company (use bullets etc)
   - Give details of the Vacancies in each category of employee (Business manager, Software engineers, System administrators, Programmers, Data entry operators)
   - qualification required.

4) Create a letter having the following specifications
   - Name ofthecompanyonthetopofthepage2with a bigfontandgoodstyle.
   - Phone no, Fax no, and E-mail address with symbols.
   - Main products manufactured by the company.
   - Slogans if any should be specified in bold at the bottom.

5) Create two pages of curriculum vitae of a graduate with the following specifications
   - Table to show qualifications with proper headings.
   - Appropriate left and right margins
   - Format 1⁄2 page using two-column approach about yourself
   - Name on each page at the top right side.
   - Page no.in the footer on the right side.

6) Write a macro format document below
   - Line spacing "2" (double)
   - Paragraph indent of 0.1
   - Justification formatting style
   - Arial font andBold14pt-size

7) Create a letter as the main document and create 10 records for the 10 persons User mail merge to create letters for selected persons among 10.

8) Create an electronic spreadsheet in which you enter the following decimal numbers and convert them into octal, Hexa decimal, and binary numbers and vice-versa.

Decimal Numbers:35,68,95,78,165,225,355,375,465
Binary numbers: 101,1101,11101,11111,10001,11101111

9) Calculate the net pay of the employees following the conditions below.

	A	B	C	D	E	F	G	H	I
1	Employee name	Employee id	Basic	DA	HRA	GPF	Gross Pay	Income	Net Worth

DA: -56% of the basic pay if Basic pay is greater than 20000 or else 44%.
HRA: -15% of the Basic pay subject to maximum of Rs.4000.
GPF: -10% of the basic pay.
INCOMETAX: -10%of basic if Basic pay is greaterthan20000.
Find who is getting the highest salary & who is getting the lowest salary.

10) The ABC Company shows the sales of different products for 5 years. Create BAR Graph, 3D and Pie chart for the following.

A	B	C	D	E	F
S.No.	**Year**	**Pro1**	**Pro2**	**Pro3**	**Pro4**
1	1989	1000	800	90	1000
2	1990	800	80	50	900
3	1991	1200	190	40	800
4	1992	400	200	30	1000
5	1993	1800	400	40	1200

11) Create a suitable examination database and find the sum of the marks (total) of each student and the respective, class secured by the student.

Pass: if marks in each subject>=35
Distinction: if average>=75
First-class: if average>=60but<75
Second class: if average>=50butlessthan60
Third class: if average>=35butlessthan50
Fail: if marks in any subject<35

12) Enter the following data into the sheet.

Name	Department	Salary
Anusha	Accounts	12000
Rani	Engineering	24000
Lakshmi	Accounts	9000
Purnima	Marketing	20000
Bindu	Accounts	4500
Tejaswi	Accounts	11000
Swetha	Engineering	15000
Saroja	Marketing	45000
Sunitha	Accounts	5600
Sandhya	Engineering	24000
Harika	Marketing	8000

- Extract records for the department in Accounts and Salary >10000.
- Sort the data by salary with the department using "sort commands".
- Calculate the total salary for a department using Subtotals.

13) Enter the following data into the sheet.

	Raju	Rani	Mark	Rosy	Ismail	Reshma
English	76	89	43	51	76	87
2nd Lang	55	85	78	61	47	33
Maths	65	82	34	58	52	65
Computers	45	91	56	72	49	56
Human Values	51	84	54	64	32	64

Apply the conditional formatting for marks.

- 35 below Red
- 35 to 50 Blue
- 51 to 70 Green
- 71 to 100 Yellow

14) Create a presentation using templates.

15) Create a Custom layout or Slide Master for professional presentation.
16) Create a presentation with slide transitions and animation effects.
17) Create a table in PPT and apply a graphical representation.

Note: The list of experiments is not limited to the above list. If the existing laboratory experiments completed in advance, the additional laboratory programs can added, and to be executed in the laboratory.

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Programming In 'C'
Offered to B.C.A. Honours – Major – II Semester

Course Code	**:**	**23BCMAL122**	No. Of Lecture Hours per week		:	3
Year of Introduction	:	2023-24	Total No. Of Lecture Hours		:	60
Year of Offering	:	2023-24	CIA Marks		:	30
Year of Revision	:	New Course	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	3
Course Category	:	Major-2				
Type of Course	:	Skill Development				
Course Relate to	:	Global				

Course Objective: This course aims to provide exposure to problem-solving through programming and introduce the concepts of the C Programming language.

Course outcomes (based on BTL):

- CO1. Understand Tokens and write basic C programs. (PO5)
- CO2. Understand control structures in C. (PO5)
  CO3. Understand arrays and strings and implement them. (PO5)
- CO4. Understand the right way of using functions, pointers, and structures in C(PO5)
- CO5. Develop and test programs written in C files (PO5, PO7)

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) & PSOs

	CO-PO MATRIX							
	CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
23BCMAL122	CO1					H		
	CO2					H		
	CO3					H		
	CO4					H		
	CO5					H		M

Syllabus

Unit No	Syllabus Content	Lecture Hours
I	**Introduction to Algorithms and Programming Languages**: Algorithm - Key features of Algorithms - examples of Algorithms, Flow Charts– Pseudo code, Programming Languages – Generation of Programming Languages – Structured Programming Language. **Introduction to C**: Introduction – Structure of C Program, Writing the first C Program, File used in C Program – Compiling and Executing C Programs, Using Comments – Keywords – Identifiers, Basic Data Types in C, Variables – Constants, I/O Statements in C, Operators in C, Programming Examples, Type Conversion and Type Casting.	16
II	**Control Structures and Functions**: Decision Control and Looping Statements: Introduction to Decision Control Statements, Conditional Branching Statements, Iterative Statements, Nested Loops, Break and Continue Statement – Go to Statement. **Functions**: Introduction, using functions – Function declaration/ prototype – Function definition, Function call – Return statement – Passing parameters, Scope of variables, Storage Classes, Recursive functions.	12
III	**Arrays**: Introduction, Declaration of Arrays, accessing elements of the Array – Storing Values in Array, Calculating the length of the Array, Operations that can be performed on Array, Passing one dimensional array to function. Two dimensional Arrays, accessing two dimensional arrays, Passing two dimensional arrays to functions. **Strings**: Introduction, String Operations using String functions.	10

IV	**Pointers**: Understanding Computer Memory – Introduction to Pointers, Declaring Pointer Variable, Pointer Expressions and Pointer Arithmetic – Null Pointers, Passing Arguments to Functions using Pointer, Pointer and Arrays – Passing Array to Function, Memory Allocation in C Programs, Memory Usage – Dynamic Memory Allocation, Drawbacks of Pointers. **Structures**: Introduction to structures, Nested Structures. **Union, and Enumerated Data Types**: Introduction to Union – accessing union elements, Enumerated Data Types.	12
V	**File Handling**: Files: Introduction to Files, Using Files in C, Reading Data from Files, Writing Data from Files, Detecting the End-of-file, Error Handling during File Operations.	10

Textbooks:
Computer Fundamentals and Programming in C by REEMA THAREJA from OXFORD UNIVERSITY PRESS

Reference Books:
E Balagurusamy, COMPUTING FUNDAMENTALS & C PROGRAMMING – Tata McGraw-Hill, Second Reprint 2008, ISBN 978-0-07-066909-3.

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MODEL QUESTION PAPER

Title of the Course	:	PROGRAMMING IN C			
Course Code	:	23BCMAL122	Maximum Marks	:	70
Offered to	:	BCA Honours Computer Applications	Time	:	3 Hrs

Section A

Answer all Questions **5 x 4=20M**

1. (A) Explain Structure of C. (CO1,L1)

OR

(B) Describe Keywords (CO1, L1)

2. (A) Write about break and continue statements (CO2,L1)

OR

(B) Write a c program to print 1 to 10 natural numbers. (CO2, L1)

3. (A) Summarize one dimensional array with suitable example. (CO3, L2)

OR

(B). Define a string with example program. (CO3, L1)

4. (A) What is scope of variables in functions. (CO4, L1) OR
(B)Define a function and how to declare a function in c . (CO4, L1)

5. (A) Write about Reading data from files. (CO5, L1)

OR

(B) How to declare a pointer variable in c. (CO5, L1)

Section B

Answer all Questions **5 x 10=50M**

6. (A) Explain Datatypes in c with example. (CO1, L1)

OR

(B) Explain about Input and Output statements in C. (CO1, L1)

7. (A) Summarize Looping statements in c with example. (CO2, L2)

OR

(B)Summarize iterative statements in c with example. (CO2, L2)

8. (A) Write a program for multiplication of 2 3x3 matrices. (CO3, L1)

OR

(B) Write a program by using string handling functions. (CO3, L1)

9. (A) Explain Storage Classes in C. (CO4, L2)

OR

(B) Explain 'array of structures. (CO4, L2)

10 (A) Explain Dynamic memory allocation. (CO5, L2)

OR

(B) How to pass arguments to functions using pointers with example program. (CO5, L2)

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Programming In 'C' Lab
Offered to B.C.A. Honours – Major – II Semester

Course Code	**:**	**23BCMAP122**	No. Of Lecture Hours per week		:	2
Year of Introduction	:	2023-24	Total No. Of Lecture Hours		:	30
Year of Offering	:	2023-24	CIA Marks		:	15
Year of Revision	:	New Course	SEE Marks		:	35
Percentage of Revision	:	0%	Total Marks		:	50
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	1
Course Category	:	Major-2				
Type of Course	:	Skill Development				
Course Relate to	:	Global				

Course Objective: This course aims to provide exposure to problem-solving through programming and introduce the concepts of the C Programming language.

Course outcomes (based on BTL):

- CO1: Demonstration of basic C programs using branching and iterative statements. (PO7)
- CO2: Perform Operations on Arrays. (PO5)
- CO3: Perform passing parameters to functions and recursive functions. (PO5)
- CO4: Demonstration of concept of pointers. (PO5)
- CO5: Demonstration of Structures and files in C program. (PO5)

List of the PracticalS

1. Write a C program to calculate the expression: ((a*b)/c)+(a+b-c) .
2. Write a C program to calculate $(a+b+c)^3$.
3. Write a C program to check whether the given number is Prime or Not.
4. Write a C program to find the sum of individual digits of a given number.
5. Program to convert Hours into seconds.
6. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
7. Write a program to check whether the given number is Palindrome or Not.
8. Write a C program to check whether a given 3-digit number is an Armstrong number or not.
9. Write a C program to print the numbers in triangular form.

   1
   1 2
   1 2 3
   1 2 3 4
10. Program to display the number of days in each month using Switch – Case.
11. Write a C program to perform the following:
    I. Addition of two matrices.
    II. Multiplication of two matrices.
12. Write a C program to determine if the given string is a palindrome or not.
13. Write C program to find the factorial of a given integer using a recursive function.
14. Write a C program to concatenate two strings using pointers.
15. Write a C program to find the length of a string using pointers.
16. Program to display Student Details using Structures.
17. Write a C program to 1. Write data into a file, 2. Read data from a file.

Note: The list of experiments is not limited to the above list. If the existing laboratory experiments completed in advance, the additional laboratory programs can added, and to be executed in the laboratory.

PYTHON PROGRAMMING

Offered to B.Sc. Honours (Comp. Sci.) & BCA Honours (Comp. Appl.) – Minor – II Semester

Course Code	**:**	**23DSMIL121**	No. Of Lecture Hours per week		:	3
Year of Introduction	:	2023-24	Total No. Of Lecture Hours		:	60
Year of Offering	:	2023-24	CIA Marks		:	30
Year of Revision	:	New Course	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	3
Course Category	:	Minor-1				
Type of Course	:	Skill Development, Employability				
Course Relate to	:	Global				

Course Objective: After taking the course, students will be able to use Python program a Scripting language and Exposure of various problems soling approaches of computer.

Course Outcomes:

CO NO	Upon successful completion of this course, the student will be able to	PO NO
CO1	Learn about concepts of programming and python	PO1, PO2
CO2	Understand the Decision making and looping controls available in Python Programs	PO2, PO3
CO3	Determine the process of using functions and modules	PO3, PO4
CO4	Implement the Data structures using Lists, Tuple, Dictionaries	PO4, PO3
CO5	Interpret the OOPs concept in Python.	PO5, PO3

CO-PO MAPPING MATRIX

	CO - PO	PO1	PO2	PO3	PO4	PO5	PO6
23AIMIL121	**CO1**	H	M				
	CO2		H	M			
	CO3			H	L		
	CO4			L	H		
	CO5			H		L	

Unit No	Syllabus Content	Lecture Hours
I	**Introduction, Data types, Operators: Introduction to Programming**: Languages, Generations, Programming Paradigms, Debugging and Testing Approaches. **Python**: Introduction, History of Python, Features of Python, Writing and executing python programs, constants, variables, reserved words, input operation, indentation, **Data types in python**: integer, string, Boolean, Operators, and expressions.	12
II	**Decision making and looping. Control Flow**: **Selection or conditional branching**: if, if-else, if-elif- else, nested if. **Loop or iterative statements:** for, while, break, continue, pass. Example programs on control flow.	13
III	**Functions and Modules:** Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Lambda or Anonymous Functions, Global and Local Variables. **Modules**: Creating modules, import statement, from import statement.	12
IV	**Data Structures: Lists**: Creation, accessing values, updating values, list operations, list methods. **Tuple:** tuple creation, accessing values, deleting values, tuple operations. **Sets:** creation, set operations. **Dictionaries:** creation, accessing values, adding, modifying, deleting items, built-in dictionary methods. NumPy, Matplotlib	13
V	**Object Oriented Programming in Python:** Introduction to OOP, Features of OOP, Merits and Demerits, Classes and Objects, Class method and self-Argument, Public and Private, the init method(constructor), Inheritance, polymorphism and Method Overriding. **Error and Exception handling**: Handling Exception using try-except block, Raising Exceptions, User Defined Exceptions.	10

TEXTBOOKS

Python Programming: Using Problem Solving approach, Reema Thareja, Oxford University Press 2017

REFERENCE BOOKS:

Python Programming, A Modern Approach, Vamsi Kurama, Pearson Publications, 2017

Recommended Co – Curricular Activities:

(Co-curricular activities shall not promote copying from textbook or from others work and shall encourage self/independent and group learning)

A. Measurable

a. Assignments (in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging).
b. Student seminars (on topics of the syllabus and related aspects (individual activity))
c. Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams))
d. Study projects (by very small groups of students on selected local real- time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (team activity))

B. General

e. Group Discussion
f. Others

RECOMMENDED CONTINUOUS ASSESSMENT METHODS:

Some of the following suggested assessment methodologies could be adopted.

1. The oral and written examinations (Scheduled and surprise tests),
2. Closed-book and open-book tests,
3. Programming exercises,
4. Practical assignments and laboratory reports,
5. Observation of practical skills,
6. Individual and group project reports.
7. Efficient delivery using seminar presentations,
8. Viva voce interviews.
9. Computerized adaptive testing, literature surveys and evaluations,
10. Peers and self-assessment, outputs form individual and collaborative work.

MODEL QUESTION PAPER

Title of the Course	:	PYTHON PROGRAMMING			
Course Code	:	23DSMIL121	Maximum Marks	:	70
Offered to	:	B.Sc Honours Computer Science & BCA Honours Computer Applications	Time	:	3 Hrs

NOTE TO PAPER SETTER: IN SECTION A & SECTION B, FOR EACH QUESTION ONE SUB QUESTION (A) MUST BE A PROGRAM MEANT FOR LOGICAL TESTING AND ANOTHER SUB QUESTION (B) IS MEANT FOR DESCRIPTIVE / LOGICAL.

SECTION A

ANSWER THE FOLLOWING QUESTIONS. 5 X 4 = 20 Marks

1. a) Write different types of programming paradigms. (CO1, L1)

   OR

   b) Develop a python code to print sum and average marks of three subjects of a student. (CO1, L1)
2. a) Write a python program to find the factorial of a given number. (CO2, L1)

   OR

   b) Explain if-elif-else statement in python with example (CO2, L2)
3. a) Develop a python program for Lambda function. (CO3, L3)

   OR

   b) Explain about global and local variables in python. (CO3, L2)
4. a) Develop a python program to insert elements into a list, remove elements from a list and sort elements of the list. (CO4, L3)

   OR

   b) Compare lists and tuples in python. (CO4, L3)
5. a) Develop a python program to demonstrate Inheritance. (CO5, L3)

   OR

   b) Explain about classes and objects in python. (CO5, L2)

SECTION B

ANSWER THE FOLLOWING QUESTIONS 5 X 10 = 50 Marks

6. a) List and explain data types in python. (CO1, L2)

   OR

   b) Write names of operators in python and explain them with examples. (CO1, L2)
7. a) Develop a python program to find whether the number is palindrome or not. (CO2, L3)

   OR

   b) Explain loops in Python with examples. (CO2, L2)
8. a) Explain different categories of arguments used in functions in python. (CO3, L3)

   OR

   b) Develop a python program to create a module and import it in another program. (CO3, L2)
9. a) Develop a python program to create a dictionary and add, modify, delete values in the dictionary and print them. (CO4, L2)

   OR

   b) Define tuple. Explain about tuples with examples. (CO4, L3)
10. a) Develop a python program to demonstrate exception handling. (CO5, L3)

    OR

    b) Define method overriding. Explain with an example. (CO5, L2)

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PYTHON PROGRAMMING LAB

Offered to B.Sc. Honours (Comp. Sci.) & BCA Honours (Comp. Appl.) – Minor – II Semester

Course Code	**:**	**23DSMIP121**	No. Of Lecture Hours per week		:	2
Year of Introduction	:	2023-24	Total No. Of Lecture Hours		:	30
Year of Offering	:	2023-24	CIA Marks		:	15
Year of Revision	:	New Course	SEE Marks		:	35
Percentage of Revision	:	0%	Total Marks		:	50
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	1
Course Category	:	Minor-1				
Type of Course	:	Skill Development, Employability				
Course Relate to	:	Global				

Course Outcomes:

CO NO	Upon successful completion of this course, the student will be able to	PO NO
CO1	Write, Test and Debug Python Programs	**PO1**
CO2	Implement Conditionals and Loops for Python Programs	**PO1, PO2, PO3**
CO3	Organize code into modules for better code organization and reusability.	**PO2, PO3**
CO4	Implement functions and represent Compound data using Lists, Tuples and Dictionaries	**PO3, PO4**
CO5	Implement OOP concepts and write applications in python.	**PO5, PO3**

CO-PO MAPPING MATRIX

	CO - PO	PO1	PO2	PO3	PO4	PO5	PO6
23AIMIP121	**CO1**	H					
	CO2	L	H	M			
	CO3		H	M			
	CO4			L	H		
	CO5			H		L	

List of Experiments:

1. Python Program to Find the Square Root
2. Python Program to Swap Two Variables
3. Python Program to Generate a Random Number
4. Python Program to Check if a Number is Odd or Even
5. Python Program to Find the Largest Among Four Numbers
6. Python Program to Check Prime Number
7. Python Program to Check Whether a number is Palindrome or Not
8. Python Program to Display the multiplication Table.
9. Python Program to Print the Fibonacci sequence.
10. Python Program to Check Armstrong Number
11. Python Program to Find the Sum of Natural Numbers
12. Python Program to Find Factorial of Number Using Recursion
13. Python Program to check given number is prime or not using functions.
14. Python Program to demonstrate usage of keyword, default, and variable length arguments.
15. Python Program for lambda functions.
16. Python Program to create module and import it.
17. Python Program to create a list and perform operations on its contents.
18. Python Program to perform operations on tuples.
19. Python Program to create a dictionary and print its content.
20. Python program to perform operations on sets.
21. Python Program for inheritance.
22. Python Program for method overriding.
23. Python Program for exception handling.
24. Python Program to demonstrate exception handling.
25. Python Program to demonstrate user defined exception.

Note: The list of experiments is not limited to the above list. If the existing laboratory experiments completed in advance, the additional laboratory programs can added, and to be executed in the laboratory.

Data Science and R Programming
Offered to B.C.A. Honours – Major – IV Semester

Course Code	**:**	**23BCMAL241**	No. Of Lecture Hours per week		:	3
Year of Introduction	:	2024-25	Total No. Of Lecture Hours		:	60
Year of Offering	:	2024-25	CIA Marks		:	30
Year of Revision	:	New Course	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	3
Course Category	:	Major-7				
Type of Course	:	Skill Development, Employability				
Course Relate to	:	Global				

Course Objective:
Data Science is a fast-growing interdisciplinary field, focusing on the analysis of data to extractknowledge and insight. This course will introduce students to the collection. Preparation, analysis, modelling, and visualization of data, covering both conceptual and practical issues.

Course Outcomes:

CO NO	Upon successful completion of this course, the student will be able to	PO NO
CO1	Learn the fundamentals of data science and the R programming language	PO1, PO2
CO2	Understand data visualization techniques using R libraries	PO2, PO3
CO3	Apply statistical methods and models to analyse data using R	PO3, PO4
CO4	Implement data manipulation and cleaning techniques using R	PO4, PO5
CO5	Interpret machine learning algorithms and implement them in R	PO5, PO6

CO-PO MAPPING MATRIX

	CO - PO	PO1	PO2	PO3	PO4	PO5	PO6
23BCMAL241	**CO1**	H	M				
	CO2		H	M			
	CO3			H	L		
	CO4			L	H		
	CO5			H		L	

Syllabus:

Unit No	Syllabus Content	Lecture Hours
I	Defining Data Science and Big data, Benefits and Uses, facets of Data, DataScience Process.Historyand Overview of R, Getting Started with R, R Nuts and Bolts.	12
II	The Data Science Process: Overview of the Data Science Process-Setting the research goal, Retrieving Data, Data Preparation, Exploration, Modelling, data Presentation and Automation.Getting Data in and out of R, Using reader package, Interfaces to the outside world.	12
III	Machine Learning: Understanding why data scientists use machine learning-What is machinelearning and why we should care about, Applications of machine learning in data science, where itis used in data science, The modelling process, Types of Machine Learning-Supervised and Unsupervised.	12
IV	Handling large Data on a Single Computer: The problems we face when handling large data, General Techniques for handling large volumes of data, generating programming tips for dealing with large datasets.	12
V	Sub-setting R objects, Vectorised Operations, Managing Data Frames with the dplyr, Controlstructures, functions, Scoping rules of R, Coding Standards in R, Loop Functions, Debugging, Simulation. Case studies on preliminary data analysis.	12

Example:

- A retail company wants to predict customer purchasing behaviour based on past purchases. Data scientists analyse past sales data, process the data, and use algorithms to predict future purchasing trends. They use R programming to clean the data, build a predictive model, and visualize the results.
- The hospital has data spread across multiple formats and sources. The task is to consolidate the data for analysis.
- Using the readr package, you can load a CSV file into R and clean the data. For instance.
- Predicting customer churn using logistic regression in R. The model can be built with the caret package to predict whether a customer will leave the service based on historical data.
- Loading and processing large datasets using data.table in R, which is optimized for speed
- Filtering and manipulating data frames with the dplyr package.

Case Study:

- How can XYZ Retail predict which products are likely to be in high demand to improve inventory management?
- How can DEF Insurance predict which policyholders are most likely to file claims?
- GHI Logistics has massive transportation data for millions of shipments over several years. Processing and analyzing this large data are a challenge.
- JKL wants to perform preliminary data analysis on their customer satisfaction surveys to detect patterns.

TEXTBOOKS

1. DavyCielen, Arno.D.B.Maysman, Mohamed Ali, “Introducing DataScience”ManningPublications, 2016.
2. Roger D. Peng, “R Programming for DataScience” Lean Publishing, 2015.

REFERENCE BOOKS:

1. Nina Zumel, John Mount, “Practical Data Science with R”, Manning Publications, 2014.
2. Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, AbhijitDasgupta, “PracticalDataScience Cookbook”, Packt Publishing Ltd., 2014.

WEB References:

1. https://www.kaggle.com/datasets
2. https://github.com/

MODEL QUESTION PAPER

Title of the Course	:	DATA SCIENCE AND R PROGRAMMING			
Course Code	:	23BCMAL241	Maximum Marks	:	70
Offered to	:	BCA Honours Computer Applications	Time	:	3 Hrs

NOTE TO PAPER SETTER: IN SECTION A & SECTION B, FOR EACH QUESTION ONE SUB QUESTION (A) MUST BE A PROGRAM MEANT FOR LOGICAL TESTING AND ANOTHER SUB QUESTION (B) IS MEANT FOR DESCRIPTIVE / LOGICAL.

SECTION A

ANSWER THE FOLLOWING QUESTIONS. 5 X 4 = 20 Marks

1. a) What are the key benefits and uses of Data Science in various industries? (CO1, L1)

   OR

   b) Explain the basic features of R and its significance in Data Science. (CO1, L1)
2. a) What are the key steps in the Data Science process, and why is data preparation important? (CO2, L1)

   OR

   b) Describe how to retrieve data from an external source into R using the readr package. (CO2, L2)
3. a) What is machine learning, and why is it important in data science? (CO3, L3)

   OR

   b) Differentiate between supervised and unsupervised machine learning. (CO3, L2)
4. a) What are the common challenges faced while handling large datasets on a single computer? (CO4, L3)

   OR

   b) How can you optimize R for processing large data on a single machine? (CO4, L3)
5. a) What are vectorized operations in R, and how do they improve the efficiency of data processing? (CO5, L3)

   OR

   b) Define scoping rules in R and explain their importance in function execution. (CO5, L2)

SECTION B

ANSWER THE FOLLOWING QUESTIONS 5 X 10 = 50 Marks

6. a) Discuss the process of Data Science and the various facets of data involved in a typical data science project. (CO1, L2)

   OR

   b) Illustrate with examples the key features of R that make it suitable for data analysis. (CO1, L2)
7. a) Explain the data science process in detail, from setting the research goal to data presentation and automation. (CO2, L3)

   OR

   b) Discuss the different functions and packages in R used for importing and exporting data, such as the readr package, and their advantages. (CO2, L2)
8. a) Explain the different types of machine learning techniques and their applications in data science. (CO3, L3)

   OR

   b) Discuss the steps involved in the machine learning process, from data collection to model deployment. (CO3, L2)
9. a) What are some best practices and tips for managing memory and performance issues when working with big data in R? (CO4, L2)

   OR

   b) Discuss the strategies and tools available in R for working with large datasets. (CO4, L3)
10. a) Illustrate with examples using dplyr functions. (CO5, L3)

    OR

    b) Discuss the role of control structures, functions, and debugging in R. (CO5, L2)

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DATA SCIENCE AND R PROGRAMMING LAB
Offered to B.C.A. Honours – Major

Course Code	**:**	**23BCMAP241**	No. Of Lecture Hours per week		:	2
Year of Introduction	:	2024-25	Total No. Of Lecture Hours		:	30
Year of Offering	:	2024-25	CIA Marks		:	15
Year of Revision	:	New Course	SEE Marks		:	35
Percentage of Revision	:	0%	Total Marks		:	50
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	1
Course Category	:	Major-7				
Type of Course	:	Skill Development, Employability				
Course Relate to	:	Global				

Course Outcomes:

CO NO	Upon successful completion of this course, the student will be able to	PO NO
CO1	Learn about the fundamentals of Data Science and the R programming language	PO1, PO2
CO2	Understand the Data Science process, including data retrieval, preparation, exploration, and modelling in R	PO2, PO3
CO3	Apply machine learning techniques using R for both supervised and unsupervised learning	PO3, PO4
CO4	Handle large datasets and optimize data processing techniques using R	PO4, PO5
CO5	Interpret advanced R programming concepts, including vectorized operations, functions, and debugging, for effective data analysis and simulation	PO5, PO6

CO-PO MAPPING MATRIX

	CO - PO	PO1	PO2	PO3	PO4	PO5	PO6
23BCMAP241	**CO1**	H					
	CO2	L	H	M			
	CO3		H	M			
	CO4			L	H		
	CO5			H		L	

List of Experiments:

1. Installing R and R studio, with proper notes on version management, cosmetic settings anddifferentlibraries.
2. Basic operations in r with arithmetic and statistics.
3. Getting data into R, Basic data manipulation, Loading Data into R
4. Basic plotting
5. Loops and functions
6. Create Vectors, Lists, Arrays, Matrices, Data frames and operations on them.
7. Demonstrate the visualization and graphics using visualization packages like ggplot2.
8. Implement Loop functions with lapply(), sapply(), tapply(), apply(), mapply().
9. Explore data using Single Variables: Unimodal, Bimodal, Histograms, Density Plots, Barcharts
10. Explore data using two Variables: Line plots, Scatter Plots, smoothing cures, Bar charts
11. Explore and implement commands using dplyr package.
12. Download a dataset and work on basic data manipulation followed by inferential statistics.

Note: The list of experiments is not limited to the above list. If the existing laboratory experiments completed in advance, the additional laboratory programs can added, and to be executed in the laboratory.

RECOMMENDED TEXTBOOKS:

1. Mark Gardener, “Beginning R - The Statistical Programming Language”, John Wiley &Sons,Inc., 2012.
2. W. N. Venables, D. M. Smith and the R Core Team, “An Introduction to R”, 2013.

Recommended Reference books:

1. The art of R Programming: A tour of Statistical Software design. Norman Matloff.KindleEdition
2. The book of R : The first course in Programming and Statistics by Tilman M. Davies.

Recommended Co-curricular activities:

(Co-curricular Activities should not promotecopyingfromtextbook or from others' work and shall encourage self/independent andgrouplearning)

A. Measurable:
   a. Assignments on
   b. Student seminars (Individual presentation of papers) on topics relating to
   b. Quiz Programmes on
   c. Individual Field Studies/projects
   d. Group discussion on
   e. Group/Team Projects on

B. General
   1. Collection of news reports and maintaining a record of paper-cuttings relatingtotopics coveredin syllabus.
   2. Group Discussions
   3. Watching TV discussions and preparing summary points recording personalobservations etc.,
   4. Under guidance from the Lecturers any similar activities with imaginative thinking.
   5. Recommended Continuous Assessment methods

OPERATING SYSTEMS

Offered to B.C.A. Honours – Major – IV Semester

Course Code	**:**	**23BCMAL242**	No. Of Lecture Hours per week		:	3
Year of Introduction	:	2024-25	Total No. Of Lecture Hours		:	60
Year of Offering	:	2024-25	CIA Marks		:	30
Year of Revision	:	New Course	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	3
Course Category	:	Major-8				
Type of Course	:	Skill Development, Employability				
Course Relate to	:	Global				

Course Description: This course provides an in-depth exploration of the fundamental principles, design, and implementation of modern operating systems (OS). The primary focus is on the architecture and management of computer systems, including process management, CPU Scheduling, memory management, file systems, device management, system security and Deadlocks.

Course Aims and Objectives:

Sl.No.	Course Objectives
1.	To understand Basic Structure, Components and Organization of Operating System.
2.	To learn the notation of a Process – a Program in Execution, Management, Scheduling and Classic Problems of Synchronization.
3.	To gain knowledge in various Memory Management Techniques.
4.	To understand Unix Operating System and various File operations.
5.	To understand File System concepts in Unix, focusing on files, Directory Structure, file Operations and file system Implementation.

Course Outcomes:

CO NO	COURSE OUTCOME	BTL	PO	PSO
CO1	Understand the main components and Structure of Operating System and their functions.	**K2**	**1, 2**	**1**
CO2	Analyse various ways of Process Management and CPU Scheduling Algorithms	**K3**	**1, 3**	**1**
CO3	Apply different methods for preventing Deadlocks in a Computer Systems.	**K4**	**2,6**	**1**
CO4	Evaluate various device and resources like Memory, Time and CPU Management techniques in distributed Systems.	**K3**	**2,6**	**1**
CO5	Create and build an Application / Service over the UNIX Operating System.	**K3**	**2,6**	**1**

For BTL: K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

CO-PO MAPPING MATRIX

CO-PO MATRIX									
CO NO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CO1	**3**	**2**						**2**	
CO2	**3**	**2**						**3**	
CO3		**3**				**2**		**3**	
CO4		**3**				**2**		**2**	
CO5		**3**				**2**		**2**	

Use the codes 3, 2, 1 for High, Moderate and Low correlation Between CO-PO-PSO respectively

Syllabus

Unit No	Syllabus Content	Lecture Hours
I	**Introduction**: What is Operating System? History and Evolution of OS, Basic OS Functions, Operating System Structure and Types of Operating Systems. **System Structures**: Operating System Services, System Calls, Types of System Calls, Overview of UNIX Operating System, and Basic features of UNIX Operating Systems.	12
II	**Process Management:** Process concepts, Process States, Process Control Block (PCB), Inter – Process Communication. **Process Scheduling:** Basic Concepts, Scheduling queues, Schedulers, Context Switching, Scheduling Criteria and CPU Scheduling Algorithms.	12
III	**Synchronization:** Process Synchronization, Semaphores: Usage, Implementation, The Critical Section Problem., Classic problems of synchronization. **Deadlocks:** Introduction, Deadlock Characterization, Necessary and Sufficient conditions for Deadlock, Deadlock Handling Approaches: Deadlock prevention, Deadlock Avoidance and Deadlock detection and Recovery.	12
IV	**Memory Management:** Overview, Swapping, Contiguous Memory Allocation, Paging, Paging Examples, Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms.	12
V	**Files and Directories in UNIX:** Files, Directory Structure, Disk Structure and Disk Scheduling File Operations, File System Implementation: File Allocation Methods, Comparison of UNIX and Windows.	12

Exercises:

- MS-DOS Internal Commands& External Commands
- Write C programs to implement the following Scheduling Algorithms:
  - First Come First Serve
  - Shortest Job First
  - Round Robin.
- Producer – Consumer Problem Using Semaphores.
- Page Replacement Algorithms: FIFO, LRU, Optimal
- Getting hands-on on basic UNIX Commands.
- Write a program using the following system calls of UNIX OS fork, exec, getpid, exit, wait, close, open dir, read dir.

Examples:

- Present your understanding of Deadlocks and new methodologies available in new Operating Systems released in the market.
- Present your understanding on how CPU Scheduling is different in WINDOWS compared to UNIX/LINUX.
- Present a paper on new methods used in Memory management in the present-day Operating Systems
- Present a Paper on how UNIX treats regular files and directories differently from other operating systems.

Specific Resources: (web)

- https://www.youtube.com/watch?v=qt8KfuNTzWs&list=PLLOxZwkBK52C0LlaTlu5emckvUrlsG6QY
- https://www.youtube.com/watch?v=Z6w6JowO5Fw&list=PLBpMYKycVdGb3tlVlmR9Rmx47p6UOVp7W
- https://www.youtube.com/watch?v=OSXqpsINSlQ
- https://www.youtube.com/watch?v=zFnrUVqtiOY&list=PLGF9VeuyJzDfFEeiK2N9NYhHedyEHQHxI
- https://www.youtube.com/watch?v=pPM9Ajqmy_4
- https://www.youtube.com/watch?v=XDIOC2EY5JE
- https://www.youtube.com/watch?v=pJ6qrCB8pDw
- https://www.youtube.com/watch?v=YP1vOIQCyck&t=10s
- https://www.youtube.com/watch?v=9uoa_p8q47Y
- https://www.youtube.com/watch?v=n71-z7LIHGc

TEXTBOOKS

1. Operating System Concepts: Abraham Silberschatz,Peter B. Galving, GregGagne, 8th Edition, Wiley
2. Unix and Shell Programming by B. MH Arwani, Oxford University Press.

REFERENCE BOOKS:

1. Operating System Principles, Abraham Silberchatz, PeterB.Galvin, GregGagne 8thEdition, WileyStudentEdition.
2. Principles of Operating Systems by NareshChauhan, OXFORD University Press.
3. Tanenbaum A S, Woodhull A S, Operating System Design and Implementation,3rd edition, PHI 2006.
4. Unix Shell Programming-YashwantKanetkar.

MODEL QUESTION PAPER

Title of the Course	:	OPERATING SYSTEMS			
Course Code	:	23BCMAL242	Maximum Marks	:	70
Offered to	:	BCA Honours Computer Applications	Time	:	3 Hrs

NOTE TO PAPER SETTER: IN SECTION A & SECTION B, FOR EACH QUESTION ONE SUB QUESTION (A) MUST BE A PROGRAM MEANT FOR LOGICAL TESTING AND ANOTHER SUB QUESTION (B) IS MEANT FOR DESCRIPTIVE / LOGICAL.

SECTION A

ANSWER THE FOLLOWING QUESTIONS. 5 X 4 = 20 Marks

1. (a) Briefly explain about operating system history and its evolution? K1

(OR)

(b) Explain features of Unix Operating System? K2

2. (a) Write a short note on Process Control Block (PCB)? K1

(OR)

(b) Explain the concept of Scheduling Queues? K3

3. (a) Write a short note on Semaphores and its implementation? K2

(OR)

(b) Explain necessary conditions for Deadlocks? K1

4. (a) Explain the concept of Demand Paging? K3

(OR)

(b) Explain Segmentation in paging? K2

5. (a) What is a file? Explain basic operations on files? K1

(OR)

(b) Differentiate Unix OS & Windows OS? K2

Section B

ANSWER THE FOLLOWING QUESTIONS. 5 X 10 = 50 Marks

6. (a) Explain about various types of Operating systems? K1

(OR)

(b) Explain in detail about Operating System Structure? K1

7. (a) Explain Shortest Job First, Round Robin and Priority Scheduling algorithms with examples? K3

(OR)

(b) Explain in detail about Inter Process Communication? K2

8. (a) Explain in detail about Classic Problems of Synchronization? K3

(OR)

(b) What is Deadlock? Explain Deadlock prevention and Recovery methods? K2

9. (a) Discuss the concept of Paging with a neat diagram? K2

(OR)

(b) Explain Page Replacement Algorithms with examples? K3

10. (a) Explain Disk Structure in detail with a neat diagram? K2

(OR)

(b) Explain Disk Scheduling Algorithms with examples? K2

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OPERATING SYSTEMS LAB
Offered to B.C.A. Honours – Major

Course Code	**:**	**23BCMAP242**	No. Of Lecture Hours per week		:	2
Year of Introduction	:	2024-25	Total No. Of Lecture Hours		:	30
Year of Offering	:	2024-25	CIA Marks		:	15
Year of Revision	:	New Course	SEE Marks		:	35
Percentage of Revision	:	0%	Total Marks		:	50
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	1
Course Category	:	Major-8				
Type of Course	:	Skill Development, Employability				
Course Relate to	:	Global				

Course Description:
This laboratory course provides hands-on experience with essential operating system concepts, focusing on UNIX commands and shell programming. Through a series of practical exercises, students will gain proficiency in using UNIX commands to interact with the operating system, manage files and processes, and perform administrative tasks.

Course Aims and Objectives:

S.NO	COURSE OBJECTIVES
1	To implement file/directory handling commands in Unix.
2	To implement CPU scheduling algorithms in c programming language
3	To understand the basics of Shell scripting
4	To display list of currently logged users in Unix shell script
5	To implement File System Management using shell script

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

CO NO	COURSE OUTCOME	BTL	PO	PSO
CO1	Getting hands-on on basic UNIX Commands	K2	1,2, 6	2
CO2	Implementing Scheduling Algorithms	K3	1,2,6	2
CO3	Able to understand and utilize basic Shell Programming	K3	1,2,6	2
CO4	Understand Shell Script Security Practices	K3	1,2,6	2
CO5	Implementing basic file operations in Shell	K3	1,2,6	2

For BTL: K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

CO-PO MATRIX									
CO NO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CO1	2	2				3			2
CO2	3	3				2			3
CO3	3	2				3			2
CO4	3	3				3			3
CO5	3	3				3			3

Use the codes 3, 2, 1 for High, Moderate and Low correlation Between CO-PO-PSO respectively

This Lab structure outlines the organization and progression of an Operating Systems Lab, with a focus on UNIX commands and shell programming. The lab is designed to provide students with hands-on experience in utilizing UNIX-based operating systems and mastering shell scripting techniques for system management and automation.

List of Experiments

Unit-I: Introduction to Operating System

1. Introducing the LINUX Native editor vi: Working on basics of creating and
2. editing a text file using standard commands of vi.
3. Introduction to UNIX Operating System, Compare with Windows OS. Writing and
4. executing simple Hello World C Program in UNIX Environment.
5. Getting hands-on on basic UNIX Commands.
6. Write a program using the following system calls of UNIX OS fork, exec, getpid,
7. exit, wait, close, opendir, readdir ?

Experiment: To Implement Dos Commands
Tasks: DOS internal Commands & DOS External Commands

Unit -II : Process Scheduling

8. Write C programs to implement the following Scheduling Algorithms:
    a. First Come First Serve.
    b. Shortest Job First.
    c. Round Robin.

Experiment: To Implement Priority Scheduling Algorithms

Unit -III: Deadlocks

9. Write a Simple shell script for basic arithmetic and logical calculations?
10. Write Shell script to check the given number is even or odd?
11. Write a shell script to swap the two integers?

Experiment: To Implement Producer- consumer Problem.
Tasks: Write C programs to implement Producer- consumer Problem.

Unit -IV : Memory Management

12. Write Shell script to perform various operations on given strings.
13. Write Shell scripts to explore system variables such as PATH, HOME etc.
14. Write a shell script to display list of users currently logged in.

Experiments: Write a C program to implement Memory management Techniques MVT, MFT

Unit -V: File Management

15. Write a shell script to delete all the temporary files.
16. Write a shell script to find the Factorial of a Number?

Tasks: File operations in shell

Note: The list of experiments is not limited to the above list. If the existing laboratory experiments completed in advance, the additional laboratory programs can added, and to be executed in the laboratory.

Reference Text Books:

- Brian W. Kernighanand Rob Pike,“The UNIX Programming Environment” Prentice Hall India (Edition available in LRCandin the form of E Book on student resource).
- YashwantKanetkar,“UNIXShellProgramming”BPBPublications(FirstEdition).

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MOBILE APPLICATION DEVELOPMENT USING ANDROID
Offered to B.C.A. Honours – Major – IV Semester

Course Code	**:**	**23BCMAL243**	No. Of Lecture Hours per week		:	3
Year of Introduction	:	2024-25	Total No. Of Lecture Hours		:	60
Year of Offering	:	2024-25	CIA Marks		:	30
Year of Revision	:	New Course	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	3
Course Category	:	Major-9				
Type of Course	:	Skill Development, Employability				
Course Relate to	:	Global				

Course Description:
This course introduces students to the fundamentals of Android development, covering the essential concepts, tools, and best practices for creating robust and engaging mobile applications. Through theoretical instruction and hands-on exercises, students will learn to design, develop, and deploy Android applications using modern development techniques and Android SDK tools.

Course Aims & Objectives:

S. No	COURSE OBJECTIVES
1	Equip students with a thorough understanding of computer network concepts apart from developing comprehensive understanding of network architecture and protocols by providing hands on experience on Cisco Packet tracer software.
2	Ensure that students possess the ability to analyse network protocols, topologies and characteristics of various categories of transmission media.
3	Provide students with a foundational proficiency in IP addressing and understand the role of switches in network management.
4	Develop in students a robust comprehension of spanning tree protocol and explore network routing techniques.
5	Enable students to define the need of network monitoring and implementing WLAN standards apart from handling IP ACLs.

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

NO	COURSE OUTCOME	BTL	PO	PSO
CO1	Comprehend the Android platform's architecture, software stack, and life cycle processes, including the activity and application life cycles, to effectively design and manage mobile applications.	K2	1, 2	1
CO2	Create intuitive and responsive user interfaces using Android's layout managers, views, and input controls, while adhering to best practices in design and usability.	K3	1, 3	1
CO3	Utilize essential Android components such as activities, intents, services, and broadcast receivers to build functional and modular applications.	K4	2,6	1
CO4	Employ Android APIs for data management, including internal and external storage, SQLite databases, and content providers, as well as integrating networking and web APIs for dynamic application functionality.	K5	2,6	1
CO5	Incorporate advanced features like location tracking, sensor integration, Bluetooth/Wi-Fi connectivity, and Google Maps, and prepare applications for deployment to the Google Play Store.	K5	2,6	1

For BTL: K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

CO-PO-PSO MATRIX									
CO NO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CO1	3	2						2	3
CO2	3	2						3	3
CO3		3				2		3	
CO4		3				2		2	
CO5		3				2		2	

Use the codes 3, 2, 1 for High, Moderate and Low correlation Between CO-PO-PSO respectively

Syllabus

Unit No	Syllabus Content	Lecture Hours
I	Introduction to Android: Overview, History, Features of Android, The Android Platform, Understanding the Android Software Stack, Android Application Architecture, The Android Application Life Cycle – The Activity Life Cycle, Creating Android Activity - Views- Layout Android SDK, Android Installation, building you First Android application, Understanding Anatomy of Android Application, Android Manifest file.	12
II	Android Application Design Essentials: Anatomy of an Android applications, Android terminologies, Creating User Interfaces with basic views, Application Context, Activities, Services, Intents, linking activities with Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions.	12
III	Android User Interface Design Essentials: User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation. Layouts, Recycler View, List View, Grid View and Web view, Input Controls: Buttons, Checkboxes, Radio Buttons, Toggle Buttons, Spinners, Input Events, Menus, Toast, Dialogs, Styles and Themes, Creating lists, and Custom lists.	12
IV	Testing Android applications: Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources.	12
V	Using Common Android APIs: Internal Storage, External Storage, SQLite Databases, managing data using SQLite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, JSON Parsing, Using Android Telephony APIs, Deploying Android Application to the World. Google maps, Using GPS to find current location, Sensors, Bluetooth / Wi-Fi Connectivity.	12

Textbooks

1 Reto Meier, “Professional Android2 Application Development”, Wiley India PvtLtd
2 Mark L Murphy, “Beginning Android”, Wiley India Pvt Ltd
3 “Android Application Development All in one for Dummies” by Barry Burd, Edition: I

References:

1. “Android”, Dixit, Prasanna Kumar Vikas Publications, New Delhi 2014, ISBN:9789325977884
2. Maclean David, Komatineni Satya, Allen Grant, “Pro Android 5”, A press Publications2015ISBN:978-1-4302-4680-0
3. Android Programming for Beginners” by Hortan, John, Packet Publication, 2015ISBN:978-1-78588-326-2
4. Lauren Darcey and Shane Conder, “Android Wireless Application Development”, Pearson Education, 2nd ed. (2011)

Case Studies:

1 Give a brief description of Android Architecture and its parts.
2 List out the challenges we face while using Android?
3 List the new features of Android in the latest version.
4 Present an idea that you would like to convert it into an application in the future.
5 Present detail report on the features of Check Boxes, Radio Buttons and Toggle Buttons.
6 List out the special features of Android with its counter parts.
7 List out the points to keep in mind to make you application more attractive.
8 List the controls that make you application attractive.

Web Resources:

- https://archive.nptel.ac.in/courses/106/106/106106156/
- https://archive.nptel.ac.in/courses/106/106/106106222/
- https://archive.nptel.ac.in/courses/106/106/106106156/
- https://archive.nptel.ac.in/courses/106/106/106106222/
- https://archive.nptel.ac.in/courses/106/106/106106222/
- https://archive.nptel.ac.in/courses/106/106/106106222/
- http://www.developer.android.com
- http://developer.android.com/about/versions/index.html
- http://developer.android.com/training/basics/firstapp/index.html
- http://docs.oracle.com/javase/tutorial/index.htm
- http://developer.android.com/guide/components/activities.html
- http://developer.android.com/guide/components/fundamentals.html
- http://developer.android.com/guide/components/intents-filters.html
- http://developer.android.com/training/multiscreen/screensizes.html
- http://developer.android.com/guide/topics/ui/controls.html
- http://developer.android.com/guide/topics/ui/declaring-layout.html
- http://developer.android.com/training/basics/data-storage/databases.html

MODEL QUESTION PAPER

Title of the Course	:	MOBILE APPLICATION DEVELOPMENT USING ANDROID			
Course Code	:	23BCMAL243	Maximum Marks	:	70
Offered to	:	BCA Honours Computer Applications	Time	:	3 Hrs

NOTE TO PAPER SETTER: IN SECTION A & SECTION B, FOR EACH QUESTION ONE SUB QUESTION (A) MUST BE A PROGRAM MEANT FOR LOGICAL TESTING AND ANOTHER SUB QUESTION (B) IS MEANT FOR DESCRIPTIVE / LOGICAL.

SECTION A

ANSWER THE FOLLOWING QUESTIONS. 5 X 4 = 20 Marks

1. A) Define the Android Software Stack and list its major components. K1

OR

B) What is the purpose of the Android Manifest file in an Android application? K1

2. A) What are the basic components of an Android application? K1

OR

B) Define Intent in Android and mention its primary use. K1

3. A) List the different types of Layouts used in designing Android user interfaces. K1

OR

B) What is the purpose of RecyclerView in Android, and how does it differ from ListView? K1

4. A) What is the purpose of Android Preferences in application development? K1

OR

B) List the types of resources available in Android and their purpose. K1

5. A) What is the difference between internal and external storage in Android? K2

OR

B) What is the purpose of Content Providers in Android? K2

Section B

ANSWER THE FOLLOWING QUESTIONS. 5 X 10 = 50 Marks

6.A) Discuss the Android Application Architecture. Explain the role of Activities, Views, and Layouts in application development. K4

OR

B) Elaborate on the Android Application Life Cycle. Illustrate your explanation with a diagram of the Activity Life Cycle. K4

7. A) Describe the different types of Android Intents and their roles in linking activities. Include examples to illustrate their usage. K3

OR

B) Discuss the Android Manifest File. Explain its common settings, the use of Intent Filters, and how Permissions are declared. K3

8. A) Discuss the key Input Controls in Android (e.g., Buttons, Checkboxes, Radio Buttons) and explain how to handle Input Events with examples. K3

OR

B) Explain how to design custom lists in Android. Compare them with default lists and discuss the role of Adapters in creating RecyclerView or ListView. K3

9. A) Explain the steps involved in publishing an Android application on the Google Play Store. Include key considerations during the process. K3

OR

B) Discuss how Android applications manage resources in a hierarchy. Provide examples of working with various types of resources like strings, drawable, and layouts. K3

10. A) Describe the process of managing data using SQLite in Android. Include examples of common operations like creating, reading, updating, and deleting records. K3

OR

B) Explain the integration of Google Maps in an Android application. Discuss how GPS can be used to fetch the current location and how sensors can enhance location-based services. K3

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MOBILE APPLICATION DEVELOPMENT USING ANDROID LAB
Offered to B.C.A. Honours – Major

Course Code	**:**	**23BCMAP243**	No. Of Lecture Hours per week		:	2
Year of Introduction	:	2024-25	Total No. Of Lecture Hours		:	30
Year of Offering	:	2024-25	CIA Marks		:	15
Year of Revision	:	New Course	SEE Marks		:	35
Percentage of Revision	:	0%	Total Marks		:	50
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	1
Course Category	:	Major-9				
Type of Course	:	Skill Development, Employability				
Course Relate to	:	Global				

Course Description:
This course introduces students to the fundamentals of Android development, covering the essential concepts, tools, and best practices for creating robust and engaging mobile applications. Through theoretical instruction and hands-on exercises, students will learn to design, develop, and deploy Android applications using modern development techniques and Android SDK tools.

Course Aims & Objectives:

S. No	COURSE OBJECTIVES
1	Equip students with a thorough understanding of computer network concepts apart from developing comprehensive understanding of network architecture and protocols by providing hands on experience on Cisco Packet tracer software.
2	Ensure that students possess the ability to analyse network protocols, topologies and characteristics of various categories of transmission media.
3	Provide students with a foundational proficiency in IP addressing and understand the role of switches in network management.
4	Develop in students a robust comprehension of spanning tree protocol and explore network routing techniques.
5	Enable students to define the need of network monitoring and implementing WLAN standards apart from handling IP ACLs.

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

NO	COURSE OUTCOME	BTL	PO	PSO
CO1	Comprehend the Android platform's architecture, software stack, and life cycle processes, including the activity and application life cycles, to effectively design and manage mobile applications.	**K2**	**1, 2, 6, 7**	**2**
CO2	Create intuitive and responsive user interfaces using Android's layout managers, views, and input controls, while adhering to best practices in design and usability.	**K3**	**1, 2, 6, 7**	**2**
CO3	Utilize essential Android components such as activities, intents, services, and broadcast receivers to build functional and modular applications.	**K4**	**1, 2, 6, 7**	**2**
CO4	Employ Android APIs for data management, including internal and external storage, SQLite databases, and content providers, as well as integrating networking and web APIs for dynamic application functionality.	**K5**	**1, 2, 6, 7**	**2**
CO5	Incorporate advanced features like location tracking, sensor integration, Bluetooth/Wi-Fi connectivity, and Google Maps, and prepare applications for deployment to the Google Play Store.	**K5**	**1, 2, 6, 7**	**2**

For BTL: K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

CO-PO-PSO MATRIX									
CO NO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CO1	**2**	**2**				**3**	**3**		**2**
CO2	**3**	**3**				**2**	**3**		**3**
CO3	**3**	**2**				**3**	**3**		**2**
CO4	**3**	**3**				**3**	**3**		**3**
CO5	**3**	**3**				**3**	**3**		**3**

Use the codes 3, 2, 1 for High, Moderate and Low correlation Between CO-PO-PSO respectively

Lab List:

1. Develop a program to implement frame layout, table layout and relative layout.
2. Develop a program to implement Text View and Edit Text.
3. Develop a program to implement Auto Complete Text View.
4. Develop a program to implement Button, Image Button and Toggle Button.
5. Develop a program to implement login window using above U1 controls.
6. Develop a program to create an activity.
7. Develop a program to implement new activity using explicit intent and implicit intent.
8. Develop a program to implement content provider.
9. Develop a program to implement service.
10. Develop a program to implement broadcast receiver.
11. Develop a program to implement Check box.
12. Develop a program to implement Radio Button and Radio Group.
13. Develop a program to implement Progress Bar.
14. Develop a program to implement List View, Grid View, Image View and Scroll View.
15. Develop a program to implement Custom Toast Alert.
16. Develop a program to implement Date and Time Picker.
17. Develop a program to implement sensors.
18. Develop a program to build Camera.
19. Develop a program for providing Bluetooth connectivity.
20. Perform CRUD operations using SQLite.
21. Develop a program for JSON parsing.

Note: The list of experiments is not limited to the above list. If the existing laboratory experiments completed in advance, the additional laboratory programs can added, and to be executed in the laboratory.

Web Resources:

1. Frame Layout, Table Layout, and Relative Layout

- **FrameLayout**: Official Android Documentation
  Learn how to use a FrameLayout, which is typically used for stacking views on top of each other.
- **TableLayout**: Official Android Documentation
  Understand how to organize child views into rows and columns.
- **RelativeLayout**: Official Android Documentation
  Get an overview of how to place child elements relative to each other using rules.

2. TextView and EditText

- **TextView**: Official Android Documentation
  This will help you learn how to use TextView to display text to the user.
- **EditText**: Official Android Documentation
  Learn how to create input fields for user text input.

3. AutoCompleteTextView

- **AutoCompleteTextView**: Official Android Documentation
  Learn how to use AutoCompleteTextView to provide suggestions as the user types.

4. Button, ImageButton, and ToggleButton

- **Button**: Oficial Android Documentation
  Learn how to create a basic clickable button.
- **ImageButton**: Official Android Documentation
  Learn how to use buttons with images instead of text.
- **ToggleButton**: Official Android Documentation
  This guide will show you how to use a button that can toggle between two states.

5. Creating an Activity and Using Explicit & Implicit Intents

- **Creating an Activity**: Creating a Simple Activity in Android
  This guide explains how to create and manage activities in Android.
- **Explicit Intents**: Explicit Intent Tutorial
  This is useful for navigating between different activities within your app by specifying the target class directly.
- **Implicit Intents**: Implicit Intent Tutorial
  Learn how to create implicit intents to perform actions, like opening a website, sending an email, or dialling a phone number.

6. Content Provider

- **Content Providers**: Official Android Documentation on Content Providers
  Understand how to use content providers to share data between different applications in Android.

7. Service

- **Services in Android**: Official Android Documentation on Services
  Learn about **Services**, which are components used for long-running background tasks.

8. Broadcast Receiver

- **Broadcast Receivers**: Official Android Documentation on Broadcast Receivers
  Broadcast receivers allow your app to listen for system-wide or custom broadcast events.

9. Checkbox

- **Checkbox in Android**: Official Android Documentation for CheckBox
  This guide provides detailed information on how to use the CheckBox widget in Android.

10. Radio Button and Radio Group

- **RadioButton in Android**: Official Android Documentation for RadioButton
  Learn how to use the RadioButton widget in Android to create mutually exclusive options for users.
- **RadioGroup in Android**: Official Android Documentation for RadioGroup
  This widget groups RadioButtons together, ensuring only one can be selected at a time.

11. Progress Bar

- **ProgressBar in Android**: Official Android Documentation for ProgressBar
  This guide explains how to implement both determinate and indeterminate progress bars in your Android app.

12. ListView, GridView, ImageView, and ScrollView

- **ListView**: Official Android Documentation for ListView
  Learn how to display a list of items in a scrollable list.
- **GridView**: Official Android Documentation for GridView
  Use this to display a collection of items in a two-dimensional, scrollable grid.
- **ImageView**: Official Android Documentation for ImageView
  Display images in your app using the ImageView widget.
- **ScrollView**: Official Android Documentation for ScrollView
  Allows you to create scrollable containers for your content.

13. Custom Toast Alert

- **Toast in Android**: Official Android Documentation for Toast
  Toasts are used to display simple messages to the user in a non-intrusive way.

14. Date and Time Picker

- **DatePicker in Android**: Official Android Documentation for DatePicker
  Use this to allow users to select a date.
- **TimePicker in Android**: Official Android Documentation for TimePicker
  This allows users to select a time.

15. Implement Sensors in Android

- **Sensors in Android**: Official Android Documentation for Sensors
  This guide covers how to interact with Android device sensors, such as accelerometer, gyroscope, and proximity sensors.

16. Build a Camera Application

- **Camera API**: Official Android Documentation for Camera API
  This document explains how to interact with the device's camera, take photos, and handle camera hardware.

17. Provide Bluetooth Connectivity

- **Bluetooth in Android**: Official Android Documentation for Bluetooth
  This guide covers how to manage Bluetooth connections for communication between devices.

18. Perform CRUD Operations Using SQLite

- **SQLite in Android**: Official Android Documentation for SQLite
  This documentation explains how to use SQLite databases to store and manage data in Android.

19. JSON Parsing in Android

- **JSON in Android**: Official Android Documentation for JSON
  Learn how to parse JSON objects and arrays in Android applications using the JSONObject and JSONArray classes.

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DATA VISUALIZATION USING TABLEAU
Offered to B.C.A. Honours – Minor – IV Semester

Course Code	**:**	**23DSMIL241**	No. Of Lecture Hours per week		:	3
Year of Introduction	:	2024-25	Total No. Of Lecture Hours		:	60
Year of Offering	:	2024-25	CIA Marks		:	30
Year of Revision	:	New Course	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	3
Course Category	:	Minor-3				
Type of Course	:	Skill Development, Employability				
Course Relate to	:	Global				

Course Description:
This course provides a comprehensive introduction to data visualization using Tableau, one of the most popular and powerful tools for creating interactive and shareable dashboards. Designed for beginners and professionals alike, the course equips learners with the skills to transform raw data into compelling visual stories that facilitate better decision-making.

Course Aims & Objectives:

S. No	COURSE OBJECTIVES
1	Understand core principles of data visualization and Tableau's capabilities.
2	Import, clean, and organize datasets for analysis.
3	Build dynamic and visually appealing dashboards tailored to specific audiences.
4	Apply advanced features like data blending, calculations, and animations.
5	Share and collaborate on Tableau projects securely and effectively.

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

NO	COURSE OUTCOME	BTL	PO	PSO
CO1	Design and build interactive dashboards in Tableau to communicate complex data insights effectively and engage stakeholders.	**K2**	**1, 2**	**1**
CO2	Utilize best practices in data visualization to present information clearly and accurately, ensuring meaningful insights are conveyed.	**K3**	**1, 3**	**1**
CO3	Connect to various data sources, clean and prepare data using Tableau tools, and manage relationships between data sets.	**K4**	**2,6**	**1**
CO4	Leverage advanced Tableau features such as calculated fields, parameters, and filters to perform in-depth data analysis and create dynamic visualizations.	**K5**	**2,6**	**1**
CO5	Publish Tableau workbooks and dashboards to Tableau Public, Tableau Server, or Tableau Online, and collaborate with team members and decision-makers.	**K5**	**2,6**	**1**

For BTL: K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

CO-PO-PSO MATRIX									
CO NO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CO1	3	2						2	3
CO2	3	2						3	3
CO3		3				2		3	
CO4		3				2		2	
CO5		3				2		2	

Use the codes 3, 2, 1 for High, Moderate and Low correlation Between CO-PO-PSO respectively

Unit No	Syllabus Content	Lecture Hours
I	Creating Visual Analytics with tableau desktop, connecting to your data-How to Connect to your data, what are generated Values? Knowing when to use a direct connection, joining tables with tableau, blending different data sources in a single worksheet.	12
II	Building your first Visualization- How Me works- Chart types, Text Tables, Maps, bar chart, Line charts, Area Fill charts and Pie charts, scatter plot, Bullet graph, Gantt charts, Sorting data in tableau, Enhancing Views with filters, sets groups and hierarchies.	12
III	Creating calculations to enhance your data- What is aggregation, what are calculated values and table calculations, Using the calculation dialog box to create, building formulas using table calculations, Using table calculation functions.	12
IV	Using maps to improve insights-Create a Standard Map View, plotting your own locations on a map, Replace Tableau's standard maps, shaping data to enable Point-to-Point mapping.	12
V	Developing an Adhoc analysis environment- generating new data with forecasts, providing self-evidence ad-hoc analysis with parameters, Editing views in tableau Server.	12

Textbooks

1. Tableau your data-Daniel G. Murray and the Inter works BI team, Wiley Publications
2. Tableau Data Visualization Cookbook, Ashutosh Nandeshwar, PACKT publishing.
3. Storytelling with Data: A Data Visualization Guide for Business Professionals by Cole Nussbaumer Knaflic (2014)
4. ggplot2: Elegant Graphics for Data Analysis by Hadley Wickham (2009)

References:

1. Designing Data Visualizations: Representing Informational Relationships by Noah Iliinsky, Julie Steele (2011)
2. Alexandru C. Telea – "Data Visualization principles and practice" Second Edition, CRC Publications
3. Joshua N. Millign– " Learning Tableau -2019" – Third Edition- Packt publications

Example:

1) You have a sales dataset containing information on sales revenue, region, and product category for a retail company.
   - Connect Tableau to the sales data file (e.g., Excel or CSV).
   - Create a direct connection to the data source and explore the option of creating an extract if performance is a concern.
   - Demonstrate how to join multiple tables, such as connecting a "Sales" table to a "Region" table based on a common column (e.g., "Region ID").
   - Blend data from different sources, such as combining online sales data with store sales data in a single worksheet.
2) Using the same sales dataset, you need to present the sales performance across regions and product categories.
   - Create a bar chart to show total sales by product category.
   - Use a line chart to show trends in sales over time.
   - Plot a scatter plot to visualize the relationship between sales and quantity sold.
   - Enhance the visualization by adding filters (e.g., filter by year), groups (e.g., group product categories into broader categories), and hierarchy (e.g., region > country > city).
3) You need to calculate the total sales for each product category and identify trends in sales performance.
   - Create calculated fields to calculate total sales by multiplying unit sales and price.
   - Use aggregation to sum sales by product category and region.
   - Build a table calculation to compute a running total of sales over time.
   - Apply filters and use table calculation functions like WINDOW_SUM or RANK to identify the top 5 performing products.
4) You have a dataset with sales information along with geographic details (e.g., latitude and longitude).
   - Create a standard map view that plots sales data by location.
   - Plot your own custom locations using longitude and latitude fields to create a map with custom markers.
   - Replace Tableau's standard map with a custom map, such as a heat map that shows areas with higher sales activity.
   - Use point-to-point mapping to visualize sales routes or connections between different stores.

5) You want to forecast future sales and create an interactive environment where users can analyze different scenarios.
   - Use Tableau's built-in forecasting tools to generate predictions for the next quarter's sales.
   - Provide a parameter that allows users to select different time frames (e.g., 1 month, 3 months, 6 months) to see how forecasts change based on their selection.
   - Use the Tableau Server to edit views and make them accessible to stakeholders.

Case Study:

1) A marketing team wants to analyse sales performance across different regions and product categories.
2) A regional sales manager wants a visual summary of sales trends, top-performing categories, and performance comparison across different regions.
3) An analyst wants to analyse sales performance over time and identify the percentage change in sales from month to month.
4) A logistics manager wants to optimize the delivery routes for products.
5) A business analyst needs to present sales forecasts and provide users with the ability to adjust scenarios and see different results.

Student Activity

Create a sample super store data set and visualize the following requirements.

General Requirements:

1. Dashboard size is 1250px wide by 750px tall.
2. Prefer using containers
3. The dashboard has a total of 5 containers (no more, no less)
4. The Filter Pane
5. Each filter has some padding 1.

Charts Pane Requirement:

1. All 3 charts must be in one vertical container
2. Do proper formatting
3. Each chart has some padding between them and other objects
4. Each chart has a grey border, slightly darker than the Pane background color.
5. The Pane under the Title has a border 2.
6. The second graph should have the title as "Sales" and should showmonthly sales per year. Make sure it is an area chart with proper formatting.
7. The third graph should the title as "Profit" and should show monthlyprofit per year. Make sure it is an area chart with proper formatting.

Continuous assessment:

Let the students be tested in the following questions from each unit

1. What are generated values? Join tables using Tableau
2. Create any visualization charts using Chart types, Text Tables, Maps, bar chart, Line charts, Area Fill charts and Pie charts, scatter plot etc.,
3. What is aggregation, what are calculated values and table calculations?
4. Using Standard Map View, Plot your own locations on a map
5. Develop an Ad-hoc analysis environment.

MODEL QUESTION PAPER

Title of the Course	:	DATA VISUALIZATION USING TABLEAU			
Course Code	:	23DSMIL241	Maximum Marks	:	70
Offered to	:	BCA Honours Computer Applications	Time	:	3 Hrs

NOTE TO PAPER SETTER: IN SECTION A & SECTION B, FOR EACH QUESTION ONE SUB QUESTION (A) MUST BE A PROGRAM MEANT FOR LOGICAL TESTING AND ANOTHER SUB QUESTION (B) IS MEANT FOR DESCRIPTIVE / LOGICAL.

SECTION A

ANSWER THE FOLLOWING QUESTIONS. 5 X 4 = 20 Marks

1. A) What are generated values in Tableau, and how are they used? K1

OR

B) Explain the difference between joining tables and blending data sources in Tableau.? K1

2. A) Name three types of charts you can create in Tableau.? K1

OR

B) What is the purpose of using filters in Tableau visualizations? K1

3. A) Define aggregation in Tableau. K1

OR

B) What is the function of the calculation dialog box in Tableau? K1

4. A) How do you create a standard map view in Tableau? K1

OR

B) What is point-to-point mapping, and why is it useful? K1

5. A) What is the purpose of forecasts in Tableau? K2

OR

B) How can parameters enhance ad-hoc analysis in Tableau? K2

Section B

ANSWER THE FOLLOWING QUESTIONS. 5 X 10 = 50 Marks

6.A) Discuss the steps to connect to data in Tableau and explain when to use a direct connection versus other methods. K4

OR

B) Describe the process of blending different data sources in a single worksheet. Include its advantages and challenges. K4

7. A) Explain the steps to create different chart types in Tableau, such as bar charts, line charts, and pie charts, and discuss their appropriate use cases. K3

OR

B) How can sets, groups, and hierarchies be used to enhance views in Tableau? Provide examples. K3

8. A) Describe the process of creating calculated fields and table calculations in Tableau. Provide examples of their application. K3

OR

B) Explain the role of table calculation functions in Tableau and how they enhance data analysis. K3

9. A) Discuss the steps involved in customizing Tableau maps, including plotting custom locations and replacing standard maps. K3

OR

B) How does shaping data enable point-to-point mapping in Tableau? Provide a detailed explanation with examples. K3

10. A) Explain how Tableau generates new data with forecasts and how this feature can be used for decision-making. K3

OR

B) Describe the process of editing views in Tableau Server and its significance in a collaborative environment. K3

DATA VISUALIZATION USING TABLEAU LAB
Offered to B.C.A. Honours – Minor

Course Code	**:**	**23DSMIP241**	No. Of Lecture Hours per week		:	2
Year of Introduction	:	2024-25	Total No. Of Lecture Hours		:	30
Year of Offering	:	2024-25	CIA Marks		:	15
Year of Revision	:	New Course	SEE Marks		:	35
Percentage of Revision	:	0%	Total Marks		:	50
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	1
Course Category	:	Minor-3				
Type of Course	:	Skill Development, Employability				
Course Relate to	:	Global				

Course Description:
This course provides a comprehensive introduction to data visualization and analytics using Tableau, a leading business intelligence tool. Participants will learn how to transform raw data into meaningful insights by creating interactive and visually compelling dashboards and reports.

Course Aims & Objectives:

S. No	**COURSE OBJECTIVES**
1	Understanding Tableau's interface and workflow
2	Connecting, preparing, and blending data
3	Creating and customizing various chart types and maps
4	Using calculations, filters, and parameters for deeper analysis
5	Designing interactive dashboards and sharing them effectively

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

NO	**COURSE OUTCOME**	**BTL**	**PO**	**PSO**
CO1	Navigate the Tableau environment confidently, including connecting to diverse data sources and preparing data for analysis.	**K2**	**1, 2, 6, 7**	**2**
CO2	Design a wide range of visualizations such as bar charts, line charts, maps, scatter plots, and dashboards to represent data effectively.	**K3**	**1, 2, 6, 7**	**2**
CO3	Use calculations, filters, parameters, and table calculations to enhance data analysis and uncover actionable insights.	**K4**	**1, 2, 6, 7**	**2**
CO4	Develop interactive dashboards that enable users to explore and analyze data dynamically.	**K5**	**1, 2, 6, 7**	**2**
CO5	Share visualizations and dashboards via Tableau Server, Tableau Online, or Tableau Public, fostering collaboration and data-driven decision-making.	**K5**	**1, 2, 6, 7**	**2**

For BTL: K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

CO-PO-PSO MATRIX									
CO NO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	2	2				3	3		2
CO2	3	3				2	3		3
CO3	3	2				3	3		2
CO4	3	3				3	3		3
CO5	3	3				3	3		3

Use the codes 3, 2, 1 for High, Moderate and Low correlation Between CO-PO-PSO respectively

Lab cycle:

Lab 1: Connect to Data Sources
1. Connect Tableau to a local CSV or Excel file and explore the data.
2. Connect to a SQL database and load data into Tableau.
3. Connect to an online data source (e.g., Google Sheets or a public API via Tableau).
4. Explore the metadata panel and modify field types or rename columns.

Lab 2: Create Univariate Charts
5. Create a bar chart to display the frequency of a categorical variable.
6. Create a histogram to visualize the distribution of a numerical variable.
7. Generate a pie chart to represent proportions of categories.

8. Customize chart colors, labels, and tooltips for better clarity.

Lab 3: Create Bivariate and Multivariate Charts

9. Create a scatter plot to visualize the relationship between two numerical variables.
10. Create a line chart to show trends over time for a given metric.
11. Use Tableau's "dual-axis" feature to overlay multiple measures on a single chart.
12. Create a heatmap to visualize relationships between categorical and numerical variables.

Lab 4: Create Maps

13. Create a basic geographical map with location-based data (e.g., sales by region).
14. Add filters to the map to display data dynamically based on user selection.
15. Create a filled map (choropleth) to visualize values by region or country.
16. Overlay additional layers on the map, such as points for store locations.

Lab 5: Calculate User-Defined Fields

17. Create calculated fields to perform custom computations (e.g., profit margin or growth rate).
18. Use logical functions (e.g., IF-ELSE statements) to create new fields.
19. Demonstrate date calculations (e.g., year-over-year growth).
20. Use table calculations to compute running totals or percentage differences.

Lab 6: Create a Workbook Data Extract

21. Create a Tableau workbook with a data extract from a live connection.
22. Modify the extract by applying filters to limit data size.
23. Demonstrate the advantages of using extracts for faster performance.
24. Update the extract when source data changes and reflect it in Tableau.

Lab 7: Save a Workbook on a Tableau Server and Web

25. Save the workbook locally and on Tableau Server.
26. Publish the workbook to Tableau Public.
27. Set permissions and sharing options for published workbooks.
28. Share the workbook URL and explore it via a web browser.

Lab 8: Export Images and Data

29. Export visualizations as image files (e.g., PNG, JPEG) and adjust resolution.
30. Export raw data underlying a visualization to a CSV or Excel file.
31. Export a packaged workbook (.twbx) for sharing with others.
32. Automate the export of dashboards or reports using Tableau features.

Note: The list of experiments is not limited to the above list. If the existing laboratory experiments completed in advance, the additional laboratory programs can added, and to be executed in the laboratory.

DATA VISUALIZATION USING PYTHON
Offered to B.C.A. Honours – Minor – IV Semester

Course Code	**:**	**23DSMIL242**	No. Of Lecture Hours per week		:	3
Year of Introduction	:	2024-25	Total No. Of Lecture Hours		:	60
Year of Offering	:	2024-25	CIA Marks		:	30
Year of Revision	:	New Course	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	3
Course Category	:	Minor-4				
Type of Course	:	Skill Development, Employability				
Course Relate to	:	Global				

Course Description:
This course offers an in-depth exploration of data visualization techniques using Python, a versatile programming language widely used in data science and analytics. Participants will learn how to transform complex datasets into clear, engaging, and informative visual representations.

Course Aims & Objectives:

S. No	COURSE OBJECTIVES
1	Understand Data Visualization Principles: Learn the fundamental concepts and best practices for creating clear, accurate, and meaningful visual representations of data.
2	Master Python Visualization Libraries: Gain proficiency in using Python libraries such as Matplotlib, Seaborn, Plotly, and Pandas to create a wide variety of visualizations.
3	Create Static and Interactive Visualizations: Develop the ability to create static charts and interactive plots to analyze and present data effectively.
4	Learn to design interactive dashboards using Plotly and Dash to explore and communicate data insights dynamically.
5	Enhance the impact of visualizations by applying storytelling methods to convey insights and facilitate data-driven decision-making.

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

NO	COURSE OUTCOME	BTL	PO	PSO
CO1	Create clear and impactful visualizations to represent data trends, distributions, and relationships using Python.	**K2**	**1, 2**	**1**
CO2	Demonstrate proficiency in Python libraries such as Matplotlib, Seaborn, Plotly, and Pandas for building diverse types of charts and graphs.	**K3**	**1, 3**	**1**
CO3	Build and deploy interactive dashboards using Plotly and Dash to enable dynamic data exploration and presentation.	**K4**	**2,6**	**1**
CO4	Utilize Python's capabilities to handle large datasets and create advanced visualizations for in-depth analysis and insights.	**K5**	**2,6**	**1**
CO5	Apply data storytelling techniques to deliver actionable insights and support decision-making processes through visual narratives.	**K5**	**2,6**	**1**

For BTL: K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

CO-PO-PSO MATRIX									
CO NO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CO1	3	2						2	3
CO2	3	2						3	3
CO3		3				2		3	
CO4		3				2		2	
CO5		3				2		2	

Use the codes 3, 2, 1 for High, Moderate and Low correlation Between CO-PO-PSO respectively

Syllabus

Unit No	Syllabus Content	Lecture Hours
I	Introduction: Introduction to Data Science, Exploratory Data Analysisand Data Science Process. Motivation for using Python for Data Analysis, Introduction of Python Jupyter Notebook. Essential Python Libraries: NumPy, pandas, matplotlib, SciPy, scikit-learn, stats models, seaborn.	12
II	Getting Started with Pandas: Arrays and vectorized computation, Introduction to pandas DataStructures, Essential Functionality, Summarizing and Computing Descriptive Statistics. DataLoading, Storage and File Formats. Reading and Writing Data in Text Format, WebScraping, Binary Data Formats, Interacting with Web APIs, Interacting with Databases Data Cleaning and Preparation. Handling Missing Data, Data Transformation, String Manipulation	12
III	Data Wrangling: Hierarchical Indexing, Combining and Merging Data Sets Reshaping and Pivoting. Data Visualization matplotlib: Basics of matplotlib, plotting with pandas and seaborn, other pythonvisualization tools. Advanced categorical and numeric plots.	12
IV	Data Aggregation and Group operations: Group by Mechanics, Dataaggregation, General split-apply-combine, Pivot tables and cross tabulation Time Series Data Analysis: Date and Time Data Types and Tools, Time series Basics, date Ranges, Frequencies and Shifting, Time Zone Handling, Periods and Periods Arithmetic, Resampling and Frequency conversion, Moving Window Functions.	12
V	Categorical Data: cleaning data and visualization techniques, Advanced Group By methods, Use Techniques for Method Chaining	12

Textbooks

McKinney, W.(2017). Python for Data Analysis: Data Wrangling with Pandas, NumPy and IPython. 2nd edition. O'Reilly Media.

References:

O'Neil, C., & Schutt, R. (2013). Doing Data Science: Straight Talk from the Frontline O'Reilly Media.

Exercises:

- Define Data Science and describe the steps involved in the Data Science process.
- List and explain the advantages of using Python for Data Analysis.
- What is Jupyter Notebook? Write a brief tutorial to demonstrate its features.
- Write code snippets to demonstrate the following:
- Creating and manipulating arrays with NumPy.
- Loading a dataset and summarizing it with pandas.
- Plotting basic visualizations using matplotlib.
- What are the key features of the seaborn and scikit-learn libraries? Provide examples.
- Load a CSV file using pandas. Perform the following operations:
- Display the first 10 rows.
- Describe the dataset.
- Find missing values and handle them.
- Write a Python script to demonstrate string manipulation in pandas.
- Perform hierarchical indexing on a multi-level dataset.
- Merge two datasets and demonstrate reshaping techniques like pivoting.
- Create basic plots (line, bar, scatter) using matplotlib.
- Demonstrate advanced categorical and numerical plots using seaborn.

Case Study:

- A company wants to analyse customer feedback from various sources (text, surveys, ratings).
- Identify the steps you would take to process and analyse this data.
- How would you use Python and Jupyter Notebook to manage this task?
- Analyse sales data using essential libraries.
- Clean the dataset and find the mean, median, and mode of sales.
- Visualize sales trends using matplotlib and seaborn.
- A startup wants to understand the performance of their recent marketing campaigns.
- Load and explore the campaign dataset.
- Identify missing data and transform columns as needed.
- Summarize the campaign results using descriptive statistics.

- Combine and reshape customer data from different regions to analyse trends.
- Merge datasets with customer demographics and purchasing behaviour.
- Create pivot tables to summarize sales data by region and customer type**.**
- Visualize trends in employee performance metrics.
- Plot the distribution of performance ratings using seaborn.
- Compare average ratings across departments using grouped bar plots.

MODEL QUESTION PAPER

Title of the Course	:	DATA VISUALIZATION USING PYTHON			
Course Code	:	23DSMIL242	Maximum Marks	:	70
Offered to	:	BCA Honours Computer Applications	Time	:	3 Hrs

NOTE TO PAPER SETTER: IN SECTION A & SECTION B, FOR EACH QUESTION ONE SUB QUESTION (A) MUST BE A PROGRAM MEANT FOR LOGICAL TESTING AND ANOTHER SUB QUESTION (B) IS MEANT FOR DESCRIPTIVE / LOGICAL.

SECTION A

ANSWER THE FOLLOWING QUESTIONS. 5 X 4 = 20 Marks

1. A) Define Data Science and explain its significance in real-world applications K1

OR

B) List any three essential Python libraries for data analysis and describe their primary uses K1

2. A) What are pandas DataFrames? How are they different from NumPy arrays? K1

OR

B) Explain the concept of vectorized computation with an example K1

3. A) What is hierarchical indexing, and why is it useful in data analysis K1

OR

B) Briefly explain the purpose of pivot tables in pandas K1

4. A) What is the “split-apply-combine” strategy, and how is it implemented in pandas K1

OR

B) Explain the difference between pivot tables and cross-tabulations K1

5. A) What are the steps involved in cleaning categorical data K2

OR

B) Briefly explain method chaining and its advantages in pandas K2

Section B

ANSWER THE FOLLOWING QUESTIONS. 5 X 10 = 50 Marks

6. A) Explain the steps involved in the Data Science process. Illustrate with an example. K4

OR

B) Write a tutorial-style explanation of Jupyter Notebook, highlighting its features and how it aids in data analysis K4

7. A) Describe the process of loading a dataset in pandas. Explain how to handle missing data and perform basic transformations K3

OR

B) Write a Python script to read a CSV file, summarize the dataset, and plot a bar graph of a selected column K3

8. A) Discuss the steps involved in combining and merging datasets. Provide Python code to illustrate these operations K3

OR

B) Write a Python script to demonstrate string manipulation techniques in pandas, such as splitting, concatenating, and replacing strings in a dataset K3

9. A) Discuss the steps for performing time series data analysis, including date handling, resampling, and frequency conversion K3

OR

B) Write a Python script to group data by a categorical column and compute aggregated metrics such as sum, mean, and count K3

10. A) Write a Python script to create a line plot, a scatter plot, and a bar plot using matplotlib. Explain the code in detail K3

OR

B) Discuss the techniques for visualizing categorical data using seaborn. Provide examples to illustrate your answer K3

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DATA VISUALIZATION USING PYTHON LAB
Offered to B.C.A. Honours – Minor

Course Code	**:**	**23DSMIP242**	No. Of Lecture Hours per week		:	2
Year of Introduction	:	2024-25	Total No. Of Lecture Hours		:	30
Year of Offering	:	2024-25	CIA Marks		:	15
Year of Revision	:	New Course	SEE Marks		:	35
Percentage of Revision	:	0%	Total Marks		:	50
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	1
Course Category	:	Minor-4				
Type of Course	:	Skill Development, Employability				
Course Relate to	:	Global				

Course Description:
This course focuses on the practical application of Python programming for data visualization, equipping students with the tools to explore, analyze, and represent data graphically. It emphasizes the use of popular Python libraries like matplotlib, seaborn, and pandas to create meaningful visualizations for data interpretation. Through hands-on exercises and real-world case studies, students will learn to develop insightful plots, customize graphs, and communicate data effectively.

Course Aims & Objectives:

S. No	COURSE OBJECTIVES
1	Introduce students to the fundamental concepts of data visualization and its importance in Data Science.
2	Provide hands-on experience with Python libraries used for creating visualizations.
3	Enable students to understand and apply best practices for data visualization, including choosing appropriate plot types and customizing visuals.
4	Teach students how to use visualizations to explore data, identify patterns, and communicate insights effectively.
5	Integrate real-world datasets and scenarios to provide a practical understanding of data visualization challenges and solutions.

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

NO	COURSE OUTCOME	BTL	PO	PSO
CO1	Demonstrate proficiency in using Python libraries such as matplotlib, seaborn, and pandas for data visualization.	**K2**	**1, 2, 6, 7**	**2**
CO2	Create a variety of plot types, including line plots, bar charts, scatter plots, histograms, and heatmaps.	**K3**	**1, 2, 6, 7**	**2**
CO3	Apply customization techniques to enhance the readability and aesthetics of visualizations.	**K4**	**1, 2, 6, 7**	**2**
CO4	Utilize visualizations to explore datasets, identify trends, and summarize insights.	**K5**	**1, 2, 6, 7**	**2**
CO5	Integrate data visualization with exploratory data analysis for a comprehensive understanding of datasets.	**K5**	**1, 2, 6, 7**	**2**

For BTL: K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

CO-PO-PSO MATRIX									
CO NO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CO1	**2**	**2**				**3**	**3**		**2**
CO2	**3**	**3**				**2**	**3**		**3**
CO3	**3**	**2**				**3**	**3**		**2**
CO4	**3**	**3**				**3**	**3**		**3**
CO5	**3**	**3**				**3**	**3**		**3**

Use the codes 3, 2, 1 for High, Moderate and Low correlation Between CO-PO-PSO respectively

Lab cycle:

Lab 1: Practicals Based on NumPy and Arrays

1. Create a 2D array and perform basic array operations (addition, subtraction, multiplication).
2. Demonstrate array slicing and indexing.
3. Perform mathematical operations using NumPy (mean, median, standard deviation).
4. Create a random array and sort it along specified axes.

Lab 2: Practicals Based on Pandas Data Structures

5. Create a pandas Series and DataFrame. Demonstrate indexing, slicing, and basic operations.
6. Add, delete, and modify rows and columns in a DataFrame.
7. Perform statistical operations (sum, mean, min, max) on a DataFrame.
8. Group data by a categorical column and compute aggregated metrics.

Lab 3: Practicals Based on Data Loading, Storage, and File Formats

9. Load a CSV file into a pandas DataFrame and display its contents.
10. Save a DataFrame to a CSV, Excel, and JSON file.
11. Load a JSON file into a DataFrame and explore its structure.
12. Read a dataset from an online source (e.g., GitHub) into pandas.

Lab 4: Practicals Based on Interacting with Web APIs

13. Use the requests library to fetch data from a public API (e.g., OpenWeather API).
14. Parse the JSON response and convert it into a pandas DataFrame.
15. Perform basic analysis on the API data (e.g., filter data by conditions).
16. Create visualizations from the fetched data (e.g., line plot for temperature trends).

Lab 5: Practicals Based on Data Cleaning and Preparation

17. Handle missing data in a dataset by filling or dropping values.
18. Perform data type conversions and verify column data types.
19. Apply string manipulation functions to clean textual data.
20. Remove duplicate rows from a DataFrame.

Lab 6: Practicals Based on Data Wrangling

21. Perform hierarchical indexing on a dataset and explore its benefits.
22. Merge two datasets and perform inner, outer, left, and right joins.
23. Reshape data using pivot tables and the melt function.
24. Split a column with concatenated strings into multiple columns.

Lab 7: Practicals Based on Data Visualization Using Matplotlib

25. Create a line plot, bar chart, and scatter plot using matplotlib.
26. Customize plots by adding titles, labels, legends, and gridlines.
27. Create subplots and adjust the layout for better visualization.
28. Save a plot to an image file in different formats (e.g., PNG, JPEG).

Lab 8: Practicals Based on Data Aggregation

29. Use the groupby function to group data by one or more columns and compute aggregate metrics.
30. Create pivot tables and cross-tabulations to summarize data.
31. Apply the split-apply-combine technique to analyze grouped data.
32. Compute rolling averages and other window functions.

Lab 9: Practicals Based on Time Series Data Analysis

33. Create a time series DataFrame with date ranges as an index.
34. Perform resampling to compute monthly, weekly, or daily aggregates.
35. Handle time zone conversion in a time series dataset.
36. Create moving averages and visualize them using matplotlib.

Note: The list of experiments is not limited to the above list. If the existing laboratory experiments completed in advance, the additional laboratory programs can added, and to be executed in the laboratory.