



GEMS ARTS AND SCIENCE COLLEGE

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LAB MANUAL



GEMS ARTS AND SCIENCE COLLEGE

Registration No. KL/2019/0242803 (NGO -Darpan)

Affiliated to the University of Calicut



LAB MANUAL

Compiled By



PG Department of Biotechnology

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PREFACE

The purpose of this lab manual is to provide an introduction to experimental research, primarily Biotechnological measurement methods. The "textbook" experiment and the "actual thing" are separated by a significant distance. This lab manual is designed to introduce the methods needed to grasp different areas of biotechnology to both Under Graduate and Post Graduate students. You will become familiar with sophisticated procedures in this course that is not often found in teaching laboratories. The figure caption provides enough details so that the reader can comprehend what is displayed. The booklet includes methods for Environmental Biotechnology, Genetic Engineering, Plant Biotechnology, Cell Biology, Molecular Biology, Bioprocess Technology, Immunology, Microbiology, And Genetics.

The majority of the experiments required by the University of Calicut for the General Biotechnology course are presented in this manual. These procedures were put together using a variety of books and online resources. We genuinely believe that the protocol manual will make it easier for professors and students to conduct experiments.

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PREPARATION OF BUFFERS

AIM

To prepare different buffers at the required pH

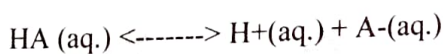
PRINCIPLE

The primary purpose of a buffer is to control the pH of the solution. Buffers can also play secondary roles in a system, such as controlling ionic strength or solvating species, perhaps even affecting protein or nucleic acid structure or activity. Buffers are used to stabilize nucleic acids, nucleic acid-protein complexes, proteins, and biochemical reactions (whose products might be used in subsequent biochemical reactions). Buffers are solutions that contain mixtures of weak acids and bases that make them relatively resistant to pH change. Conceptually buffers provide a ready source of both acid and base to either provide additional H⁺ if a reaction (process) consumes H⁺, or combine with excess H⁺ if a reaction generates acid. The most common types of buffers are mixtures of weak acids and salts of their conjugate bases, for example, acetic acid/sodium acetate. Buffers are most effective within ± 1 pH unit of their pK_a. Outside of that range the concentration of either the acid or its salt is so low as to provide little or no capacity for pH control.

The Henderson-Hasselbalch Equation

$$\text{pH} = \text{p}K_a + \log \frac{[\text{A}^-]}{[\text{HA}]}$$

The species " HA " and " A⁻ " represent the conjugate acid and conjugate base, respectively, of a buffer system.



Here, the "acid" is that which donates H⁺ to yield a deprotonated species, and the "base" is that which accepts H⁺ to yield the protonated species.

PROCEDURE

1. Preparation of Phosphate Buffer

Phosphate buffers, consist of a mixture of monobasic dihydrogen phosphate and dibasic monohydrogen phosphate. By varying the amount of each salt, a range of buffers can be prepared that buffer well between pH 5.8 and pH 8.0. Phosphates have a very high buffering capacity and are highly soluble in water.

(a) 0.1 M Sodium phosphate monobasic; 13.8 g/l (monohydrate, M.W. 138.0)

(b) 0.1 M Sodium phosphate dibasic; 26.8 g/l (heptahydrate, M.W. 268.0)

Mix Sodium phosphate monobasic and dibasic solutions in the proportions indicated and adjust the final volume to 200 ml with deionized water. Adjust the final pH using a sensitive pH meter.

Ingredient	Quantity
Disodium hydrogen phosphate	2.38 g
Potassium dihydrogen phosphate	0.19 g
Sodium chloride	8.0 g
Distilled water	1000 mL

2. Preparation of Acetate Buffer

(a) 0.1 M Acetic acid (5.8 ml made to 1000 ml)

(b) 0.1 M Sodium acetate; 8.2 g/l (anhydrous; M.W. 82.0) or 13.6 g/l (trihydrate; M.W. 136.0)

Mix acetic acid and sodium acetate solutions in the proportions indicated and adjust the final volume to 100 ml with deionized water. Adjust the final pH using a sensitive pH meter.

Buffers	Prepared from			Buffer containing	
	acid ^a (vol%)	salt ^b (vol%)	water (vol%)	citrate or acetate(mM)	[Na ⁺] (mM)
Citrate 0.05M pH 3.5	37	13	50	50	39
0.05M pH 5.0	17	33	50	50	99
Acetate 0.1M pH 3.5	47	3	50	100	6
0.1M pH 5.0	15	35	50	100	70

^a 0.1M citric acid for citrate buffers, or 0.2M acetic acid for acetate buffers

^b 0.1M sodium citrate for citrate buffers, or 0.2M sodium acetate for acetate buffers.

3. Preparation of Tris HCl Buffer

(a) 0.1 M Tris(hydroxymethyl)aminomethane; 12.1 g/l (M.W.: 121.0)

(b) 0.1 M Hydrochloric acid

Mix 50 ml of Tris(hydroxymethyl)aminomethane and indicated volume of hydrochloric acid and adjust the final volume to 200 ml with deionized water. Adjust the final pH using a sensitive pH meter

ml of	44.2	41.4	38.4	32.5	21.9	12.2	5.0
Tris HCL							
pH	7.2	7.4	7.6	7.8	8.2	8.6	9.0

Preparation of Borate buffer

A: 0.2 (M) solution of boric acid (12.4 g in 1000 ml distilled water).

B: 0.05 (M) solution of borax (19.05 g in 1000 ml of distilled water; 0.2 (M) in terms of sodium borate). Mix A and B and dilute to 200 ml.

Vol of	50	50	50	50	50	50
Boric Acid						
Vol of	2	4.9	8.4	30	59	115
Borax						
pH	7.6	8.0	8.4	8.8	9	9.2

AGAROSE GEL ELECTROPHORESIS

AIM

To perform agarose gel electrophoresis.

PRINCIPLE

Agarose gel electrophoresis is a simple and highly effective method for separating, identifying, and purifying 0.5- to 25-kb DNA fragments. The protocol can be divided into three stages:

- (1) a gel is prepared with an agarose concentration appropriate for the size of DNA fragments to be separated;
- (2) the DNA samples are loaded into the sample wells and the gel is run at a voltage and for a time period that will achieve optimal separation;
- (3) the gel is stained or, if ethidium bromide has been incorporated into the gel and electrophoresis buffer, visualized directly upon illumination with UV light.

MATERIALS REQUIRED

- Electrophoresis buffer (TAE)
- Ethidium bromide solution
- Electrophoresis-grade agarose
- 10× loading buffer (see recipe)
- DNA molecular weight markers
- 55°C water bath
- Horizontal gel electrophoresis apparatus
- Gel casting platform
- Gel combs (slot formers)
- DC power supply

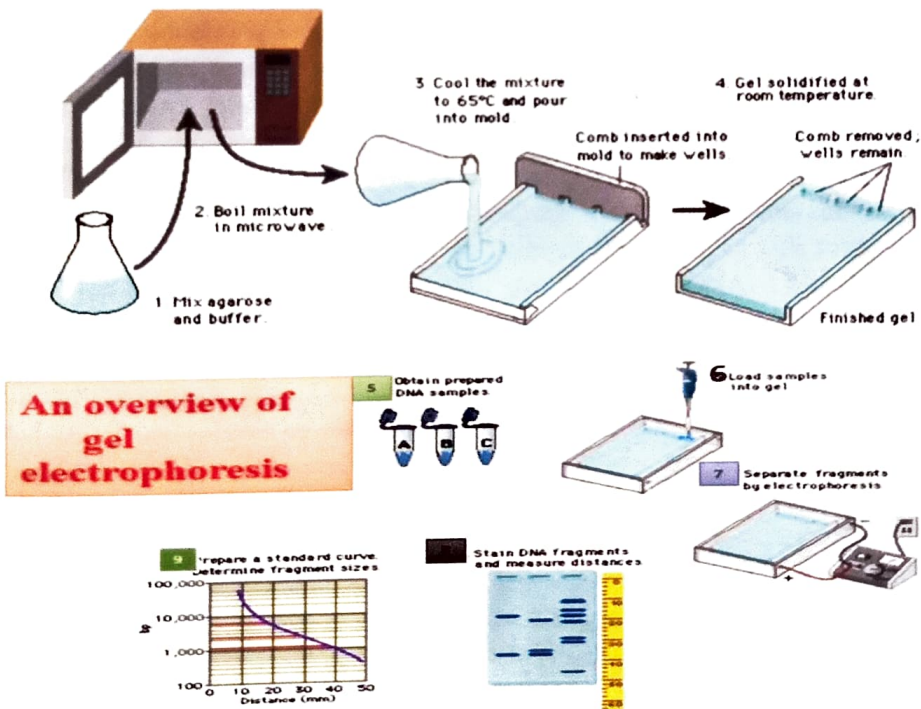
PROCEDURE

Preparing the gel

- Prepare an adequate volume of electrophoresis buffer to fill the electrophoresis tank and prepare the gel.
- Add the desired amount of electrophoresis-grade agarose to a volume of electrophoresis buffer sufficient for constructing the gel. Melt the agarose in a microwave oven or autoclave and swirl to ensure even mixing. Gels typically contain 0.8 to 1.5% agarose.
- Seal the gel casting platform if it is open at the ends. Pour in the melted agarose and insert the gel comb, making sure that no bubbles are trapped underneath the combs and all bubbles on the surface of the agarose are removed before the gel sets.

Loading and running the gel

- 4. After the gel has hardened, remove the tape from the open ends of the gel platform and withdraw the gel comb, taking care not to tear the sample wells.
- 5. Place the gel casting platform containing the set gel in the electrophoresis tank. Add sufficient electrophoresis buffer to cover the gel to a depth of about 1 mm (or just until the tops of the wells are submerged). Make sure no air pockets are trapped within the wells.
- 6. DNA samples should be prepared in a volume that will not overflow the gel wells by addition of the appropriate amount of 10x loading buffer. Samples are typically loaded into the wells with a pipettor or micropipet. Care should be taken to prevent mixing of the samples between wells.
- 7. Be sure that the leads are attached so that the DNA will migrate into the gel toward the anode or positive lead. Set the voltage to the desired level, typically 1 to 10 V/cm of gel, to begin electrophoresis. The progress of the separation can be monitored by the migration of the dyes in the loading buffer.
- 8. Turn off the power supply when the bromphenol blue dye from the loading buffer has migrated a distance judged sufficient for separation of the DNA fragments. If ethidium bromide has been incorporated into the gel, the DNA can be visualized by placing on a UV light source and can be photographed directly



RESULT

DNA was visualized on the agarose gel stained with ethidium bromide

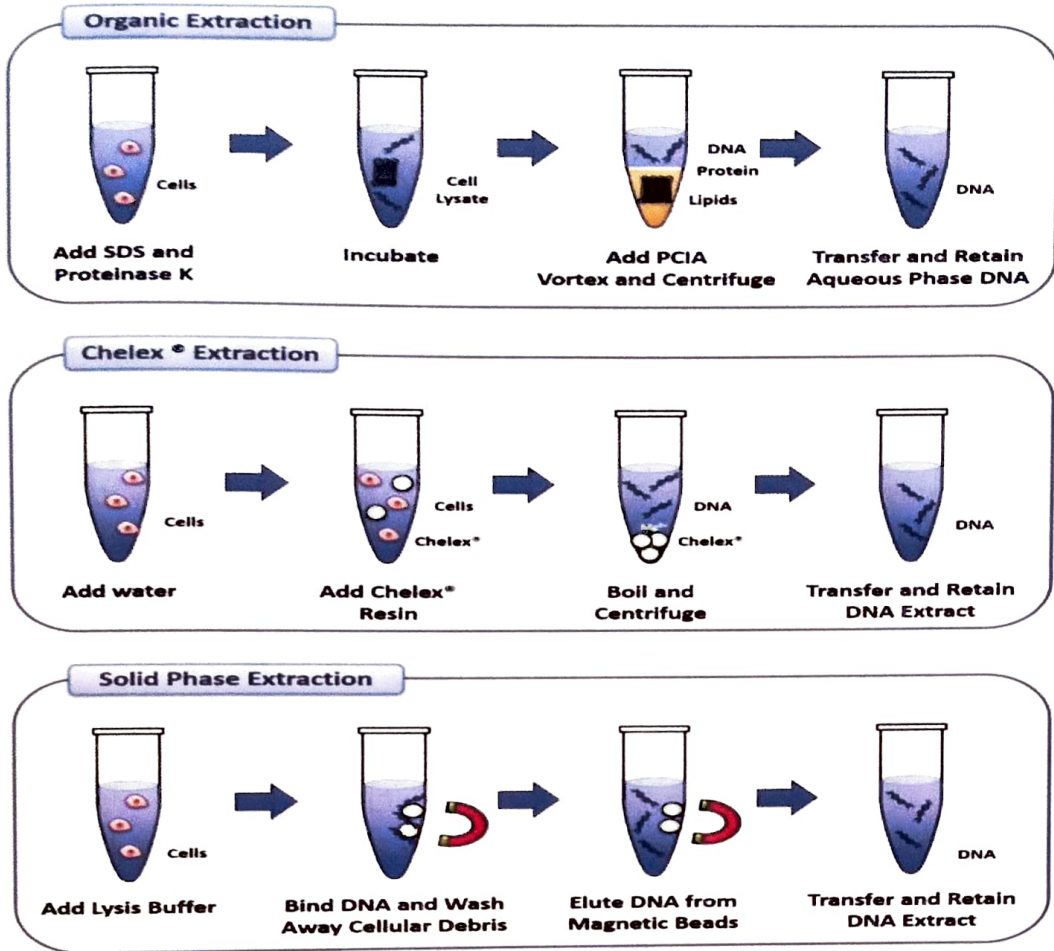
ISOLATION OF BACTERIAL DNA

AIM

To isolate genomic DNA from Bacteria

PRINCIPLE

Organic (phenol–chloroform) extraction uses sodium dodecylsulfate (SDS) and proteinase K for the enzymatic digestion of proteins and nonnucleic acid cellular components. A mixture of phenol:chloroform:isoamyl alcohol (25:24:1) is then added to promote the partitioning of lipids and cellular debris into the organic phase, leaving isolated DNA in the aqueous phase. Following centrifugation, the aqueous phase containing the purified DNA can be transferred to a clean tube for analysis. DNA can also be recovered and concentrated from the aqueous phase by ethanol precipitation or through the use of a centrifugal filter unit, which allows for additional purification and concentration of the DNA in the samples (Koons et al., 1994). The purification of genomic DNA from bacterial cultures provides the basis for downstream molecular analysis. The major steps involved in genomic isolation from bacteria are a) cell disruption by enzyme-detergent lysis; b) extractions with organic solvents, and c) recovery of the DNA by alcohol precipitation. Initially the cell membranes must be disrupted in order to release the DNA in the extraction buffer. SDS (sodium dodecyl sulfate) is used to disrupt the cell membrane. Once cell is disrupted, the endogenous nucleases tend to cause extensive hydrolysis. Nucleases apparently present on human fingertips are notorious for causing spurious degradation of nucleic acids during purification. DNA can be protected from endogenous nucleases by chelating Mg^{2++} ions using EDTA. Mg^{2++} ion is considered as a necessary cofactor for action of most of the nucleases. Nucleoprotein interactions are disrupted with SDS, phenol or proteinase K. Proteinase enzyme is used to degrade the proteins in the disrupted cell soup. Phenol and chloroform are used to denature and separate proteins from DNA. Chloroform is also a protein denaturant, which stabilizes the rather unstable boundary between an aqueous phase and pure phenol layer. The denatured proteins form a layer at the interface between the aqueous and the organic phases which are removed by centrifugation. DNA released from disrupted cells is precipitated by cold absolute ethanol or isopropanol.



PROCEDURE

- Transfer 10 mL of mid- to late-log-phase culture (0.5 – 0.7 at OD600) to a falcon tube and pellet the cells through centrifugation at 7,500 rpm for 10 minutes. Discard the supernatant.
- Resuspend pellet with 467 μ L RNase A in Buffer P1 and transfer to a 1.5-mL microcentrifuge tube. Add 8 μ L lysozyme and 5 μ L a chromopeptidase, gently mix and incubate at 37oC for 60 minutes
- Add 30 μ L 10% SDS (sodium dodecyl sulfate) and 3 μ L proteinase K, gently invert and incubate at 50oC for 60 minutes.
- Add 525 μ L PCI (Phenol:Chloroform:Isoamyl) solution and mix for 10 minutes by gentle inversion. Centrifuge at 12,000 rpm for 15 minutes.
- Extreme care and personal protective gear (gloves, lab coats, and safety goggles) should be used when working with phenol as it is corrosive and may cause severe burns. This step should be completed in a fume hood.
- Transfer the upper aqueous phase to a sterile 1.5-mL microcentrifuge tube, taking care not to disturb the bilayer.
- Add an equal volume of -20oC 100% ethanol and gently mix by inversion. Centrifuge at 12,000 rpm for 20 minutes.
- Carefully decant the supernatant and thoroughly dry pellet at room temperature or in a 50oC incubator.

EXP NO:

DATE:

- Over drying will result in making the DNA pellet more difficult to dissolve back into solution. The pellet may or may not be visible to the naked eye.
- Resuspend the pellet in 50 μ L TE (Tris-EDTA) buffer and allow pellet to sit overnight at 4°C.
- Confirm presence and concentration of bacterial DNA by running 5 μ L of product on a 1.5% agarose gel.
- Purified DNA will appear as a defined band when visualized under UV light

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**Registration no: KL/2019/0242803 (NGO-Darpan)
Affiliated to Calicut university**



B.Sc. Computer Science

(Choice based credit and semester system for
Undergraduate curriculum)

LAB MANUAL

Programmed By



DEPARTMENT OF COMPUTER SCIENCE

PREFACE

The purpose of this lab manual is to provide an introduction to practical laboratory works and coding methods. The "textbook" provide how to code the programs and write lab records. This lab manual is designed to introduce the methods needed to grasp different programming strategies to Under Graduate students. You will become familiar with sophisticated procedures in this course that is not often found in teaching laboratories. This manual not contain the output of the program because the students should practice the source code in the computer lab so that the programmer can get what is displayed in the screen that's the output of the program. The booklet includes methods for doing programs and format of the recode. This manual contained some additional knowledge of academic project and industrial visit.

The majority of the programs and academic projects required by the University of Calicut for the Computer Science course under graduate are presented in this manual. These procedures were put together using a variety of books and online resources. We genuinely believe that the protocol manual will make it easier for professors and students to conduct experiments.

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B.Sc. Computer Science
Core Papers

COURSE EVALUATION:

Total marks for each lab courses shall be 100 marks and Industrial Visit & Project Evaluation cum Programme viva- voce shall be 100 marks

Sl. No.	Course Code	Course Name	Credit	Marks Internal	Marks External	Marks Total
1	BCS2B03	HTML and Programming in C	4	20	80	100
2	BCS4B06	Data Structures and RDBMS	4	20	80	100
3	BCS6B14	Java and PHP Programming	4	20	80	100
4	BCS6B15	Android and Linux shell Programming	4	20	80	100
5	BCS6B17	Industrial Visit/Internship & Project Work	3	15	60	75

INTERNAL EVALUATION

The internal assessment shall be based on a predetermined transparent system involving written test, assignments, seminars and attendance in respect of theory courses and on test/record/viva/attendance in respect of lab courses. 20% of the total marks in each course (15 marks for theory, 20 marks for lab/project) are for internal examinations. The marks secured for internal assessment only need to be sent to University by the colleges concerned. Internal assessment of the project will be based on its content, method of presentation, final conclusion and orientation to research aptitude.

Components with percentage of marks of Internal Evaluation of Lab Courses are

Test paper (50%) – 10 Marks

Attendance (20%) – 4 Marks

Assignment/Lab involvement (30%) – 6 Marks

(if a fraction appears in internal marks, nearest whole number is to be taken)

For the test paper marks, at least one test paper should be conducted. If more test papers are conducted, the mark of the best one should be taken. To ensure transparency of the evaluation process, the internal assessment marks awarded to the students in each course in a semester shall be notified on the notice board at least one week before the commencement of external examination. There shall not be any chance for improvement for internal marks. The course teacher(s) shall maintain the academic record of each student registered for the course, which shall be forwarded to the University by the college Principal after obtaining the signature of both course teacher and Head of the Department.

The Split up of marks for Test paper and Class Room Participation (CRP) for internal evaluation are as follows.

Split up of marks for Test paper:

	Theory	Practical
85% -100%	6	10
65% -85%	5	8
55% - 65%	4	6
45% - 55%	3	5
35%- 45%	2	4
Less than 35%	1	2

Attendance of each course will be evaluated as below

	Theory	Practical
85 % and above	3	4
$75\% \leq \text{CRP} < 85\%$	2	2
$50\% \leq \text{CRP} < 75\%$	1	1

Internal evaluation for the project shall be generally based on content, method of presentation, final conclusion, and orientation to research aptitude. The split up shall be

Originality	–	3 Marks
Methodology	–	3 Marks
Scheme/Organization of Report	–	3 Marks
Viva-voce	–	6 Marks

EXTERNAL EVALUATION

There shall be University examinations for each course at the end of each semester. Practical examinations shall be conducted by the University at the end of second, fourth and sixth semesters. External evaluation of Project, Industrial Visit Report and Programme viva-voce shall be conducted along with the project evaluation at the end of the sixth semester.

The external examination in practical courses shall be conducted by two examiners, one internal and an external, appointed by the University. The project evaluation with Programme viva voce will be conducted by two examiners, one internal and an external (appointed by the University), at the end of the sixth semester. No practical examination will be conducted in odd semester. Practical examinations for B.Sc. Computer Science Programme shall be conducted in the even semester 2, 4 and 6. The model of the question paper for external examination (lab courses) of 3 Hrs. duration shall be:

1. **Section A:** One marked question of 30 Marks from Programming Lab Part A is to be attempted (Design Algorithm/Flowchart/Interface: 10 Marks, Code: 10 Marks, Result: 10 Marks. **Total 30 Marks**)
2. **Section B:** One marked question of 30 Marks from Programming Lab Part B is to be attempted (Design Algorithm/Flowchart/Interface: 10 Marks, Code: 10 Marks, Result: 10 Marks. **Total 30 Marks**)
3. **Section C:** Lab viva voce (**Total 10 Marks**)
4. **Section D:** Lab Record (**Total 10 Marks**)

Number of students in one batch for practical examination must be limited to 14.

Project guidelines – Students must be encouraged to do projects in the latest tools or tools appropriate for their topic. Department should conduct monthly evaluation of the project and give necessary instructions to the students as and when required. Number of students in a project group must be limited to 4.

The scheme of evaluation for project cum Programme viva voce shall be

1. Relevance of the Topic, Statement of Objectives (**Total 10 Marks**)
2. Methodology (Reference/ Bibliography, Presentation, quality of Analysis/ Use of Statistical Tools) (**Total 10 Marks**)
3. Findings and recommendations (**Total 15 Marks**)
4. Project cum Programme Viva Voce (**Total 15 Marks**)
5. Report of Industrial visit /Internship Certificate (**Total 10 Marks**)

**BCS2B03 - Programming Laboratory I:
Lab Exam of 1st & 2nd
Semester - HTML and Programming in C**

Course Number: 11

Number of Credits: 4

Course Evaluation: Internal – 20 Marks + External – 80 Marks

Objective

- To make the students learn web designing
- To make the students learn programming environments.
- To practice procedural programming concepts.
- To make the students equipped to solve mathematical or scientific problems using C

Prerequisites

- Knowledge in operating computer.
- Knowledge in Computer fundamentals.

COURSE OUTLINE:

Part A: HTML lab work

List of Exercises:

1. Design a web page to display the information of Computer Science department of your college by using basic page tags. Display the information in the form of paragraphs/sentences. Also use effects to highlight the information like bold, italic or underline.
2. a) Create a webpage with HTML describing your department. Use paragraph and list tags.

b) Apply various colors to suitably distinguish key words. Also apply font styling like italics, underline and two other fonts to words you find appropriate. Also use header tags.
3. Use the above webpage to
 - a) Create links on the words e.g. “Wi-Fi” and “LAN” to link them to Wikipedia pages.
 - b) Insert an image and create a link such that clicking on image takes user to other page.
 - c) Change the background color of the page. At the bottom create a link to take user to the top of the page.
4. Design a page to display the information in table format. Display the list of colleges offering B.Sc. Computer Science along with the details College Name, Address, Contact no. Address column will consist of sub columns as House Name, Post, City and pin code.

(Purpose: - Introduction of table tags along with the sub columns and other supportive tags like caption, cell spacing, cell padding etc.)

5. Create a webpage to create a photo Album. When the user clicks on the Image and Video Link it should open the corresponding album.
6. Design web pages which display the product images and its information with it. The products are computer, printers and laptop. The information displayed of product should be configuration/technical details, price etc.

(Purpose: - Study image tag. Display image in tabular form along with the other text information.)

7. Design a page to display the B.Sc. Computer Science syllabus by using List tag.

(Purpose: - Introduce list tag to display data in ordered or unordered format as main, sub main, sub-sub main, etc by using nos. or special types of bullets.)

8. Create HTML pages using Hyper Links

- i. File Link
- ii. Single Page Link

9. Create a hyperlink to show the information and syllabus of B.Sc. Computer Science. When click on the links each page should display the objective of respective course, Lesson plan, Course duration etc.

(Purpose: - Introduce anchor tag to create links between pages. One can able to transfer the control to next page, previous page or to a specific page like Home page.)

10. Design an HTML page describing your University infrastructure. Use tables to provide layout to your HTML page.

11. Use and <div> tags to provide a layout to the above HTML page instead of a table layout.

12. HTML pages with Tables

- i. Use Tables to layout HTML pages
- ii. Use and <div> tags to provide a layout to the above page instead of table layout
- iii. Use Frames to divide the page contents into different parts
- iv. Embed Audio and Video into your HTML webpage

13. Design a page to display the information in table format. Display the list of colleges offering Computer Science along with the details College Name, Address, Contact no. Address column will consist of sub columns as Post Office, City, District and Pin code.

(Purpose: - Introduction of table tags along with the sub columns and other supportive tags like caption, cell spacing, cell padding etc.)

14. Create an HTML page to show the use of Navigation Frame

15. Create an HTML page to show the use of Floating Frame

16. Create an HTML page to show the use of Inline Frame

17. Design web pages to display the information about your college and UG Programmes offered in your college. Divide the page into three frames. The top frame should display the title of the college, left frame should display the UG Programmes and the right frame display the details of selected programme like fees, syllabus etc.

(Purpose: - Study frame tag which allow to divide the screen into no of sections.)

18. Design web pages to accept the student information. Student should enter the details like first name, last name, middle name, city up to 25 characters, and address up to 50 characters. Show the combo box to select the qualification, option button for gender selection. Display the information accepted in a formatted form.

(Purpose: - Study form tag which allow to design the formatted screen to accept the information from the user.)

19. Design a website to show the use of the following input controls

- i. Checkbox,
- ii. Radio button

20. Design a website to show the use of the following input controls

- i. Select box,
- ii. Hidden controls

21. Design CSS style sheet to define settings for heading, body, table and links.

(Purpose: - Study CSS style sheet facility. This allows setting the default settings for all the pages.)

22. Design a webpage to show the use of External Style Sheets

Part B: C Programming

Write programs to do the following:

1. Find the sum of digits and reverse of a number.
2. Find the distance between two points.
3. Find the factorial of a number.
4. Find the Nth Fibonacci number using recursion.
5. Print the reverse of a string using recursion.
6. Solve the problem of Towers of Hanoi using recursion.
7. Find Sin(x) and Cos(x) in the range 0o to 180o (interval 30o) using functions.
8. Create a pyramid using *

9. Display the multiplication tables up to the number N.
10. Find the number of words in a sentence.
11. Perform matrix addition, subtraction, multiplication, inverse, and transpose using pointers and functions.
12. Replace a part of the string with another string.
13. Find the power of a number using structure and union.
14. Find the average of prime numbers in a group of N numbers using function.
15. Find the sum of the series $S = 1 + (\frac{1}{2})^2 + (\frac{1}{3})^3 + \dots$ to 0.0001% accuracy.
16. Display the rightmost digit in a floating point number.
17. Create a pattern with the number N.

N = 39174	Pattern: 3 9 1 7 4
	9 1 7 4
	1 7 4
	7 4
	4
18. Display the short form of a string. E.g. Computer Science: CS
19. Currency conversion (any four currencies)
20. Find the currency denomination of a given amount.
21. Prepare sales bill using array of structures.
22. Addition and subtraction of complex numbers using structure.
23. Find the amstrong numbers within a given range.
24. Check for palindrome string/number.
25. Check for leap year.
26. Find the number of special characters in a given string.
27. Store and read data from a text file.

28. Write odd and even numbers into separate files.
29. Swapping of two numbers using call-by-reference method.
30. Copy the contents of one file into another one using command line parameters.
31. Base conversion of numbers.
32. Calculate the percentage of marks obtained for N students appeared for examination in M subjects using array of structures.
33. Display a table of the values of function $y = \exp(-x)$ for x varying from 0.0 to N in steps of 0.1
34. Design a Scientific Calculator and include as many functions as possible.
35. Merge two numeric arrays in sorted order.
36. Fill upper triangle with 1, lower triangle with -1 and diagonal elements with 0.
37. Count the occurrence of different words in a sentence.
38. Convert an input amount into words.
39. Convert a time in 24-hour clock to a time in 12-hour clock using structure.
40. Change the date/time format using structure.

Include any 15 HTML programs and 20 C programs in the record book.

Note: All lab works should be neatly recorded in a Laboratory Record Book in written form. However, Program results can be pasted in the left hand side of the fare record. All students should have a rough record (observation note book) too, in which they write all the works to be carried out in the lab prior to his/her entering the lab. He/She may also note down the i/p and o/p that he gives for program verification in the observation note book (rough record).

**BCS4B06- Programming Laboratory II:
Lab Exam of 3rd and 4th Semester
Data Structures and RDBMS**

Course Number: 22

Number of Credits: 4

Course Evaluation: Internal – 20 Marks + External – 80 Marks

Objective

- To make the students equipped to solve mathematical or scientific problems using C
- To learn how to implement various data structures.
- To provide opportunity to students to use data structures to solve real life problems.

Prerequisites

- Knowledge in operating computer.
- Theoretical knowledge in Data structures.
- Knowledge in Database

Course Outline

Part A: Data structure – Lab Questions

1. Sort a given list of strings
2. Reverse a string using pointers.
3. Implement Pattern matching algorithm.
4. Search an element in the 2-dimensional array
5. Append 2 arrays
6. Merge two sorted array into one sorted array.
7. Search an element in the array using iterative binary search.
8. Search an element in the array using recursive binary search.
9. Implement sparse matrix
10. Implement polynomial using arrays

11. Implement singly linked list of integers.
12. Delete a given element from a singly linked list
13. Sort a singly linked list.
14. Delete an element from a singly linked list
15. Implement a doubly linked list of integers
16. Implement a circular linked list.
17. Implement polynomial using linked list of 2 polynomials
18. Implement Stack using array
19. Implement Stack using linked list
20. Infix expression into its postfix expression
21. Implement Queue using array
22. Implement Queue using linked list
23. Implement a binary search tree of characters.
24. Traverse a binary search tree non recursively in preorder
25. Traverse a binary search tree non recursively in inorder²⁷.
26. Reverse a binary search tree non recursively in postorder
27. Traverse a binary search tree recursively in preorder
28. Traverse a binary search tree recursively inorder
29. Traverse a binary search tree recursively postorder.
30. Delete an element from a binary search tree.² Search an element in a binary search tree
31. Implement linear sort
32. Implement bubble sort

33. Implement exchange sort
34. Implement selection sort.
35. Implement insertion sort.
36. Implement quick sort.
37. Implement merge sort.
38. Implement heap sort

Part B: DBMS– Lab Questions

1. Create a table employee with fields (EmpID, EName, Salary, Department, Age). Insert some records. Write SQL queries using aggregate functions for
 - A. Display the total number of employees.
 - B. Display the age of the oldest employee of each department.
 - C. Display departments and the average salaries
 - D. Display the lowest salary in employee table
 - E. Display the highest salary in sales department;
2. A trading company wants to keep the data of their Order Processing Application using the following relations.

Customer_Master

Customer_Number	-	Primary Key
Customer_Name	-	Not NULL
Address	-	
Pincode	-	

Order_Master

Order_Number	-	Primary Key
Order_date	-	Not NULL
Customer_Number	-	Refers Customer_master table
Order_amount	-	Not NULL

Order_Detail

Line_Number	-	Primary Key
Order_Number	-	Primary Key
Item_No	-	Not NULL, Refers ITEM table
Quantity	-	Not NULL

ITEM

Item_No	-	Primary Key
UnitPrice	-	Not NULL

SHIPMENT

Order_Number	-	Primary Key
Warehouse_No	-	Primary Key, Refers Warehouse table
Ship_Date	-	Not NULL with Integrity Check

WAREHOUSE

Warehouse_No	-	Primary Key
City	-	Not NULL

- Create the above tables by properly specifying the primary keys and foreign keys.
 - Enter at least five tuples for each relation.
 - Produce a listing: Cust_Name, No_of_orders, Avg_order_amount, where the middle column is the total number of orders by the customer and the last column is the average order amount for that customer.
 - List the Order_Number for orders that were shipped from **all** the warehouses that the company has in a specific city.
 - Demonstrate the deletion of an item from the ITEM table and demonstrate a method of handling the rows in the ORDER_ITEM table that contains this particular item.
3. In this session you need to create database for an Employee management system of an ABC organization. The details about different tables are given below. According to that you can proceed further and create tables using PostgreSQL/MySQL Create the following tables with the specified constraints:

Department:

Department Number - Primary Key
Department Name - Not NULL unique
Manager ID - Refers to EmployeeID of employee table.
Manager
Date of Joining - Not NULL.

Employee:

First Name - Not NULL
Middle Initials
Last Name - Not NULL
Employee ID - Primary Key
Date of Birth - Not NULL
Address
Gender - M or F
Salary - Range of 5000 to 25000
Date of Joining
Department Number - Refers to Department Number of Department table.

Department location:

Department Number - Refers to Department number of department table.
Department Location - Not NULL
Department number & Department Location are combined Primary Key

Project:

Project Name - Not NULL.
Project Number - Primary Key.
Project Location - Not NULL.
Department number - Refers to department number of Department table.

Works-on:

Employee ID - Not NULL refers to Employee ID of Employee table.
Project Number - Not NULL refers to Project number of Project table.
Hours - Not NULL.
Employee ID & Project Number are combined primary key.

Dependent:

Employee ID - Refer to employee table Employee ID field
Dependent Name - Gender - M or F

Date of Birth - Not NULL
Relationship - Not NULL

Now enter a few sets of meaningful data and answer the following queries.

- A. List the department wise details of all the employees.
 - B. Find out all those departments that are located in more than one location.
 - C. Find the list of projects.
 - D. Find out the list of employees working on a project.
 - E. List the dependents of the employee whose employee id is 001
4. These sessions is similar to the previous one, but in this session, assume that you are developing a prototype database of the College library management system, for that you need to create the following tables:
- Book Records
 - book details
 - Member details and
 - Book issue details

Book Records:

Accession Number
ISBN Number

Books:

ISBN Number
Author
Publisher
Price

Members:

Member ID
Member Name
Maximum Number of books that can be issued
Maximum Number of days for which book can be issued

Book Issue:

Member ID
Accession Number
Issue Date
Return Date

You must create constraints, including referential integrity constraints, as appropriate. Please note accession number is unique for each book. A book, which has no return date, can be considered as issued book. Enter suitable data into the tables. Now answer the following:

- A. Insert data in all the three tables (use insert).
 - B. Insert appropriate description associated with each table and the column (use comment).
 - C. Display the structure of the tables.
 - D. Display the comments that you have inserted.
 - E. Using SELECT statement, write the queries for performing the following function:
 - a) Get the list of all books (No need to find number of copies).
 - b) Get the list of all members.
 - c) Get the Accession number of the books which are available in the library.
 - d) On return of a book by a member calculate the fine on that book.
 - e) List of books issued on 01-Jan-2005.
 - f) Get the list of all books having price greater than Rs. 500/-
 - g) Get the list of members who did not have any book issued at any time.
 - h) Get the list of members who have not returned the book.
 - i) Display member ID and the list of books that have been issued to him/her from time to time.
 - j) Find the number of copies of each book (A book accession number would be different but ISBN number would be the same).
 - k) Find the number of copies available of a book of given ISBN number.
 - l) Get the member ID and name of the members to whom no more books can be issued, because they have already got as many books issued as the number for which they are entitled.
5. This session is based on Lab 2 where you have created a library management system. In this session you have different query specification. You must create appropriate forms, reports, graphs, views and data filtering, use of multilevel report, etc. to answer these queries.
- A. Get the list of ISBN-Number, Book name, available copies of the books of which available copies are greater than zero.
 - B. Get the list of ISBN-Number, Book name, Total copies, available copies of the book of which available copies are greater than zero. List should be displayed in alphabetical order of book name.
 - C. Get the list of ISBN number, Book name, Author, total copies, cost (cost is price total copies). List should be displayed in descending order of cost.
 - D. Get the list of books issued to each member.
 - E. Write query to know the maximum and average price of the books.
 - F. Get the list of all existing members and the number of days for which a member is allowed to keep the book. Also find out the members who have got the maximum number of books issued.
 - G. Get the list of member codes of those members who have more than two books issued.

- H. Find the details of the books presently issued to a member.
 - I. Create the history of issue of a book having a typical accession number.
 - J. To set the width of the book name to 35.
6. Create the following table and perform the necessary tasks defined below one by one. You must use the query tools/ SQL/ Reports/ Forms/ Graphs/Views/ using client/server wherever needed.

Create the following table named customer

Column name	Type	size
Customer ID	Character	10
Name	Character	25
Area	Character	3
Phone	Numeric	7

Insert the appropriate data into table and do the following.

- Update Phone numbers of all customers to have a prefix as your city STD Code
 - Print the entire customer table
 - List the names of those customers who have e as second letter in their names.
 - Find out the Customer belonging to area „abc“
 - Delete record where area is NULL.
 - Display all records in increasing order of name.
 - Create a table temp from customer having customer-id, name, and area fields only
 - Display area and number of records within each area (use GROUP by clause)
 - Display all those records from customer table where name starts with a or area is „abc“.
 - Display all records of those where name starts with „a“ and phone exchange is 55.
7. Answer the following queries using Library system as created earlier. You must create a view to know member name and name of the book issued to them, use any inbuilt function and operators like IN, ANY, ALL, EXISTS.
- a. List the records of members who have not been issued any book using EXISTS operator.

- b. List the members who have got issued at least one book (use IN / ANY operator).
 - c. List the books which have maximum Price using ALL operators.
 - d. Display Book Name, Member Name, and Issue date of Book. Create a view of this query of the currently issued books.

8. Create a table of Employee (emp_number, name, dept_number, salary) and Department (dept_number, dept_name). Insert some records in the tables through appropriate forms having integrity checks. Add some records in employee table where department value is not present in department table. Now answer the following query:
 - a. Display all records from employee table where department is not found in department table.
 - b. Display records from employee table in a report format with proper headings. This report must also contain those records where department number does not match with any value of department table.
 - c. Display those employee records who have salary less than the salary of person whose emp_number= A100.
 - d. Create another table: SalesData (RegionCode, City, SalespersonCode, SalesQty).
 - e. Display records where salesperson has achieved sales more than average sales of all sales persons of all the regions.

9. Create the following tables:
 - Order party: (Order number, Order date, customer code)
 - Order: Order number, Item code, Quantity
 - The key to the second table is order-number + item-code
 - Create a form for data entry to both the tables.

10. Create a table shop with fields Item_ID, Item_Name, Price, and Quantity. Write a procedure 'sales' to update the quantity by accepting Item_ID and Quantity as argument. Write PostgreSQL block to invoke the procedure

11. Implement student information system

12. SQL scripts to display various reports like Result of an Examination, Salary Report, Sales Report, Sales reports grouped on Sales person or item, etc

13. Write simple PostgreSQL anonymous blocks for displaying whole numbers from 1 to 100, odd numbers from 1 to 100, even numbers from 1 to 100, positive whole numbers up to a given number, odd numbers from 1 to a given number, even numbers from 2 to a given number, Fibonacci

numbers up to 100, Strange numbers up to 1000, factorials of the numbers from 1 to 10, etc.

14. Create a table product with the fields(Product_code primary key, Product_Name, Category, Quantity, Price). Insert some records Write the queries to perform the following.

- a. Display the records in the descending order of Product_Name
- b. Display Product_Code, Product_Name with price between 20 and 50
- c. Display the Product_Name and price of categories bath soap, paste, washing powder
- d. Display the product details whose Quantity less than 100 and greater than 500
- e. Display product names starts with 's'
- f. Display the products which not belongs to the category 'paste'
- g. Display the product names whose second letter is 'a' and belongs to the Category 'washing powder'

15. Create a STUDENT table with following fields:

Field Name	Type	Width
RegNo	Character	10
Name	Character	20
Paper1	Numeric	3
Paper2	Numeric	3
Paper3	Numeric	3
Paper4	Numeric	3
Paper5	Numeric	3
Total	Numeric	3
Result	Character	6
Grade	Character	1

Enter the RegNo, Name and Marks in 5 Papers of at least 10 students. Write a SQL program to process the records to update the table with values for the fields Total (Paper1+Paper2+Paper3+Paper4+Paper5), Result („Passed“ if total is greater than or equal to 50% of the total; „Failed“ otherwise), and Grade („A“ if mark obtained is greater than or equal to 90% of the total mark, „B“ if mark obtained is greater than or equal to 75% of the total mark, „C“ if mark obtained is greater than or equal to 60% of the total mark, „D“ if mark obtained is greater than or equal to 50% of the total mark, and „F“ if mark obtained is less than 50% of the total mark). Display a report in descending

order of the total mark, showing the data entered into the table along with the total marks, result and grade.

16. An examination has been conducted to a class of 10 students and 4 scores of each student have been provided in the data along with their reg_no, name, total and avg_score. Assign null values to the fields total and average. Write Postgresql block to do the following

Find the total and average of each student. Update the table with the calculated values Assign a letter grade to each student based on the average Score as

- avg_score between 90 and 100 - A
- avg_score 75 -89 - B
- avg_score 60- 74 - C
- avg_score 50 -59 - D
- avg_score below 50 - Failed

17. Prepare a salary report of the employees showing the details such as:

EmpNo, Name, Basic Pay, DA, Gross Salary, PF, Net Salary, Annual Salary and Tax For this purpose, create a table named SALARIES having the following structure.

Field Name	Type	Width
EmpNo	Character	10
Name	Character	20
Basic	Numeric	6

Enter the records of at least 10 employees. Use the following information for calculating the details for the report:

- DA is fixed as the 40% of the basic pay.
- PF is fixed as 10% of the basic pay.
- Gross Salary is (Basic Pay + DA).
- Net Salary is (Gross Salary – PF)
- Annual Salary is (12 * Net Salary)

Tax is calculated using the following rules:

- If annual salary is less than 100000, No Tax
- If annual salary is greater than 100000 but less than or equal to 150000, then the tax is 10% of the excess over 100000.
-

- If annual salary is greater than 150000 but less than or equal to 250000, then the tax is 20% of the excess over 150000.
- If annual salary is greater than 250000, then the tax is 30% of the excess over 250000.

18. Generate a Hospital information system that can generate the following reports:

- Patients who belongs to in-patient category
- Patients who belongs to out-patient category

For this purpose, create a table named HOSPITAL having the following structure.

Field Name	Type	Width
PatientID	character	10
Name	character	20
Age	numeric	3

Doctor	character	20
PatientType	character	15
ConsultCharge	numeric	6
BloodTestCharge	numeric	6
XrayCharge	numeric	6
OtherCharges	numeric	6
TotalAmount	numeric	6

Enter the records of at least 10 patients. Write a SQL program to display the report in the ascending order of patient name.

19. Using the Hospital table created in Lab 16, generate a Hospital information system that can generate the following reports:

- Patients undergone blood test.
- Patients who have taken X-Rays

20. Design a Hotel Bill calculating system that generates hotel bills for the customers.

21. Design an Electricity Bill Report generating system that generates electricity bills details of customers for a month.

22. Generate a Library Information System that generates report of the books available in the library.

23. Programs involving multiple tables.

24. Create a table named Elec_Bill (Cust_No, Cust_Name, Units_Consumed, Bill_Amt). Set bill_amt as null. Write a PostgreSQL function to calculate the Bill_Amt by accepting Cust_No and Units_Consumed. Write a PostgreSQL block to update the calculated amount by invoking the function.

25. Create two tables Book (BookID, BookName, Author, Publisher) and Book_Del (Date_of_Del, BookID, BookName)

Create an application to generate a trigger before deleting a record from book table. The trigger procedure should insert the deleted BookID and BookName along with current date to the table Book_Del.

Include any 20 Data structure Lab questions and 15 DBMS Lab questions in the record book.

Note: All lab works should be neatly recorded in a Laboratory Record Book in written form. However Program results can be pasted in the left hand side of the fare record. All students should have a rough record (observation note book) too, in which they write all the works to be carried out in the lab prior to his/her entering the lab. He/She may also note down the i/p and o/p that he gives for program verification in the observation note book (rough record).

BCS6B14 Programming Laboratory III: Lab Exam of Vth Semester Java and PHP Programming

Course Number: 33

Contact Hours per Week: 0

Number of Credits: 4

Number of Contact Hours: 0 Hrs.

Course Evaluation: Internal – 20 Marks + External – 80 Marks

Objective

- To practice Java programming.
- To practice client side and server side scripting.
- To practice PHP Programming.
- To practice developing dynamic websites.
- To practice how to interact with databases through PHP.

Prerequisites

- Theoretical knowledge in Java programming.
- Theoretical knowledge of PHP Programming.

Course Outline

Part A: Java Programming

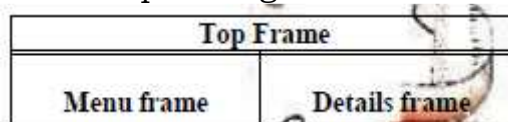
1. Write a program to find the distance between two points.
2. Write a program to find the sum, difference, product, quotient and remainder of two numbers passed as command line argument.
3. Write java program to display Fibonacci series up to a limit.
4. Write java program to display Armstrong numbers within a range.
5. Given the sides of a triangle, write a program to check whether the triangle is equilateral, isosceles or scalene and find its area.
6. Read an array of 10 or more numbers and write a program to find the
 - a) Smallest element in the array
 - b) Largest element in the array
 - c) Second largest element in the array
7. Write a program to perform base conversion
 - a) Integer to binary
 - b) Integer to Octal
 - c) Integer to Hexadecimal
8. Write a program to verify De Morgan's Law
9. Write a program to merge two arrays.
10. Write a program to find the trace and transpose of a matrix.
11. Write java program to find the sum of the digits and reverse of a given number using class and objects.
12. Write a program to sort a set of n numbers using a class.
13. Create a class „Account“ to represent a bank account. Write a program to deposit and withdraw amounts from the account.
14. Using class and objects, Write a java program to find the sum of two complex numbers (Hint: Use object as parameter to function).

15. Create a class Time with hh, mm, ss as data members. Write a java program to find the sum of two time intervals (Hint: Use object as parameter to function).
16. Write a program to count and display total number of objects created to a class (Hint: static members).
17. Write a java program to find the volume of cube, rectangular box, cylinder using function overloading.
18. Create a class student with methods to read and display the student details. Create a derived class result with methods to read marks of 5 subjects. Write a java program to display the total and grade of students, creating objects of class result.
19. Create a class Employee with ID, Name Designation and Dept. Create a child class salary with Basic, HRA, DA and Allowance. Write a program to compute the net salary assuming that HRA is 1250, DA, Allowance are 110% and 35% of the Basic salary.
20. Write a program to demonstrate inheritance hierarchy by using class a base class shape and 'TwoDim' and 'ThreeDim' as sub classes. Create classes "square" and 'triangle' derived from TwoDim and 'sphere and 'cube' derived from ThreeDim. A reference variable of shape is used to determine area of various shapes.
21. Write a program to demonstrate the order in which constructors are invoked in multilevel inheritance.
22. Create an abstract class shape with two data members and an abstract method area. Create two child classes rectangle and triangle. Write a program to display the area of the shapes.
23. Create an interface calculator having methods to perform basic arithmetic operation. Write a program to implement the interface to perform operation on integer and float values.
24. Create a class factorial with a method that accept a number and return its factorial in a package P1. Using the factorial class, write a program to find the factorial of a number.
25. Write a multi thread java program for displaying odd numbers and even numbers up to a limit (Hint : Implement thread using Runnable interface).
26. Write a multi thread java program for displaying numbers ascending and descending order (Hint: create thread by inheriting Thread class).

27. Write a program to handle arithmetic exception.
28. Create a user defined exception „MinBalExp“ to be invoked when the read number is less than a pre-set value.
29. Create a user defined exception „OddValExp“ to be invoked when the read number is an odd number.
30. Write a program to copy a file to another. Pass the file names as command line arguments.
31. Write a program to track keyboard events on an applet.
32. Write an applet to display a rectangle with specified coordinate and colour passed as parameter from the HTML file.
33. Create an AWT application to add, remove items in a list box.
34. Create an AWT application to select gender using radio buttons.
35. Design a window to accept the qualifications of a user using checkboxes.
36. Create an applet for a displaying smiling face.
37. Write a program to display ip address of the system.
38. Write a program to implement echo server (A server that echo the messages the client sends).
39. Create a database table employee (id, name, design, dept). Write a program to list the employees using JDBC.
40. Write a program to insert a new employee record to the above table.

**Part B: PHP Programming
HTML and CSS**

1. Design a website of an educational institution using framesets and links. A sample design is as shown below.



2. Design a webpage that illustrates the use of the following form controls:
 - (i) input controls: single-line text, password, multi-line text.
 - (ii) buttons: submit and reset.
3. Design a webpage that illustrates the use of the following form controls:
 - (i) input controls: check box, radio button, select box
 - (ii) buttons: submit and reset.
4. Design a webpage that illustrates the use of the following form controls:
 - (i) input controls: datalist, multi-select box, grouped select box
 - (ii) buttons: submit and reset.
5. Design a webpage that illustrates the use of field sets and legends.
6. Design a web page to demonstrate Border colors using internal CSS
7. Design a web page to demonstrate Text alignment using CSS.
8. Design a web page to demonstrate inline CSS.
9. Design a webpage to invert the behavior of the <h1> to <h6> tags using external CSS.
10. Design a webpage for a simple image gallery.

JavaScript

11. Write a javascript program to perform find the area and circumference of a circle
12. Write a javascript program to check whether a given number is perfect, abundant or deficient. Use alert box to display the output.
13. Write a javascript program to check whether the given sides can form a triangle. If yes, find the type (isosceles, equilateral and scalene) and area of the triangle. Use prompt dialogue box to accept the sides
14. Write a javascript program to display the nth prime number. Value of n should be accepted from the user. Validate the value entered by the user: Only positive numbers except 0 are to be accepted.
15. Write a JavaScript program to find all years in which 1st January is a Sunday between a given range (eg:- between 2010 and 2017). Use

16. Design a webpage to illustrate image rollover.
17. Design a JavaScript program to illustrate the following events: onLoad, onClick, onBlur, onSubmit, onChange.
18. Design a JavaScript program to display the multiplication table of a no accepted from the user.
19. Design a form that accepts two integers. Provide 4 buttons for Add, Subtract, Multiply, Divide. Add JavaScript program to add, subtract, multiply and divide the given numbers when these buttons are clicked. Use output element to display the results.
20. Write a JavaScript program to create a table after accepting row and column numbers from the user. Contents of each cell should be corresponding row-column number (e.g. Row-0 Column-0).
21. Write a JavaScript program to store different colors in an array and change the background color of the page using this array element
22. Write a JavaScript program to create clock with a timing event.
23. Write a JavaScript program for form validation for question numbers 2, 3 and 4.
24. Design a webpage to demonstrate the use of progress HTML element.

Web Programming Using PHP

25. Write a PHP program to check whether the given number is Armstrong or not.
26. Write a PHP program to check whether a given number is perfect, abundant or deficient.
27. Display the Fibonacci series up to a given number.
28. Create a php program to display the bio data of a person by reading the personal details using an HTML page.
29. Create a login page using database.
30. Create a mysql table student with fields roll no, name, mark, grade. Insert records in the table. Write a PHP program to display the mark list of a student by accepting the register no of the student.

31. Write a php application to generate the pay slip of an employee by accepting name, basic salary and designation. The net salary will be calculated based on the following conditions.

Designation	conveyance allowance	extra allowance
Manager	1000	500
Supervisor	750	200
Clerk	500	100
Peon	250	

HRA – 25 %

Income tax

Gross \leq 2000 0

2500 < gross \leq 4000 3%

4000 < gross \leq 5000 5%

Gross > 5000 8%

Gross = basic + HRA + conveyance + extra

Net = gross – income tax

32. Create a table “product” with fields itemcode, itemname, unitprice. Write php program to insert 5 records into the table and display it in a table format.

33. Write a php program for delete and update operation on account table. The account table contain fields such as accountno, name and amount.

34. Write an HTML page to display a list of fruits in a list box. Write php program to display the names of the fruits which are selected by the user.

35. Write php program to store current date/time in a cookie and display the last visited on, date time on the web page upon reopening of the same page.

36. Design a PHP page to implement a login screen using sessions. Login details are to be verified from the server side with values stored in a database.

37. Write a php program to create an array and store 10 names in the array. Do the following operations.

- Display the contents using for each statement.
- Display the array in a sorted order.
- Display the array without the duplicate elements
- Remove the last element and display
- Display the array in reverse order
- Search an element in the given array.

38. Design a PHP page to illustrate the use of **keygen** HTML element.

39. Design a PHP page to illustrate the use of **meter** HTML element – accept five cities and the temperature of those cities and display the result graphically.

40. Design a PHP page to illustrate the use of file upload – uploading files of a type with a specified size to the webserver.

Include any 20 Java Programming Lab questions and 20 PHP Programming Lab questions in the record book.

Note: All lab works should be neatly recorded in a Laboratory Record Book in written form. However Program results can be pasted in the left hand side of the fare record. All students should have a rough record (observation note book) too, in which they write all the works to be carried out in the lab prior to his/her entering the lab. He/She may also note down the i/p and o/p that he gives for program verification in the observation note book (rough record).

BCS6B15 Programming Laboratory IV: Lab Exam of Android and Linux Shell Programming

Course Number: 34

Contact Hours per Week: 0

Number of Credits: 4

Number of Contact Hours: 0 Hrs.

Course Evaluation: Internal – 20 Marks + External – 80 Marks

Objective

- To practice Android programming.
- To practice user interface applications.
- To develop mobile application.
- To practice shell programming

Prerequisites:

- Theoretical knowledge in Android programming.
- Theoretical knowledge of Shell Programming.

Course Outline:

Part A: Android Programming

1. Programs to understand basic arithmetic operations
2. Programs to understand basic logic operations
3. Programs to understand loops and control statements
4. Programs to understand GUI in android
5. Android application for adding two numbers
6. Develop simple user interface to display message
7. Create two menu items-opening a file-saving a file
8. Inserting values into Spinner control using Text view and Button.
9. Implementation of background image
10. Starting another activity from your own activity using intent
11. Create a new activity that services ACTION-PICK for contact data which display each of the contact in the contact database and lets the user to select one before closing and returning the selected contacts URL to the calling activities
12. Create Android application to linkify a text view to display web and E-mail address as hyperlinks. When clicked they will open the browser and E-mail address respectively
13. Implementation of array adapter
14. Create an alert dialogs used to display a message and offer two button options to continue. Clicking either button will close the dialog after executing the attached click listener
15. Get data from Text view control and insert into database using SQLite. Another activity shows inserted data in a List View control
16. Load menu item by parsing XML data.
17. Program to implement simple calculator
18. Program to Get IP Address
19. Program to Home and Lock Screen Widget (Temperature Widget)

20. Create a new contact using intent
21. A Button control shows Date picker and Text view control displays selected date.
22. Insert data into Spinner and delete selected item using SQLite.
23. Program to create simple login screen.
24. Create an Android application to display the map of your locality. Use ACTION_VIEW intent by passing latitude and longitude as parameters.
25. Create an Android application to convert a voice into text (using Google Speech to Text service)
26. Create an Android application to populate a list view by getting names & numbers from a SQLite database table.
27. Display the saved contacts available in the android phone in a listview using content providers
28. Create an image grid. Images should be placed under the resources section.
29. Create an android app with three tabs. First tab should contain two Edit text and that should accept age and name. In the second tab you need another 3 edit texts that accept education address and phone number. After these information is proved, when the third tab is open it should display all the provided information neatly.
30. Create a custom toast with an Image and a TextView.
31. Apply a Custom List style to a ListView. ListView should have at least 10 Items.
32. Determine the acceleration of your android device along all three axes using accelerometer? (i.e. x,y,z).
33. Capture an Image from the primary camera of an android device and save that picture into the internal storage.
34. Create an app to list files under a given folder name in an EditText
35. Fetch data from an arbitrary URL given in an EditText and display it in a TextView
36. Create an SQLite database named student. Accept student details from the MainActivity and save it in the table called student. Display the

calculated result in the second activity when a button on the MainActivity is clicked.

37. Create an android app to switch the wifi on and off also illustrate the use of permission in android?

38. Create a spinner that takes data from the String.xml file.

39. Create a simple android application that opens the default messaging application available in the android device?

40. Create an app to display message in the notification bar?

Part B: Shell Programming

1. Write a script to find area of a circle
2. Write a shell script to find given number is even or odd
3. Write a shell script to make a menu driven calculator using case
4. Write a shell script to find the greatest of three numbers
5. Write a shell script to compute mean and standard deviation of three numbers
6. Write a shell script to find sum of all digits from a given number
7. Write a shell script to find reverse of a number
8. Write a shell script to find prime numbers upto a given number
9. Write a shell script to find n Fibonacci numbers
10. Write a shell script to check whether a given number is Armstrong or not
11. Write a shell script to reverse a string and check whether a given string is palindrome or not
12. Write a shell script to count no of line, words and characters of a input file

13. Code for Write a shell program to convert all the contents into the uppercase in a particular file in Unix
14. Write a script to find the value of one number raised to the power of another. Two numbers are entered through the keyboard.
15. Write a shell script find the factorial of a given number
16. An employee Basic salary is input through keyboard where da is 40% of basic salary and hra is 20% of basic salary. Write a program to calculate gross salary
17. Write a shell script to find the average of the number entered as command line arguments
18. Code for Shell script which whenever gets executed displays the message Good Morning/Good afternoon /Good Evening depending on the time it gets executed"
19. Write a shell script to Display Banner, calendar of given year
20. Code for a program to display current date and time, number of users, terminal name, login date and time
21. Write a shell script which uses all the file test operators
22. Write a shell script to copy the contents of file to another. Input file names through command line. The copy should not be allowed if second file exists.
23. Write a shell script to find number of vowels, consonants, numbers in a given string.
24. Code for Shell script to perform operations like display, list, make directory and copy, rename, delete
25. Write a shell script to compare two files and remove one of them if they are same

Include any 15 Android Programming Lab questions and 15 Shell Programming Lab questions in the record book.

Android versions eclipse, studio etc. may be used for doing the lab works.

Note: All lab works should be neatly recorded in a Laboratory Record Book in written form. However Program results can be pasted in the left hand side of the fare record. All students should have a rough record (observation note

book) too, in which they write all the works to be carried out in the lab prior to his/her entering the lab. He/She may also note down the i/p and o/p that he gives for program verification in the observation note book (rough record).

BCS6B17 Industrial Visit and Project Work

Course Number: 36

Contact Hours per Week: 4 (0T + 2L in V Sem + 2L in VI Sem)

Number of Credits: 2

Number of Contact Hours: 64 Hrs.

Course Evaluation: Internal – 15 Marks + External – 60 Marks

Objective

- To provide practical knowledge on software development process

Prerequisites

- Basic programming and system development knowledge

Course Outline

The objective of the B.Sc. Computer Science final project work is to develop a quality software solution by following the software engineering principles and practices. During the development of the project the students should involve in all the stages of the software development life cycle (SDLC). The main objective of this project course is to provide learners a platform to demonstrate their practical and theoretical skills gained during five semesters of study in B.Sc. Computer Science Programme.

During project development students are expected to define a project problem, do requirements analysis, systems design, software development, apply testing strategies and do documentation with an overall emphasis on the development of a robust, efficient and reliable software systems. The project development process has to be consistent and should follow standard. For example, database tables designed in the system should match with the E-R Diagram. SRS documents to be created as per IEEE standards.

Students are encouraged to work on a project preferably on a live software project sponsored by industry or any research organization. Topics selected should be complex and large enough to justify as a B.Sc. Computer Science final semester project. The courses studied by the students during the B.Sc. Computer Science.

Programme provide them the comprehensive background knowledge on diverse subject areas in computer science such as computer programming, data structure, DBMS, Computer Organization, Software Engineering, Computer Networks, etc., which will be helping students in doing project work. Students can also undertake group project to learn how to work in groups.

However, the maximum number of students in a group must be limited to 4. For internal evaluation, the progress of the student shall be systematically assessed through *two or three stages of evaluation at periodic intervals*. A bonafied project report shall be submitted in hard bound complete in all aspects.

Industrial Visit/Internship:

Contact Hours per Week: NIL

Number of Credits: 1

Number of Contact Hours: NIL

Course Evaluation: External – 10 Marks

Guide Lines:

- Minimum one day visit to National research Institutes, Laboratories, places of scientific
- Importance or Software Companies.

OR

- One-week Industrial Training / Internship at any software firms/ Research Labs
- The Industrial visit should be done in fifth or sixth semester.
- A 10 – 20 page Industrial visit report have to be submitted with certificate from industry, sufficient photos and analysis along with Project for evaluation in the sixth semester or Internship Certificate have to be submitted along with Project work Evaluation in the sixth semester.

B.Sc. Computer Science
Complementary Papers

COURSE EVALUATION:

Total marks for complementary lab course shall be 100 marks. The evaluation scheme for each course shall contain two parts (1) Internal evaluation (2) external evaluation. 15 marks shall be given to the internal evaluation of theory course. The remaining 60 marks shall be for the external evaluation.

Sl. No.	Course Code	Course Name	Credit	Marks Internal	Marks External	Marks Total
1	CSC4C05	C and Data Structures	4	20	80	100

INTERNAL EVALUATION

The internal assessment shall be based on a predetermined transparent system involving written test, assignments, seminars and attendance in respect of theory courses and on test/record/viva/ attendance in respect of lab courses. 20 marks for lab courses as internal examinations. Components with percentage of marks of Internal Evaluation of Lab Courses are:

Test paper (50%)	-	10 Marks
Attendance (20%)	-	4 Marks
Assignment/Lab involvement (30%)	-	6 Marks

Split up of marks for Test paper:

	Theory	Practical
85% -100%	6	10
65% -85%	5	8
55% - 65%	4	6
45% - 55%	3	5
35%- 45%	2	4
Less than 35%	1	2

Attendance of each course will be evaluated as below

	Theory	Practical
85 % and above	3	4
75% ≤ CRP < 85%	2	2
50% ≤ CRP < 75%	1	1

(If a fraction appears in the final internal marks awarded, nearest whole number is to be taken)

To ensure transparency of the evaluation process, the internal assessment marks awarded to the students in each course in a semester shall be notified on the notice board at least one week before the commencement of external examination. There shall not be any chance for improvement for internal marks. The course teacher(s) shall maintain the academic record of each student registered for the course, which shall be forwarded to the University by the college Principal after obtaining the signature of both course teacher and HOD. The marks secured for internal examination only need be sent to university, by the colleges concerned.

EXTERNAL EVALUATION:

The Practical examinations shall be conducted by the University at the end of fourth semester. The external examination in practical courses shall be conducted by two examiners, one internal and an external, appointed by the University. The model of the question paper for external examination (lab courses) of 3 Hrs. duration shall be:

- 1. Section A:** One marked question of 30 Marks from Programming Lab Part A (C Programming) is to be attempted (Design - Algorithm/Flowchart/Interface: 10 Marks, Code: 10 Marks, Result: 10 Marks. **Total 30 Marks**)
- 2. Section B:** One marked question of 30 Marks from Programming Lab Part B is to be attempted (Design - Algorithm/Flowchart/Interface: 10 Marks, Code: 10 Marks, Result: 10 Marks. **Total 30 Marks**)
- 3. Section C:** Lab viva voce (**Total 10 Marks**)
- 4. Section D:** Lab Record (**Total 10 Marks**)

Number of students in one batch for practical Examination must be limited to 14.

CSC4C05 – Programming Lab: C and Data structure

Semester: 4

Course Number: 5

Number of Credits: 4

Course Evaluation: Internal – 20 Marks + External – 80 Marks

Aim of the Course:

- To provide practical skill in Programming

C PROGRAMMING

1. Find roots of a quadratic equation
2. Find the area and nature of a triangle
3. Find the sum of digits and reverse of a number
4. Find the factorial of a number
5. Find Sin(x)
6. Find Cos(x)
7. Display pyramid using „**“
8. Check for leap year
9. To display count of +ves, -ves and zeros in a set of N numbers
10. Find first n prime numbers
11. Find LCM and HCF of 2 numbers
12. To print Armstrong numbers within range
13. Evaluate the series $1 + x + x^2/2! + x^3/3! + \dots + x^n/n!$
14. Convert a decimal number to a new base
15. Find the decimal equivalent of a number(base other than 10)
16. Calculate percentage of marks obtained for N students appeared for examination in M subjects.
17. To calculate standard deviation of N numbers.
18. To merge two arrays
19. To find Nth Fibonacci number
20. To find row and column totals of a matrix
21. Matrix addition, multiplication and transpose
22. To find the trace of a square matrix
23. To sort n numbers
24. Find the strings end with a particular character
25. Find the number of words in a given sentence
26. To check whether given string is palindrome or not
27. Swapping of two numbers using function
28. Reverse a string using recursion
29. Find the number of vowels in a string
30. To find length of a string using pointer
31. To count the occurrence of a word in a sentence.
32. To generate mark list of N students in a class using array of structures.
33. To insert an element at the correct position in a sorted array
34. To store and read from a text file
35. Write odd and even numbers into two files

DATASTRUCTURE USING C

1. Sort a given list of strings
2. Search an element in a 1-dimensional array
3. Search an element in a 2-dimensional array
4. Merge two sorted array into one sorted array.
5. Search an element in the array using recursive binary search.
6. Implement sparse matrix
7. Implement polynomial using arrays
8. Implement singly linked list of integers.
9. Delete an element from a singly linked list
10. Implement a doubly linked list of integers
11. Implement a circular linked list.
12. Implement polynomial using linked list
13. Addition of 2 polynomials
14. Implement Stack using array
15. Implement Stack using linked list
16. Implement Queue using array
17. Implement Queue using linked list
18. Implement bubble sort
19. Implement selection sort.
20. Implement insertion sort.
21. Implement quick sort.
22. Implement merge sort.

All lab works should be neatly recorded in a Laboratory Record Book in written form. However Program results can be pasted in the left hand side of the fare record. The laboratory record should have a minimum of:

- 20 lab exercises from C Programming
- 15 lab exercises from Data Structure Programming

All students should maintain a rough record (observation note book) too, in which they write all the works to be carried out in the lab prior to his/her entry into the lab. He/She may also note down the input and output for program verification in the rough record.

B.Sc. Computer Science
Complementary Microbiology

COURSE EVALUATION:

Total marks for complementary lab course shall be 100 marks. The evaluation scheme for each course shall contain two parts (1) Internal evaluation (2) external evaluation. 15 marks shall be given to the internal evaluation of theory course. The remaining 60 marks shall be for the external evaluation.

Sl. No.	Course Code	Course Name	Credit	Marks Internal	Marks External	Marks Total
1	CSC4C11	Python Programming	2	15	60	75

INTERNAL EVALUATION

The internal assessment shall be based on a predetermined transparent system involving written test, assignments, seminars and attendance in respect of theory courses and on test/record/viva/ attendance in respect of lab courses. 20 marks for lab courses as internal examinations. Components with percentage of marks of Internal Evaluation of Lab Courses are:

Test paper (50%)	-	8 Marks
Attendance (20%)	-	3 Marks
Assignment/Lab involvement (30%)	-	4 Marks

Split up of marks for Test paper:

	Practical
85% - 100%	8
65% - 85%	6
55% - 65%	5
45% - 55%	4
35% - 45%	2
Less than 45%	1

Attendance of each course will be evaluated as below

	Practical
85 % and above	3
75% ≤ CRP < 85%	2
50% ≤ CRP < 75%	1

(If a fraction appears in the final internal marks awarded, nearest whole number is to be taken)

To ensure transparency of the evaluation process, the internal assessment marks awarded to the students in each course in a semester shall be notified on the notice board at least one week before the commencement of external examination. There shall not be any chance for improvement for internal marks. The course teacher(s) shall maintain the academic record of each student registered for the course, which shall be forwarded to the University by the college Principal after obtaining the signature of both course teacher and HOD. The marks secured for internal examination only need be sent to university, by the colleges concerned.

EXTERNAL EVALUATION:

The Practical examinations shall be conducted by the University at the end of fourth semester. The external examination in practical courses shall be conducted by two examiners, one internal and an external, appointed by the University. The model of the question paper for external examination (lab courses) of 3 Hrs. duration shall be:

- 1. Section A:** One marked question of 40 Marks from Programming Lab Part A (C Programming) is to be attempted (Design - Algorithm/Flowchart/Interface: 10 Marks, Code: 10 Marks, Result: 20 Marks. **Total 30 Marks**)
- 2. Section C:** Lab viva voce (**Total 10 Marks**)
- 3. Section D:** Lab Record (**Total 10 Marks**)

Number of students in one batch for practical Examination must be limited to 14.

SC4C11(P) -PYTHON PROGRAMMING LAB

Course Outcomes:

- Understand the basics of Python programming
- Learn the Decision Making and Functions in Python
- Learn and practice Object Oriented Programming and files handling in Python
- Understand the GUI Programming and Databases operations in Python

Python Programming -Lab Program Cycle

1. Program to demonstrate basic data types in python
2. Program to demonstrate operators in python.
3. A cashier has currency notes of denominations 10, 50, and 100. If the amount to be withdrawn is input through the keyboard using input () function in hundreds, find the total number of currency notes of each denomination the cashier will have to give to the withdrawer.
4. Program to demonstrate list and tuple in python.
5. A library charges a fine for every book returned late. For first 5 days the fine is 50 paisa, for 6-10 days fine is one rupee and above 10 days fine is 5 rupees. If you return the book after 30 days your membership will be cancelled. Write a program to accept the number of days the member is late to return the book and display the fine or the appropriate message
6. Write a Program for checking whether the given number is an even number or not.
7. Write a Python program to print Fibonacci series.
8. Write function to compute gcd and lcm of two numbers.
9. Using a for loop, write a program that prints out the decimal equivalentents of $1/2$, $1/3$, $1/4$.
10. Write a program to calculate overtime pay of 10 employees. Overtime is paid at the rate of
 1. Rs.12.00 per hour for every hour worked above 40 hours.
 2. factional part of an hourAssume that employee do not work for
11. Write a function reverse to reverse a list without using the reverse function.
12. Write a program that combines the lists into a dictionary.

EXCEL

1. Formatting Spread Sheet

Create a spreadsheet like the one below. Enter all the numbers.

- Change the formatting of the numbers to dollars.
- Make the grid around the cells visible.
- Insert the title “Monthly Budget” and center and merge it.
- Total the expenses at the bottom of each month.
- Calculate the average for each row using formula
- Center and bold the headings (months and average)

	A	B	C	D	E	F	G	H
1		January	February	March	April	May	June	Average
2	House Payment	750	750	750	750	750	750	
3	Charity	200	200	200	200	200	200	
4	Groceries	300	425	425	425	425	425	
5	Car Payment	300	300	300	300	300	300	
6	Gasoline	45	45	45	45	45	45	
7	Clothing	100	75	75	75	75	75	
8	Utilities	95	85	85	85	85	85	
9	Total							
10	Income							

2. Chart Creation

The following table shows the number of students in different departments of a university.

Year	Humanities	Science	Commerce
2015	2890	1843	564
2016	3542	2214	798
2017	4548	2871	1256
2018	5238	3167	1762
2019	5884	3654	2145

- a) Represent the total number of students for different years by bar diagram
- b) Represent the data as multiple bar diagram

3. The following table gives the number of deaths on Indian roads in 2019 for individuals in various classifications. Express the data set in a pie chart

Classifications	Pedestrians	Bicyclists	Motorcyclists	Automobile drivers
No. of Deaths	25858	4196	56136	23900

4. Lookup Function

Create a look up table with the following details

Student id, name, class, course, % of attendance and Grade

Student ID	Name	Class	Course	% of Att.	Grade
S-2020-MB12	ANNA	C1	BSc MB	98	A+

Display the details of a selected student using lookup function.

Student ID	S-2020-MB12
	ANNA
	C1
	BSc MB
	98
	A+

5. Conditional Formatting

A table of employee data is given. In order to make it easier to understand, we want

- 1) Each row to highlight the cell if the basic pay exceeds 26000.
- 2) Visualize the Gross salary using color variation
- 3) Shade if the department is 'Purchase'

Emp ID	Emp Name	Date of Joining	Department	Basic Pay	DA	Gross Salary
e-p1-01	Akshay Kumar	29.07.2020	Purchase	32000		

[DA = Basic salary + 32% of basic salary
Gross Salary = Basic pay + DA]

6. Pivot Table

Product ID	Processor	Specification	Operating System	Unit Price	Status
Pr/App/01	A16 Bionic Apple	64 GB RAM, HDD	IOS	99000	Available
Pr/Sams/02	Intel Core i3	8GB RAM, SSD	Ubuntu	38000	Pending
Pr/HP/03	Intel Core i7	64 GB RAM, SSD	Windows 10	78000	Available
Pr/Len/04	Intel Core Duo	8GB RAM, HDD	Windows XP	40000	Pending
Pr/HP/05	Intel Core i3	8GB RAM, SSD	Windows 10	52000	Pending
Pr/App/06	A15 Bionic Apple	16 GB RAM, SSD	MAC OS	82000	Available
Pr/HP/07	AMD Ryzen9 7950X	32 GB RAM, HDD	Windows XP	80000	Available

Create a pivot table for the data given above and find the overall average price of all products that satisfy the following criteria:

- The **Specification** includes '**SSD**'
- The **Operating System** is **Windows**
- The **Processor** is **Intel**

Bring out a table which provides the list of status details (**'Available'** and **'Pending'**) with product ID .

SPSS

Descriptive Statistics

1. The numbers of ATM transactions per day were recorded at 15 locations in a city. The data were:

35,49,225,50,30,65,40,55,52,76,48,325,47,32,60

- a) Find the mean number of transactions
- b) Find the median number of transactions

2. Compute the mean, median, mode for the following frequency distribution

Height(cm)	145-150	150-155	155-160	160-165	165-170	170-175	175-180	180-185
Frequency	4	6	28	58	64	30	5	5

3. The ages and incomes of the 10 employees in a company are given below. Compute the standard deviation of ages and incomes for these employees.

Age	25	28	34	51	47	39	55	40	37	41
Income	23500	26000	30000	42000	40000	35500	50000	37000	35700	38000

4. A study assessing the effectiveness of iron supplements among 8 school students reveals the following data. Check whether the supplement is effective or not?

Hb level before	Hb level after
10	13
8	13
9	11
10	12
8	10
10	13
11	14
12	16

One-way ANOVA

5. The data in the following table gives the number of hours of relief provided by 5 different brands of headache tablets administered to 25 subjects experiencing fevers of 38°C or more. Perform the analysis of variance and test the hypothesis at the 0.05 level of significance that the mean number of hours of relief provided by the tablets is same for all 5 brands

A	B	C	D	E
5	9	3	2	7
4	7	5	3	6
8	8	2	4	9
6	6	3	1	4
3	9	7	4	7

6. Calculate Pearson's coefficient of correlation between advertisement cost (in thousands) and sales (in lakhs) as per the data given below:

Advt. cost	39	65	63	90	82	75	25	98	36	78
Sales	47	53	58	86	62	68	60	91	51	84

PYTHON PROGRAMMING

- 1) Write a program to perform different arithmetic operations on two given numbers.
- 2) A cashier has currency notes of denominations 10, 50, and 100. If the amount to be withdrawn is input through the keyboard using input() function in tens, find the total number of currency notes of each denomination the cashier will have to give to the withdrawer.
- 3) Write a program to find the largest and smallest number from a list.
- 4) A library charges a fine for every book returned late. For first 5 days the fine is 50 paisa, for 6-10 days fine is one rupee and above 10 days fine is 5 rupees. If you return the book after 30 days your membership will be cancelled. Write a program to accept the number of days the member is late to return the book and display the fine or the appropriate message
- 5) Write a program to print even numbers in a range.

- 6) Write a program to print first n Fibonacci numbers.
- 7) Write function to compute GCD and LCM of two numbers.
- 8) Write a program to count the number of uppercase, lowercase, numerals and specialcharacters in a string
- 9) Write a program to calculate overtime pay of 10 employees. Overtime is paid at the rate of Rs.12.00 per hour for every hour worked above 40 hours. Assume that employee do not work for fractional part of an hour
- 10) Write a program to check whether a string is palindrome or not.
- 11) Write a function reverse to reverse a list without using the reverse function.
- 12) Write a program to delete a number from a list of numbers stored in a sequence. Display the numbers before and after deletion

Semester IV-CSC4C11 (P) - Programming Lab: SPSS & PYTHON PROGRAMMING

Internal (15), External (60), Total (75),
Credits (2) Part A - SPSS/Excel (15 marks)

- Procedure - 5
- Output - 10

Part B - Python (30 marks)

- Algorithm - 10
- Program - 10
- Output - 10

Viva (5 marks)

Record (10 marks)

60 marks

B.Sc. Computer Science
Complementary Electronics

COURSE EVALUATION:

For Complementary Lab practical examination 15 marks for internal and 60 marks for external. For external exam 60 marks is divided into two. 50 marks (Aim, Design, Circuit diagram, Tabular column, Calculation & Result) for experiment and 10 marks for record. In a week 2 hours is given as Lab hour.

Sl. No	Course Code	Course Title	Credits	Internal	External	Total
1	ELE2C03	ELECTRONIC DEVICES & CIRCUITS LAB	2	15	60	75
2	ELE4C06	DIGITAL & COMMUNICATION ELECTRONICS LAB	2	15	60	75

INTERNAL & EXTERNAL EVALUATION

The practical examinations for the complementary course shall be conducted by the University at the end of semesters 2 and 4 respectively. The examiners shall be selected from a panel of experts prepared by the University. For each examination Centre there shall be one external examiner (Chief) and one internal examiner (Additional). For the evaluation of practical examination 20% weightage is given for internal assessment and 80% weightage is given for university exam. Record 60% lab involvement 40% as far as internal is concerned. (If a fraction appears in internal marks, nearest whole number is to be taken).

EXPERIMENTS:

1. Electronic Devices Lab

List of experiments

1. Familiarization of electronic components.
2. Familiarization of equipment like CRO, Signal generators.
3. Characteristics of PN junction diode.
4. Characteristics of zener diodes.
5. Characteristics of LED.
6. FET Characteristics.
7. Characteristics of transistor in CE and CB configurations.
8. RC differentiator and integrator circuits.

2. Electronic Circuits Lab

List of experiments:

1. Rectifier circuits (Half wave, Full wave and bridge rectifiers) and filters.
2. Voltage regulator using zener diode.
3. CE amplifier (determination of voltage gain).
4. Astable multivibrator using BJT.
5. RC phase shift oscillator.
6. Astable multivibrator using 555.
7. Monostable multivibrator using 555.

3. Digital Electronics Lab

List of experiments:

1. Familiarization of logic gates using ICs (NOT, OR, AND, XOR, NAND, NOR).
2. Realization of basic gates using NAND & NOR.
3. Design a Half and Full adder.
4. Design a Half and Full Subtractor.
5. Design a 4x1 Multiplexer using logic gates.
6. Multiplexers and Demultiplexer using ICs.
7. Study of RS and D flip flops
8. Design a 3 bit Counter using JK Flip-Flop IC

4. Communication Lab

List of experiments:

1. To study Amplitude Modulator using Transistor.
2. To study envelope detector for demodulation of AM signal.
3. To study FM – Generator and Detector circuit.
4. To study Time Division Multiplexing (TDM).
5. To study Pulse Amplitude Modulation (PAM).
6. To study Pulse Width Modulation (PWM).
7. To study Pulse Position Modulation (PPM).

Practical Lab 1

ELE2C03: Electronic Devices and Circuits Lab

Number of Credits: 2

1. Familiarization of electronic components.
2. Familiarization of equipment like CRO, Signal generators.
3. Characteristics of PN junction diode.
4. Characteristics of zener diodes.
5. Characteristics of LED.
6. FET Characteristics.
7. Characteristics of transistor in CE and CB configurations.
8. RC differentiator and integrator circuits.
9. Rectifier circuits (Half wave, Full wave and bridge rectifiers) and filters.
10. Voltage regulator using zener diode.
11. CE amplifier (determination of voltage gain).
12. Astable multivibrator using BJT.
13. RC phase shift oscillator.
14. Astable multivibrator using 555.
15. Monostable multivibrator using 555

Practical Lab 2

ELE4C06: Digital and Communication Electronics Lab

Number of Credits: 2

1. Familiarization of logic gates using ICs (NOT, OR, AND, XOR, NAND, NOR).
2. 2. Realization of basic gates using NAND & NOR.
3. Design a Half and Full adder.
4. Design a Half and Full Subtractor.
5. Design a 4x1 Multiplexer using logic gates.
6. Multiplexers and Demultiplexer using ICs.
7. Study of RS and D flip flops.
8. Design a 3-bit Counter using JK Flip-Flop IC.
9. To study Amplitude Modulator using Transistor.
10. To study envelope detector for demodulation of AM signal.
11. To study FM – Generator and Detector circuit.
12. To study Time Division Multiplexing (TDM).
13. To study Pulse Amplitude Modulation (PAM).
14. To study Pulse Width Modulation (PWM).
15. To study Pulse Position Modulation (PPM)