



SPACES

Degree College

AUTONOMOUS

Permanently affiliated to Andhra University
Managed by: Sri Prakash Educational Society

Sri Prakash Academy of Computers, Electronics & Sciences

**Carving
Careers...**



Estd. 1993

BOARD OF STUDIES

2025-26 ACADEMIC YEAR

Subject:

BCA-COMPUTER APPLICATIONS

BOARD OF STUDIES MEETING

2025-2026

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PREFACE

SPACES Degree College, Payakaraopeta has been conferred the status of an autonomous institution by the competent statutory authorities, in accordance with the provisions under the provisions of clause 13 of UGC regulations 2023, as notified by the University Grants Commission (UGC) vide letter No. F. 2-10/2023(AC-Policy) dated 27.05.2025 and according to the notification of Andhra University with Ref. No. CII (1) Conferment of Autonomous/SPACES/2025 dated 01-07-2025.

The Board of Studies (BoS) is a statutory academic body constituted under the autonomous status of SPACES Degree College, Payakaraopeta, as per the guidelines issued by the University Grants Commission (UGC) dated 3rd April, 2023 and the affiliating university, Andhra University.

The following are the guidelines regarding the composition and functions of Board of Studies of an autonomous college.

Composition of Board of Studies:

- 1.Head of the Department concerned (Chairperson).
- 2.One expert nominated by the Vice-Chancellor from a panel of six recommended by the Autonomous College Principal.
- 3.Two subject experts from outside the parent University nominated by the Academic Council.
- 4.One representative from industry/corporate sector/allied areas to be nominated by the principal.
- 5.One member of the College alumni to be nominated by the Principal.
- 6.All faculty members of the Department.
- 7.Two student members from second and third years

Term: The term of the nominated members shall be three years. Meetings: Meeting of the Board of Studies shall be held once in a year.

Functions: The Board of Studies shall recommend the following to the Academic Council:

- (a) Courses of studies;
- (b) Measures for the improvement of the standards of teaching and research;
- (c) Any other academic matter.

PROCEEDINGS OF THE PRINCIPAL, SPACES DEGREE COLLEGE (AUTONOMOUS) , PAYAKARAOPETA

R.C. NO:1 /A.C/BOS/Members Nomination dated: 03-10-2025

Sub: SPACES Degree College (Autonomous), Payakaraopeta- UG Board of Studies (BOS) -
Nomination of Members – Orders Issued.

Ref: UG Guidelines for Autonomous Colleges (2018)

ORDER:

The Principal, SPACES Degree College (Autonomous), Payakaraopeta is pleased to constitute UG Board of studies in Computer Sciences for Reviewing the syllabi in BCA-Computer Applications subject for I and II semesters duly following the norms of the UGC Autonomous guidelines

S.No.	Category of the Member	Name of the Member	Designation
1	University Nominee	Prof. S. Viziananda Row	Department of Computer Science and Systems Engineering, A.U College of Engineering (A) Visakhapatnam
2	Representative from Industry	Sri. K. Papa Rao	Global Delivery Head, AIIDEN AI, HYD
3	Subject Expert-1	Sri.Rasmi Ranjan Khansama	Department of Computer Science, Govt. College, Tuni.
4	Subject Expert-2	Dr.SuneethaMerugula	Asst. Professor Department of Computer Science & Engineering, GITAM School of Technology, Visakhapatnam
5	Member	Miss. K. Manjusha	Lecturer, Department of Comp. Sci, SPACES Degree College(A), Payakaraopeta
6	Member	Mrs.V Sasikala	Lecturer, Department of Comp. Sci, SPACES Degree College(A), Payakaraopeta
7	Member	Miss. Y. Sravani	Lecturer, Department of Computer Sci., SPACES Degree College(A), Payakaraopeta
8	Member	Sri. K.V.Apparao	Lecturer, Department of Computer Sci., SPACES Degree College(A), Payakaraopeta
9	Member	Mrs. D.Srilakshmi	Lecturer, Department of Computer Sci., SPACES Degree College(A), Payakaraopeta
10	Member	Miss. M.R.M.Harshitha	Lecturer, Department of Computer S cl., SPACES Degree College(A), Payakaraopeta
11	Member	Sri.P.S.Gajapathiraju	Lecturer, Department of Computer Sci., SPACES Degree College(A), Payakaraopeta
12	Member	Sri.A.R.V.L.Narayana	Lecturer, Department of Computer Sci., SPACES Degree College(A), Payakaraopeta
13	Student Alumni	Miss. P.Pusha Sri	-
14	BOS Chairman	Sri.S.M.V.S.Kumar	HOD, Department of Computer Science, SPACES Degree College(A), P.R Peta

The above members are requested to attend the BoS meeting on 23rd October 2025 and share their valuable reviews, and suggestions on the following functionaries.

- Prepare and review the syllabi for the subject keeping in line of APSCHE and Affiliating University and interest of the stake holders for consideration and approval of the IQAC and Academic Council.
- Suggested methodologies for innovative teaching and evaluation techniques.
- Suggest the panel of Names to the academic council for appointment of Examiners.
- Coordinate research, teaching, extension and other activities in the Department.



A. R. G. Reddy
PRINCIPAL
SPACES DEGREE COLLEGE
PAYAKARAOPETA

Composition of the Board of Studies (BoS) the Academic Year 2025-26

S.No.	Category of the Member	Name of the Member	Designation
1	University Nominee	Prof.S.Viziananda Row	Department of Computer Science and Systems Engineering, A.U College of Engineering (A) Visakhapatnam
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3	Subject Expert-1	Sri.RasmiRanjan Khansama	Department of Computer Science, Govt. College, Tuni.
4	Subject Expert-2	Dr.Suneetha Merugula	Asst. Professor Department of Computer Science & Engineering, GITAM School of Technology, Visakhapatnam
5	Member	Miss. K. Manjusha	Lecturer, Department of Comp.Sci,SPACES Degree College(A), Payakaraopeta
6	Member	Mrs.V Ssaikala	Lecturer, Department of Comp. Sci, SPACES Degree College(A), Payakaraopeta
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SPACES DEGREE COLLEGE (AUTONOMOUS), PAYAKARAOPETA

DEPARTMENT OF COMPUTER SCIENCE

BOARD OF STUDIES MEETING

AGENDA

DATE: 23-10-2025

TIME: 11:00 AM-12:30PM

Venue: SPACES Degree College, Payakaraopeta.

Agenda of the Meeting:

- 1. Welcome and Introduction of Members**
- 2. Presentation & Discussion of the following aspects**
 - a) To Review the curriculum of I and II semesters of B.Sc – Computer Science/ Artificial Intelligence, Skill Enhancement Courses//BCA Course with effect from academic year 2025-2026.
 - b) To discuss Whether changes are required in the syllabus.
 - c) To discuss and propose the criteria and pattern of internal assessment.
 - d) To discuss and propose the pattern of external assessment.
 - e) To discuss about PO's and PSO's
 - f) To discuss Model Question papers for the I and II Semesters including Theory and Practical.
 - g) To discuss about blueprint for Internal exams and Semester End Examinations.
 - h) To propose the names for Question paper setters and Examiners.
 - i) To discuss about remedial classes for Slow learners
 - j) To discuss about Organizing Guest lecturers
 - k) To discuss about implementation of certificate courses.
- 3. Suggestions and feedback from experts and Members of the BOS.**
- 4. Any other matter according to the discretion of the Chair person.**
- 5. Resolutions**
- 6. Vote of Thanks**



Chairperson

BOARD OF STUDIES

SPACES DEGREE COLLEGE(AUTONOMOUS), PAYAKARAOPETA
DEPARTMENT OF COMPUTER SCIENCE

Minutes of the Board of Studies (BoS) Meeting

The First Meeting of the Board of Studies (BoS), Department of Computer Science, SPACES Degree College, was held on 23-10-2025, SPACES Degree College, Payakaraopeta to scrutinize and approve the drafted syllabus of BCA Computer Applications Honours (Major) under autonomous status.

Agenda Item 1: Welcome and Introduction of Members

The Chairperson welcomed all members and introduced participants, including internal faculty, external experts, industry, and alumni representatives.

Agenda Item 2: Presentation and Ratification of Syllabus

The comprehensive syllabus was presented and discussed. Components reviewed included:

- Program Outcomes (PO), Program Specific Outcomes (PSO), Course Outcomes (CO), Learning Outcomes (LO)
- Theory and Practical syllabi
- Internal and External Assessment schemes
- Model Question Papers and Question Bank Aligning with Bloom's Taxonomy
- Innovative Teaching Methods and Pedagogy
- **Certificate Courses**

Agenda Item 3: Suggestions and Feedback

Suggestions were noted for implementation.

Agenda Item 4: Resolution and Approval of Proposed Syllabus

The Board unanimously approved all syllabus components, assessment schemes, question banks, teaching methodologies, and **certificate courses**.

Agenda Item 5: Any Other Business

No other business was raised.

Agenda Item 6: Vote of Thanks

The Chairperson thanked all members and declared the meeting adjourned.

The following members were present

S.No	Name	Designation	Signatures
1	Sri S.M.V.S Kumar	Chairperson	Sri S.M.V.S Kumar
2	Prof. S. Viziananda Row	University Nominee	Prof. S. Viziananda Row
3	Sri. Rasmi Ranjan Khansama	Subject Expert	Rasmi
4	Dr. Suneetha Merugula	Subject Expert	Suneetha M.
5	Sri K Papa Rao	Industry Expert	K. Papa Rao
6	Miss. P.Pusha Sri	Alumna	P. pushpa Sri
7	Sri. K.V.Apparao	Member	K.V. Apparao
8	Mrs. D.Srilakshmi	Member	D. Srilakshmi
9	Miss. M.R.M.Harshitha	Member	M. Harshitha
10	Sri.P.S.Gajapathiraju	Member	P.S. Gajapathiraju
11	Sri.A.R.V.L.Narayana	Member	A.R.V.L. Narayana
12	Miss. Y Sravani	Member	Y. Sravani
13	Mrs.V.Sasikala	Member	V. Sasikala
14	Miss. K Manjusha	Member	K. Manjusha
15	Dr.V.V.S B Bangarraju	Dean-Academics	V.V.S B Bangarraju
16	Dr.A K Tripathy	IQAC Coordinator	A.K. Tripathy
17	Dr A Rama Krishna Reddy	Principal	A.R.K. Reddy

SPACES DEGREE COLLEGE(AUTONOMOUS), PAYAKARAOPETA

DEPARTMENT OF COMPUTER SCIENCE

BOARD OF STUDIES MEETING – RESOLUTIONS

Date: 23-10-2025

Time: 11:00 Noon to 12:30 PM

Resolution1:

It was resolved that the allotted credits and workload particulars for two Major papers in semester I -Computer Fundamentals and Office Automation & Problem solving using C, and for the two major subjects in semester -II – Data structures using C & Database Management System will remain unchanged and continue to follow the APSCHE norms. Each subject carries 3 credits for theory and 1 credit for practicals, with 3 hours of theory and 2 hours of practicals per week. The detailed paper titles, curriculum frame work including credits and hours/ week were presented in **Annexure -1**.

Resolution2:

It was resolved to make certain changes to the existing syllabus issued by APSCHE. The modifications are as follows:

Semester -1

Major-1: Computer Fundamentals and Office Automation – Theory Paper

One additional concept, Characteristics of computers, is added in continuation of fundamentals to know the importance of computers in Unit-1.

Major -1: Computer Fundamentals and Office Automation– Practical

No changes were proposed; it was resolved to adopt the syllabus as it is issued by APSCHE.

Major -2: Problem solving using C – Theory Paper:

One concept goto statement from Unit 2 is removed as it typically discouraged in modern programming practice .

one concept -Self referenced structure was additionally added in Unit 5 as it provides basic building concept for Data Structures programming practice.

Major-2:– Problem solving using C Practical Paper

No changes were proposed; it was resolved to adopt the syllabus as it is issued by APSCHE.

Semester-2:

Major-1: Data Structures using C – Theory Paper

One concept -Shortest path problems from Unit-5 is removed as it provides deeper exploration of algorithmic principles.

Major-1: Data Structures using C – Practical

No changes were proposed; it was resolved to adopt the syllabus as it is issued by APSCHE.

Major -2: – Database Management System Theory Paper

One concept Triggers is additionally added in unit 5 to enforce integrity ,data consistency and security.

Major-2: Database Management System – Practical

No changes were proposed; it was resolved to adopt the syllabus as it is issued by APSCHE.

The changes made in the syllabus, along with their justifications were presented in **Annexure -2.**

Resolution3:

It was resolved that the evaluation of each paper will be 100 marks in theory and 50 marks in practical. The theory component includes both internal and external assessments. The mode of internal and external assessment shall be followed as per the guidelines of the affiliating Andhra University. As per the University's current norms, 30 marks will be allotted for Internal assessment and 70 marks will be allotted for external assessment. Students should secure a minimum of 40% in both internal and external assessments to qualify for a pass. The details of internal and external assessments along with qualifying marks, were presented in **Annexure -3.**

Resolution4:

It was resolved that the internal assessment of students will be based on the performance in mid examinations, student seminars, assignments, and attendance. Two mid examinations will be conducted in each semester for 50 marks each and scaled down to 10 marks. The breakup of internal marks is as follows:

Mid-1: 10 marks, Mid 2: 10 Marks, Seminar and assignment-5 marks and attendance -5 marks.

Resolution5:

The blue print and Model question paper for internal assessment were reviewed, discussed and approved for implementation. It was resolved that the first mid examination is to be conducted for first two units and second mid examination is to be conducted for next 2 units. The detailed blue print and model question paper were presented in [Annexure- 4](#).

Resolution6:

The blue print and Model paper for Semester End examination were reviewed, discussed and approved for implementation. It was resolved to conduct semester end examination for 70 marks consisting of essay type questions and short answer questions. The detailed blue print and model question paper were presented in [Annexure- 5](#).

Resolution7:

It was resolved to introduce certificate course in the following specializations: Plant Biotechnology, Industrial Biotechnology and Food Biotechnology. The certificate course may be offered in the sixth semester of their course and it should be designed to enhance Hands-On experience and industrial skills for industrial readiness.

Resolution8:It was resolve to conduct remedial classes for slow learners after Mid -1 Examinations to help improve their academic performance.

Resolution9:

The BOS resolved to organize guest lectures by inviting subject experts from reputed institutions and industries to enhance student's exposure and knowledge.

Resolution10:

The list of question paper setters and examiners for BCA Honours was presented, discussed and approved by the board. The list of question paper setters and examiners, were presented in **Annexure -6**.

The Chairperson thanked all members for their active participation and valuable inputs. The meeting concluded with all the above resolutions being passed unanimously.

The above resolutions were approved

S.No	Name	Designation	Signatures
1	Sri S.M.V.S Kumar	Chairperson	S. M. V. S. Kumar
2	Prof. S. Viziananda Row	University Nominee	Prof. S. Viziananda Row
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8	Mrs. D.Srilakshmi	Member	D. Srilakshmi
9	Miss. M.R.M.Harshitha	Member	M. R. M. Harshitha
10	Sri.P.S.Gajapathiraju	Member	P. S. Gajapathiraju
11	Sri.A.R.V.L.Narayana	Member	A. R. V. L. Narayana
12	Miss. Y Sravani	Member	Y. Sravani
13	Mrs.V.Sasikala	Member	V. Sasikala
14	Miss. K Manjusha	Member	K. Manjusha
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17	Dr A Rama Krishna Reddy	Principal	A. Rama Krishna Reddy

PROGRAMME OUTCOMES (POs)

Students of Undergraduate Programme (B. Sc, B. Com, BCA) at the time of graduation will be able to:

PO1: Domain Expertise:

- ✓ Acquire comprehensive knowledge and Skills.
- ✓ Make use of knowledge In an innovative manner.
- ✓ Effectively apply the knowledge and skills to address various issues.

PO2: Life- long learning:

- ✓ Learn "How to learn " — self motivated and self directed learning
- ✓ Be inquisitive and establish cause and effective relationship
- ✓ Adapt to the ever emerging demand of work place and life.

PO3: Problem Solving:

- ✓ Predict and analyze problems
- ✓ Frame hypothesis
- ✓ Investigate and interpret empirical data.
- ✓ Plan and Execute action

PO4: Good at Communication and Life Skills:

- ✓ Express thoughts in an effective manner
- ✓ Listen, understand and project views in a convincing manner
- ✓ Develop skills to present significant information clearly and concisely to interested groups.

PO5: Computing Skills and Ethics:

- ✓ Develop rationale and scientific thinking process..
- ✓ Use technology intelligently for communication entertainment and for the benefit of man-kind.
- ✓ Ensures ethical practices throughout ones endeavors for the well being of human race.
- ✓

PO6: Modern Equipment Usage:

- ✓ Use ICT effectively
- ✓ Access, retrieve and use authenticated information.

PO7: Environmental sustainability:

- ✓ Think critically on environment sustainability measures.
- ✓ Propagate and follow environment friendly practices.

PROGRAMME SPECIFIC OUTCOMES (PSO's)

PSO1: Understand the fundamental theories, concepts and applications in basic areas of research in Computer Science

PSO2: To Provide adequate understanding about computer science and its applications.

PSO3: To understand the principles and working of computer systems and be able to apply computational knowledge and project development skills to provide innovative solutions.

PSO4: To design and develop computer programs and understand the structure and development methodologies of software systems.

PSO5: To apply their skills in the field of algorithms, web designing, Software development and data analytics.

PSO6: To inculcate training and practical approach , internship is given to be trained among the students in the field of Computer Science.

PSO7: To equip the students with sufficient exposure and skills to enable them in attaining a deserving position in software industry.

BCA Computer Applications HONOURS
Course Structure(A.Y. 2025-26) - 1st Year

Annexure -1

Year	Semester	Cours	Course Title	No.of Hours (Theory)	No of Hours (Practical)	Total No. of Hours	No.of Credits (Theory)	No.of Credits (Practical)	Total No. of Credits
I YEAR	Semester-1	1	Computer Fundamental and Office Automation	3	2	5	3	1	4
		2	Problem Solving Using C	3	2	5	3	1	4
	Semester-2	3	DataStructures Using C	3	2	5	3	1	4
		4	Database Management Systems	3	2	5	3	1	4

Annexure -2

ADDITIONAL INPUTS/MODIFICATIONS IN THE SYLLABUS- SEMESTER I

COURSE-1 (Computer Fundamentals and Office Automation)

S.No	Course Title	Unit	Added topics	Deleted Topics	Justification
1	Computer Fundamentals and Office Automation	1	Characteristics of computers	NIL	Tells What makes a computer system uniquely powerful and how those qualities impact its use and capabilities.
3	Computer Fundamentals and Office Automation-PRACTICAL		NIL	NIL	---

COURSE-2 (Problem Solving Using C)

S.No	Course Title	Unit	Added topics	Deleted Topics	Justification
1	Problem solving using C	2	NIL	Goto statement in Jump statements	Typically discouraged in Modern programming practice.
2	Problem solving using C	5	Self-referenced Structures	NIL	Provides Basic for building dynamic Data Structures
3	Problem solving using C-Practical		NIL	NIL	----

ADDITIONAL INPUTS/MODIFICATIONS IN THE SYLLABUS- SEMESTER II**COURSE-3 (DataStructures Using C)**

S.No	Course Title	Unit	Added topics	Deleted Topics	Justification
1	Datastructures using c	5	---	Concept of Shortest Path Problems	Removing these concepts provides time for deeper exploration of core algorithmic principles or more application-oriented learning.
2	Datastructures uing c- PRACTICAL	-	NIL	NIL	---

COURSE-4 (Database Management Systems)

S.No	Course Title	Unit	Added topics	Deleted Topics	Justification
1	Database Management Systems	5	Triggers	NIL	Need to learn to know about maintenance of automation, enforce integrity, data consistency and security
2	Database Management Systems- PRACTICAL	-	NIL	NIL	--

Annexure-3
Internal & External Assessment
Evaluation Pattern

INTERNAL ASSESSMENT

S.No	Examination	Marks	Scaled down	Duration
1	Mid Exam 1	50	10	2 hrs
2	Mid Exam 2	50	10	2hrs
3	Seminar & Assignments,	-	05	
4	Attendance	-	05	
Total			30	

EXTERNAL ASSESSMENT

Examination	Marks	Duration
Theory Examination	70	3 Hours
Practical Examination	50	3 Hours

Assessment and Qualifying Marks

S. No	Assessment	Total Marks	Qualifying Marks
1	Internal Assessment	30	12
2	Semester End Exam - Theory	70	28
3	Semester End Exam- Practical Lab	50	20

Internal Assessment Breakup

S. No	Activity	Marks Allotted
1	Mid -term Examination 1	10
2	Mid -term Examination 2	10
3	Student Seminars & Assignments	05
4	Attendance	05

Rubrics for Awarding Attendance marks

S. No	Attendance Percentage	Marks allotted
1	75%	1
2	76 – 80 %	2
3	81 – 85 %	3
4	86 – 90 %	4
5	90.01 to 100 %	5

Annexure – 4

SPACES DEGREE COLLEGE (AUTONOMOUS), PAYAKARAOPETA

I B.Sc Computer Science (Honours)

Blueprint – Mid Examination

Max Marks :50

Duration: 2 hours

Question Type	Questions to be given	Questions to Answer	Marks per Question	Total Marks
Short Questions	7	5	4	20
Essay Questions	6	3	10	30
Total	-	-	-	50

Annexure – 5

**SPACES DEGREE COLLEGE (AUTONOMOUS), PAYAKARAOPETA
I B.Sc Computer Science (Honours)**

Blueprint – Semester End Examinations

Theory Examination

Max Marks :70 Marks

Credits: 3

Duration: 3 Hours

Question Type	Questions to be Given	Questions to Answer	Marks per Question	Total Marks
Short Questions	8	5	4	20
Essay Questions	10	5	10	50
Total	-	-	-	70

Practical Examination

Max Marks: 50 Marks

Credits: 1

Duration: 3 Hours

Component	Max Marks
Documentation / Practical Writing	10
Practical Execution	20
Record submission	10
Viva	10

Model Syllabus for 4-Year UG Honours in B.Sc. (Computer Science) as Major in consonance with Curriculum framework w.e.f. AY 2025-26

SEMESTER-I

COURSE 1: COMPUTER FUNDAMENTALS AND OFFICE AUTOMATION

Theory

Credits: 3

3 hrs/week

COURSE OBJECTIVES:

1. **Understand foundational computing concepts**, including number systems, the evolution of computers, block diagrams, and generational progress.
2. **Develop knowledge of computer architecture**, focusing on system organization and networking fundamentals.
3. **Acquire practical skills in document creation**, formatting, and digital presentations using word processing tools.
4. **Gain proficiency in spreadsheet operations**, such as data entry, formulas, functions, and charting techniques.
5. **Introduce data visualization and basic modelling principles**, fostering analytical thinking in structuring and interpreting data sets.

Course Outcomes

1. At the End of the Course, The Students will be able to **explain different number systems**, the historical evolution of computers, and identify key components in a block diagram.
2. Learners will demonstrate **basic blocks of a computer and fundamental networking knowledge**.
3. Learners will create professional-level documents and **design visually appealing presentations** using word processing software and presentation software.
4. Learners will manipulate data within spreadsheets, apply formulas, and **generate accurate summaries and visualizations**.
5. Learners will apply data modelling techniques to **analyze, organize, and represent data effectively** in various scenarios.

Unit 1. Number Systems, Evolution, Block Diagram and Generations:

Number Systems: Binary, Decimal, Octal, Hexadecimal; conversions between number systems.

Evolution of Computers: History from early mechanical devices to modern-day systems.

Block Diagram of a Computer: Components like Input Unit, Output Unit, Memory, CPU (ALU+ CU), **Characteristics of Computers**.

Generations of Computers: First to Fifth Generation – technologies, characteristics, examples.

Unit 2. Basic organization and N/W fundamentals:

Computer Organization: Functional components – Input/Output devices, Storage types, Memory hierarchy.

Types of Computers: Micro, Mini, Mainframe, and Supercomputers.

Networking Fundamentals: Definition, need for networks, types (LAN, WAN, MAN), topology (Star, Ring, Bus).

Internet Basics: IP Address, Domain Name, Web Browser, Email, WWW.

Unit 3. Word Processing and presentations:

Word Processing Basics: Using MS Word/Google Docs – formatting, styles, tables, mail merge.

Presentation Tools: Using PowerPoint/Google Slides – slide design, animations, transitions.

Applications: Creating resumes, reports, brochures, and presentations.

Keyboard Shortcuts

Unit 4. Spreadsheet Basics:

Spreadsheet Concepts: Understanding rows, columns, cells in tools like MS Excel/Google Sheets, cell referencing.

Functions and Formulae: SUM, AVERAGE, IF, COUNT.

Charts and Graphs: Creating visual representations

Data Handling: Sorting, filtering, conditional formatting.

Text Functions: LEFT, RIGHT, MID, LEN, TRIM, CONCAT, TEXTJOIN

Advanced Functions: Logical: IF, AND, OR, IFERROR,

Lookup: VLOOKUP, HLOOKUP, XLOOKUP, INDEX, MATCH

Unit 5. Data Analysis and Visualization:

Conditional Formatting: Custom rules, Color scales, Icon sets, Data bars

Data Analysis Tools: Pivot Tables and Pivot Charts, Data Validation (Drop-downs, Input Messages, Error Alerts), What-If Analysis: Goal Seek, Scenario Manager, Data Tables

Charts and Dashboards: Creating Interactive Dashboards, Using slicers with Pivot Tables, Combo Charts and Sparklines

Productivity Tips: Using Named Ranges, Freeze Panes, Split View

Textbooks:

1. **Fundamentals of Computers**, Reema Thareja, Oxford University Press, Second Edition
2. **Fundamentals of Computers**, V. Rajaraman – PHI Learning
3. **Introduction to Computers** by Peter Norton – McGraw Hill
4. **Microsoft Office 365 In Practice** by Randy Nordell – McGraw Hill Education

References:

1. **Excel 2021 Bible** by Michael Alexander, Richard Kusleika – Wiley
2. **Networking All-in-One For Dummies** by Doug Lowe – Wiley
3. **Microsoft Official Docs and Training:** <https://learn.microsoft.com>
4. **Google Workspace Learning Center:** <https://support.google.com/a/users/>

Activities:

Outcome: At the End of the Course, The Students will be able to **explain different number systems**, the historical evolution of computers, and identify key components in a block diagram.

Activity: Create a digital poster or infographic comparing number systems (binary, decimal, octal, hexadecimal) and illustrating the timeline of computer generations with key innovations.

Evaluation Method: Rubric-based assessment of the poster presentation on a 10-point scale focusing on:

- Accuracy of number system conversions
- Correct identification of block diagram components
- Visual organization and creativity

Outcome: Learners will demonstrate **basic blocks of a computer and fundamental networking knowledge**.

Activity: Design a concept map showing the internal architecture of a computer and types of networks (LAN, WAN, MAN), including devices and topologies.

Evaluation Method: Checklist-based peer review and instructor validation:

- Completeness of the map
- Correctness of networking concepts
- Use of appropriate terminology
- Logical flow and structure of the map

Outcome: Learners will create professional-level documents and **design visually appealing presentations** using word processing software and presentation software.

Activity: Prepare a formal report (e.g., project proposal) in a word processor and present it using a slide deck with transitions, embedded media, and design elements.

Evaluation Method: Performance-based evaluation using a 10-point scoring scale:

- Formatting and structure of the document
- Presentation aesthetics and clarity
- Communication skills during presentation

Outcome: Learners will manipulate data within spreadsheets, apply formulas, and **generate accurate summaries and visualizations**.

Activity: Analyze a dataset (e.g., student scores or sales data) using spreadsheet software. Apply formulas (SUM, AVERAGE, IF, VLOOKUP) and create relevant charts.

Evaluation Method: Practical test with a rubric:

- Correct use of formulas
- Accuracy of data summaries

Outcome: Learners will apply data modelling techniques to **analyze, organize, and represent data effectively** in various scenarios.

Activity: Prepare an interactive dashboard for a given data set using EXCEL.

Evaluation Method: Evaluation of the dashboard on a 10-point scoring scale:

- Presentation aesthetics and clarity
- Interactiveness
- Communication skills during presentation

SEMESTER-I
COURSE 1: COMPUTER FUNDAMENTALS AND OFFICE AUTOMATION

Practical

Credits: 1

2 hrs/week

List of Experiments:

1. Demonstration of Assembling and Desassembling of Computer Systems.
2. Identify and prepare notes on the type of Network topology of your institution.
3. Prepare your resume in Word.
4. Using Word, write a letter to your higher official seeking 10-days leave.
5. Prepare a presentation that contains text, audio and video.
6. Using a spreadsheet, prepare your class Time Table.
7. Using a Spreadsheet, calculate the Gross and Net salary of employees (Min 5) considering all the allowances.
8. Generate the class-wise and subject-wise results for a class of 20 students. Also generate the highest and lowest marks in each subject.
9. Using IF, AND, OR, and IFERROR to Automate Grade Evaluation.
 - a. Create a table of student scores in different subjects.
 - b. Use IF to assign grades (A/B/C/Fail).
 - c. Use IFERROR to handle missing scores or invalid data.
10. *Employee Database Search Using VLOOKUP, HLOOKUP, XLOOKUP, INDEX, and MATCH*
 - a. Create a database of employees (Name, ID, Department, Salary).
 - b. Implement VLOOKUP to search by employee ID.
 - c. Use HLOOKUP to extract department heads by role.
 - d. Apply XLOOKUP for more flexible searches.
 - e. Use INDEX + MATCH as an alternative to VLOOKUP.
11. Sales Report Analysis Using Pivot Tables and Charts
 - a. Use a dataset of product sales (Product, Region, Date, Quantity, Revenue).
 - b. Create Pivot Tables to summarize data by region/product.
 - c. Insert Pivot Charts for visual analysis (e.g., bar, line).
 - d. Add slicers to make the dashboard interactive.
12. Designing a Data Entry Form with Drop-downs and Input Rules
 - a. Create a student registration form.
 - b. Add drop-down lists for course selection using Data Validation.
 - c. Add input messages to guide users.
 - d. Add error alerts for wrong entries.
13. Monthly Budget Planning using Goal Seek and Scenario Manager
 - a. Create a simple personal budget (income, expenses, savings).
 - b. Use Goal Seek to determine income needed to save a desired amount.
 - c. Use Scenario Manager to compare different budgeting scenarios (best/ worst/ realistic case).
 - d. Create a one-variable Data Table to analyze how different expenses affect savings.
14. Dashboard Creation Using Combo Charts, Sparklines & Slicers
 - a. Use existing sales or attendance data.
 - b. Insert combo charts (e.g., column + line).
 - c. Add sparklines to show trends.
 - d. Use slicers with Pivot Tables to control dashboard elements.
 - e. Finalize and format for interactivity.

Course: 1 – COMPUTER FUNDAMENTALS AND OFFICE AUTOMATION
Credits:3
BLUE PRINT

Unit	Shorts	Essays(Internal choice)
Unit 1	2	2
Unit 2	1	2
Unit 3	2	2
Unit 4	2	2
Unit 5	1	2
Total	8 Out of 8, 5 questions should be answered $5 \times 4 = 20$ Marks	10 Out of 10, 5 questions should be answered $5 \times 10 = 50$ Marks

Course: 1 – COMPUTER FUNDAMENTALS AND OFFICE AUTOMATION
Credits:3
BLUE PRINT

SECTION -A

Answer any 5 questions .Each question carries 4 marks. (5 x 4 =20)

1. Unit-I
2. Unit-I
3. Unit-II
4. Unit-III
5. Unit-III
6. Unit-IV
7. Unit-IV
8. Unit-V

SECTION- B

Answer all questions. Each question carries 10 marks. (5 x 10 =50)

(Each question (both A or B) from each Unit.

9. A) Unit I
Or
B) Unit I
10. A) Unit II
Or
B) Unit II
11. A) Unit III
Or
B) Unit III
12. A) Unit IV
Or
B) Unit IV
13. A) Unit V
Or
B) Unit V

SEMESTER-I

COURSE 2: PROBLEM SOLVING USING C

Theory

Credits: 3

3hrs/week

Course Objectives:

1. Understand the fundamentals of computer programming, Apply structured problem-solving approaches using algorithms, flowcharts, and C programming constructs.
2. Develop efficient logic using decision-making, loop, and jump control statements.
3. Utilize derived data types like arrays and strings for modular program design.
4. Design and implement modular solutions using functions, recursive logic, pointer operations, and dynamic memory management.
5. Handle complex data structures including structures, unions, and text file operations.

Course Outcomes:

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

1. Understand basic computing concepts, programming paradigms and write structured C programs.
2. Apply control flow statements to solve logical and repetitive tasks in C.
3. Implement arrays and string operations to manage and manipulate data efficiently.
4. Design modular code using functions, recursion, and appropriate parameter passing.
5. Utilize pointers and memory operations for effective data handling. Demonstrate competence in dynamic memory allocation and text file processing.

Unit 1. Introduction to computer programming:

Introduction, Types of software, Compiler and interpreter, Concepts of Machine level, Assembly level and high-level programming, Flowcharts and Algorithms, Fundamentals of C: History of C, Features of C, C Tokens-variables and keywords and identifiers, constants and Data types, Rules for constructing variable names, Operators, Structure of C program, Input /output statements in C-Formatted and Unformatted I/O

Unit 2. Control statements:

Decision making statements: if, if else, else if ladder, switch statements. Loop control statements: while loop, for loop and do-while loop. Jump Control statements: break,continue.

Unit 3. Derived data types in C:

Arrays: One Dimensional arrays - Declaration, Initialization and Memory representation; Two Dimensional arrays -Declaration, Initialization and Memory representation. Strings: Declaring & Initializing string variables; String handling functions, Character handling functions

Unit 4. Functions:

Pointers: Pointer data type, Pointer declaration, initialization, accessing values using pointers. Pointer arithmetic, Pointers and arrays.

Function Prototype, definition and calling. Return statement. Nesting of functions. Categories of functions. Recursion (Basic Concept only). Parameter Passing by address & by value. Local and Global variables. Storage classes: automatic, external, static and register.

Unit 5. Dynamic Memory Management:

Introduction, Functions-malloc, calloc, realloc, free Structures: Basics of structure, structure members, accessing structure members, nested structures, array of structures, structure and functions, structures and pointers, self-referenced structures. Unions - Union definition; difference between Structures and Unions. Working with text files - modes: opening, reading, writing and closing text files.

Text Books:

1. Programming in ANSI C, E. Balagurusamy, Tata McGraw Hill, 6 th Edn,
2. Computer fundamentals and programming in C, Reema Theraja, Oxford University Press

Reference Books:

1. Let us C, Y Kanetkar, BPB publications
2. Head First C: A Brain-Friendly Guide, David Griffiths, Dawn Griffiths

Activities:

Outcome: Understand basic computing concepts, programming paradigms and write structured C programs.

Activity: Create a concept map of computing fundamentals and programming paradigms (procedural, structured, object-oriented). Then, they write a structured C program (e.g., a calculator or student grade system) using proper syntax, indentation, and modular design.

Evaluation Method: Rubric-based Code Review & Viva to check the

- The correctness of the concept map
- Correct use of structure (main + functions)
- Identification of paradigm used
- Code readability and documentation

Outcome: Apply control flow statements to solve logical and repetitive tasks in C.

Activity: Implement a program that solves a logic puzzle (e.g., number guessing game, pattern generation, or prime number finder) using if, switch, for, while, and do-while.

Evaluation Method: Automated Test Cases + Peer Review to check the

- Correct use of control statements
- Logical correctness of output

- Efficiency and edge case handling
- Peer feedback on clarity and logic

Outcome: Implement arrays and string operations to manage and manipulate data efficiently.

Activity: Build a program that stores and arranges student marks in ascending and descending order using arrays and performs string operations like concatenation, comparing, and formatting names.

Evaluation Method: Functional Demonstration + Code Walkthrough to check the

- Correct array and string usage
- Memory efficiency
- Handling of invalid inputs
- Explanation of sorting/searching logic

Activity:

- **Recursive Problem Solver**

Students write a modular program to solve a recursive problem (e.g., factorial, Fibonacci, or Tower of Hanoi) using functions with parameters and return values.

Evaluation Method:

- **Code Trace + Written Quiz**
 - Correct function decomposition
 - Proper parameter passing (by value/reference)
 - Recursion depth and base case handling
 - Quiz on tracing recursive calls

Outcome: Utilize pointers and memory operations for effective data handling. Demonstrate competence in dynamic memory allocation and text file processing.

Activity: Create a program that dynamically stores user input (e.g., survey responses) using pointers and writes/reads the data to/from a text file.

Evaluation Method: Memory Debugging + File I/O Assessment to check the

- Proper use of malloc, calloc, realloc, and free
- Pointer arithmetic and dereferencing
- File creation, reading, writing, and error handling
- Use of tools like Valgrind or manual memory trace (Optional for Unix flavours)

SEMESTER-I

COURSE 2: PROBLEM SOLVING USING C

Practical

Credits: 1

2 hrs/week

List of Experiments:

1. Write a program to check whether the given number is Armstrong or not.
2. Write a program to find the sum of individual digits of a positive integer.
3. Write a program to generate the first n terms of the Fibonacci sequence.
4. Write a program to find both the largest and smallest number in a list of integer values
5. Write a program to demonstrate change in parameter values while swapping two integer variables using Call by Value & Call by Address
6. Write a program to perform various string operations.
7. Write a program to search an element in a given list of values.
8. Write a program that uses functions to add two matrices.
9. Write a program to calculate factorial of given integer value using recursive functions
10. Write a program for multiplication of two N X N matrices.
11. Write a program to sort a given list of integers in ascending order.
12. Write a program to calculate the salaries of all employees using 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
13. Write a program to read / write the data from / to a file.
14. Write a program to reverse the contents of a file and store in another file.
15. 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 a book details for a given ISBN and display book details, if available
 - c. Update a book details using ISBN
 - d. Delete book details for a given ISBN and display list of remaining Books

Course: 2 – PROBLEM SOLVING USING C
Credits:3
BLUE PRINT

SECTION -A

Answer any 5 questions .Each question carries 4 marks. (5 x 4 =20)

1. Unit-I
2. Unit-I
3. Unit-II
4. Unit-III
5. Unit-III
6. Unit-IV
7. Unit-IV
8. Unit-V

SECTION- B

Answer all questions. Each question carries 10 marks. (5 x 10 =50)

(Each question (both A or B) from each Unit.

9. **A)** Unit I
 Or
 B) Unit I
10. **A)** Unit II
 Or
 B) Unit II
11. **A)** Unit III
 Or
 B) Unit III
12. **A)** Unit IV
 Or
 B) Unit IV
13. **A)** Unit V
 Or
 B) Unit V

SEMESTER-II

COURSE 3: DATA STRUCTURES USING C

Theory

Credits: 3

3 hrs/week

Course Objectives:

1. Understand fundamental concepts of algorithms and data structures with focus on complexity analysis and abstract data types.
2. Explore various types of linked lists and their dynamic memory representations and operations.
3. Analyze and implement linear data structures, such as stacks and queues, and examine their real-world applications.
4. Apply sorting and searching algorithms, understanding their performance implications and optimization strategies.
5. Design and manipulate hierarchical and graph-based structures, applying traversal algorithms and understanding their practical uses in computing.

Course Outcomes:

Learners will be able to:

1. Explain algorithm characteristics, time and space complexity, and asymptotic notations with clarity.
2. Implement and analyze different types of linked lists, including insertion, deletion, and traversal operations.
3. Develop stack and queue data structures using arrays and linked lists, and apply them in expression evaluation.
4. Apply efficient searching and sorting algorithms to solve computational problems and evaluate performance trade-offs.
5. Construct and traverse tree and graph structures, using them to solve problems like shortest path and spanning trees.

Unit 1. Basic Concepts:

Algorithm: Definition and characteristics, Complexity analysis: Space Complexity, Time Complexity, Asymptotic Notations.

Introduction to Data structures: Definition, Types of Data structures, Abstract Data Types (ADT), Introduction to Linked Lists, Representation of linked lists in Memory, Comparison between Linked List and Array.

Unit 2. Linked Lists:

Types of Linked Lists - Singly Linked list, Doubly Linked list, Circularly Singly Linked list, Circularly Doubly Linked list; Implementation of Single Linked List ADT: Creating a List, Traversing a linked list, Searching in linked list, Insertion and deletion into linked list (At first Node, Specified Position, Last node).

Unit 3. Stacks and Queues:

Introduction to stack ADT, Implementation of stacks using array and Linked List, Application of stacks - Polish Notations - Converting Infix to Post Fix Notation - Evaluation of Post Fix Notation.

Queues: Introduction to Queue ADT, Implementation of Queues using array and Linked List, Application of Queues Types of Queues- Circular Queues, De-queues, Priority Queue, Heaps.

Unit 4. Searching and Sorting:

Linear or Sequential Search, Binary Search, Hashing and collision resolution.

Sorting: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort and Merge Sort

Unit 5. Trees and Graphs:

Tree Terminology, Binary Tree Representation, Traversal techniques, Expression Tree, Binary Search Tree- Definition, Operations on a Binary Search Tree: Creation, Search, Insertion & deletion.

Graphs: Introduction to Graphs, Terminology, Representation (Adjacency Matrix, Adjacency List), Traversal of Graphs (DFS, BFS), Applications of Graphs, Concept of Minimum Cost Spanning Tree

Textbooks:

1. Data Structures Using C, Balagurusamy E. Tata McGraw Hill
2. Data Structures using C, Reema Thareja, Third Edition, Oxford University Press

Reference Books:

1. Data Structures, Lipschutz, Schaum's Outline Series, Tata Mcgraw-hill
2. Data Structures Using C, Ch. Vijay Kumar, Pen Press International

Activities:

Outcome: Explain algorithm characteristics, time and space complexity, and asymptotic notations with clarity

Activity: Create a comparative chart of algorithms with different notations related to time and space complexities.

Evaluation Method: Rubric-based assessment of the chart for correctness, clarity, and depth of explanation on a 10-point scale.

Outcome: Implement and analyze different types of linked lists, including insertion, deletion, and traversal operations

Activity: Code a menu-driven program in C to implement single linked lists with all basic operations.

Evaluation Method: Practical lab assessment with test cases and Viva-style questioning to explain pointer manipulation.

Outcome: Develop stack and queue data structures using arrays and linked lists, and apply them in expression evaluation

Activity: Build a program to convert infix expressions to postfix and evaluate them using stacks; Implement queues using both arrays and linked lists with enqueue/dequeue operations.

Evaluation Method: Code review and execution of programs for sample cases and evaluation based on correctness and efficiency.

Outcome: Apply efficient searching and sorting algorithms to solve computational problems and evaluate performance trade-offs

Activity: Implement and compare sorting algorithms (e.g., selection sort and bubble sort) and searching algorithms (e.g., Linear vs. Binary Search) on datasets of varying sizes. Record number of swaps and iterations for preparing a chart to assimilate the results.

Evaluation Method: Performance report with graphs and analysis. Oral presentation or peer review discussing trade-offs and algorithm selection rationale.

Outcome: Construct and traverse tree and graph structures, using them to solve problems like shortest path and spanning trees

Activity: Implement binary trees and graphs using adjacency lists/matrices.

Evaluation Method: Lab demo with sample inputs and visual output (e.g., tree traversal order, graph paths).

SEMESTER-II

COURSE 3: DATA STRUCTURES USING C

Practical

Credits: 1

2 hrs/week

List of Experiments

1. Write a program to read 'N' numbers of elements into an array and also perform the following operation on an array
 - a. Add an element at the beginning of an array
 - b. Insert an element at given index of array
 - c. Update an element using a values and index
 - d. Delete an existing element
2. Write a program to implement Single Linked List with insertion, deletion and traversal operations
3. Write a program to implement Doubly Linked List with insertion, deletion and traversal operations
4. Write a program to implement the Stack operations using Arrays and Linked Lists.
5. Write a program to convert a given infix expression to a postfix expression using stacks.
6. Write a program to implement the Queue operations using Arrays and Linked Lists.
7. Write a program to implement the Circular Queue operations using Arrays.
8. Write a program for Binary Search Tree Traversals
9. Write a program to search an item in a given list using the following Searching Algorithms
 - a. Linear Search
 - b. Binary Search.
10. Write a program for implementation of the following Sorting Algorithms
 - a. Bubble Sort
 - b. Insertion Sort
 - c. Quick Sort
 - d. Merge Sort

Course: 3 – DATASTRUCTURES UISNG C
Credits:3
BLUE PRINT

SECTION -A

Answer any 5 questions .Each question carries 4 marks. (5 x 4 =20)

1. Unit-I
2. Unit-I
3. Unit-II
4. Unit-III
5. Unit-III
6. Unit-IV
7. Unit-V
8. Unit-V

SECTION- B

Answer all questions. Each question carries 10 marks. (5 x 10 =50)

(Each question (both A or B) from each Unit.

9. **A)** Unit I
 Or
 B) Unit I
10. **A)** Unit II
 Or
 B) Unit II
11. **A)** Unit III
 Or
 B) Unit III
12. **A)** Unit IV
 Or
 B) Unit IV
13. **A)** Unit V
 Or
 B) Unit V

SEMESTER-II

COURSE 4: DATABASE MANAGEMENT SYSTEMS

Theory Credits: 3 3 hrs/week

Course Objectives:

1. To understand the fundamentals of data, information, and the evolution from file-based systems to modern database management systems.
2. To develop the ability to design conceptual data models using Entity-Relationship (ER) and Enhanced ER.
3. To explore relational model principles, such as keys, integrity constraints, relational algebra and calculus, and normalization.
4. To perform data definition and manipulation using SQL commands including queries, joins, subqueries, views, and set operations.
5. To apply procedural logic using PL/SQL, incorporating control structures, functions, procedures, and database triggers.

Course Outcomes:

At the End of the Course, The Students will be able to:

1. Describe the fundamentals of data, database systems, and the differences between file based and database approaches. Compare and classify various DBMS architectures, data models, and their components, including the three-schema architecture.
2. Design conceptual data models using Entity-Relationship and Enhanced ER diagrams, applying generalization, specialization, and constraints.
3. Apply relational model concepts, including CODD rules, relational algebra, relational calculus, and normalization techniques.
4. Construct and execute SQL queries for data definition, manipulation, aggregation, joining, and subqueries, including views and set operations.
5. Develop PL/SQL programs incorporating control structures, procedures, functions, and triggers to manage database behavior effectively.

Unit 1. 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 data base, costs and risks of database approach.

Unit 2. Entity-Relationship Model:

Introduction, the building blocks of an entity relationship diagram, classification of entity sets, attribute classification, relationship degree, relationship classification, reducing ER diagram to tables, enhanced entity-relationship model (EER model), generalization and specialization, IS A relationship and attribute inheritance, multiple inheritance, constraints on specialization and generalization, advantages of ER modeling.

Unit 3. 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, Functional dependencies and normal forms.

Unit 4. Structured Query Language:

Introduction, Commands in SQL, Data Types in SQL, Data Definition Language, Selection Operation, Projection Operation, Aggregate functions, Data Manipulation Language, Table Modification Commands, Join Operation, Set Operations, View, Sub Query.

Unit 5. PL/SQL:

Introduction, Shortcomings of SQL, Structure of PL/SQL, PL/SQL Language Elements, Data Types, Operators Precedence, Control Structures, Steps to Create a PL/SQL, Program, Iterative Control, Procedures, Functions, Triggers.

Textbooks:

1. Database System Concepts, Avi Silberschatz, Henry F. Korth, S. Sudarshan, Seventh Edition, McGraw-Hill
2. Database Management Systems by Raghu Ramakrishnan, McGrawhill

Reference Books:

1. Fundamentals of Database Systems, Elmasri Navathe Pearson Education
2. An Introduction to Database systems, C.J. Date, A.Kannan, S.Swami Nadhan, Pearson

SEMESTER-II
COURSE 4: DATABASE MANAGEMENT SYSTEMS
Practical Credits: 1 2 hrs/week

Experiment 1: Database: Inventory Management

Table 1: Products

Structure:

Column Name	Data Type	Constraints
product_id	INT	PRIMARY KEY
product_name	VARCHAR(50)	NOT NULL
price	DECIMAL(10,2)	CHECK(price > 0)
stock_qty	INT	CHECK(stock_qty >= 0)

Sample Data:

product_id	product_name	price	stock_qty
1	Pen	10.00	100
2	Notebook	50.00	200
3	Stapler	120.00	50
4	Marker	25.00	80
5	File Folder	60.00	150

Table 2: Suppliers

Structure:

Column Name	Data Type	Constraints
supplier_id	INT	PRIMARY KEY
supplier_name	VARCHAR(50)	NOT NULL
contact_no	VARCHAR(20)	UNIQUE
product_id	INT	FOREIGN KEY REFERENCES Products(product_id)

Sample Data:

supplier_id	supplier_name	contact_no	product_id
101	StationeryMart	9876543210	1
102	PaperWorld	9876500000	2
103	OfficeSupplies	9876512345	3
104	MarkerHub	9876522222	4
105	FileDepot	9876533333	5

Section A: DDL (Data Definition Language)

1. Create a database called InventoryDB.
2. Create a table Products and table Suppliers with the specified columns and constraints:

Section B: DML (Data Manipulation Language)

4. Insert at least 5 rows into the Products table.
5. Insert at least 5 rows into the Suppliers table.
6. Update the stock quantity of product 'Pen' to 120.
7. Delete a supplier with a specific supplier_id.
8. Write a query to rename 'Notebook' to 'NoteBook A4'

Section C: DQL (SELECT Queries)

9. Display all records from the Products table.
10. Display only product_name and price of all products.
11. List all products that have a stock quantity less than 100.
12. Show all products between 20 and 100 price range.
13. Find all suppliers whose contact number starts with '98765'.
14. Find the average price of products.
15. Display the total number of products in the inventory.
16. Show the maximum and minimum stock quantities.
17. Count how many suppliers supply each product.

18. Show all products where price > 50 AND stock_qty > 100.
19. Show all products where price < 20 OR stock_qty < 80.
20. Display suppliers whose supplier_name contains the word 'Mart'
21. List all suppliers along with the product they supply (use INNER JOIN).
22. Display suppliers whose name starts with 'S'.
23. Find products whose name has exactly 5 characters
24. Find suppliers who supply products costing more than 100.

Experiment 2 : ONLINE BOOKSTORE DB

An online book store wants to implement a BOOKSTORE DB for managing their online transactions by using the following tables.

Authors Table

Column Name	Data Type	Constraints
author_id	INTEGER	PRIMARY KEY
first_name	VARCHAR	NOT NULL
last_name	VARCHAR	NOT NULL
nationality	VARCHAR	NULL allowed

Books Table

Column Name	Data Type	Constraints
book_id	INTEGER	PRIMARY KEY
Title	VARCHAR	NOT NULL
author_id	INTEGER	FOREIGN KEY REFERENCES Authors
publication_year	INTEGER	
Price	DECIMAL	

Customers Table

Column Name	Data Type	Constraints
customer_id	INTEGER	PRIMARY KEY
first_name	VARCHAR	NOT NULL
last_name	VARCHAR	NOT NULL
Email	VARCHAR	UNIQUE, NOT NULL
Address	VARCHAR	NOT NULL

Orders Table

Column Name	Data Type	Constraints
order_id	INTEGER	PRIMARY KEY
customer_id	INTEGER	FOREIGN KEY REFERENCES Customers
book_id	INTEGER	FOREIGN KEY REFERENCES Books
order_date	DATE	NOT NULL
quantity	INTEGER	NOT NULL

SAMPLE DATA SET for BOOKSTORE DB

Authors Table

author_id	first_name	last_name	nationality
1	Jane	Austen	British
2	George	Orwell	British
3	Gabriel	Garcia Marquez	Colombian
4	Toni	Morrison	American
5	Mark	Twain	American
6	Harper	Lee	American
7	Fyodor	Dostoevsky	Russian

Books Table

book_id	Title	author_id	publication_year	price
101	Pride and Prejudice	1	1813	12.99
102	1984	2	1949	9.50
103	One Hundred Years of Solitude	3	1967	15.00
104	Beloved	4	1987	11.25
105	Animal Farm	2	1945	8.75
106	Adventures of Huckleberry Finn	5	1884	10.50
107	To Kill a Mockingbird	6	1960	14.00

Customers Table

customer_id	first_name	last_name	Email	address
201	Alice	Smith	alice.s@example.com	12 Oak St, London
202	Bob	Johnson	bob.j@example.com	45 Pine Ave, Oxford
203	Charlie	Brown	charlie.b@example.com	78 Maple Rd, Bristol
204	Diana	Prince	diana.p@example.com	34 Queen St, York
205	Edward	Norton	edward.n@example.com	22 River Ln, Leeds
206	Fiona	Hall	fiona.h@example.com	56 Lake Dr, Bath
207	Greg	Miller	greg.m@example.com	89 Park Ave, Glasgow

Orders Table

order_id	customer_id	book_id	order_date	Quantity
301	201	101	2025-07-20	1
302	202	102	2025-07-21	2
303	201	105	2025-07-22	1
304	203	103	2025-07-23	1
305	204	106	2025-07-24	1
306	205	107	2025-07-25	3
307	206	104	2025-07-26	2

Section A: DDL (Schema Design & Constraints)

- Write SQL statements to create all 4 tables (Authors, Books, Customers, Orders) with:
 - Primary Keys
 - Foreign Keys
 - Appropriate data types
 - NOT NULL constraints where necessary.
- Alter the Books table to add a constraint that price must be greater than 0.
- Add a new column phone_number to the Customers table (VARCHAR(15)) and ensure it is unique.

- Drop the phone_number column from the Customers table.

Section B: DML (Data Manipulation)

- Insert at least 7 records for each table (use sample dataset above).
- Update the price of the book titled Animal Farm by increasing it by 10%.
- Delete all orders made before 2025-07-21.
- Change the nationality of Gabriel Garcia Marquez to “Latino-American”.

Section C: SELECT Queries (Data Querying)

- List all books published between 1900 and 2000.
- Find all customers whose email contains “example.com”.
- Retrieve books whose price is between 10 and 15 and published before 1950.
- Show authors who are either ‘British’ or ‘American’.
- Find books that have a price less than 10 or are published after 1980.
- Display all orders placed after 2025-07-22.
- List all books written by author with author_id = 2.
- Find customers whose last name starts with B.
- Show all books with a price NOT between 9 and 13.
- Display books whose publication_year is in (1813, 1945, 1987).
- Find authors whose nationality is NOT ‘British’.
- List customers whose address contains the word Park.
- Show all books sorted by price in descending order.
- List authors in alphabetical order by last_name.
- Display orders sorted by order_date (latest first).

Use of Date Functions

- Show all orders placed in July 2025.
- Show all orders with an estimated delivery date (5 days after order date).
- Show customers who placed an order on a weekend.
- Calculate how many days have passed since the last order was placed.

Aggregate Functions (COUNT, SUM, AVG, MIN, MAX)

- Count the total number of books in the database.

29. Find the average price of all books.
30. Show the highest-priced book.
31. Count how many orders each customer has placed.
32. Calculate the total sales (price $\times$ quantity) for each customer.

GROUP BY and HAVING

33. Count how many books are written by each author.
34. Group orders by customer_id and display total quantity ordered.
35. Show customers who have ordered more than 2 books in total (use HAVING).
36. Find the total number of books sold per author (GROUP BY author).

Experiment 3: EMPLOYEE DB

An enterprise wants to automate its employee management process by implementing an Employee Database. The goal is to replace manual record-keeping with a centralized system that stores employee, department, and project details. Use the following table structures and data set to implement Employee DB.

EmployeeDB – Table Structures

1. Departments Table

Column	Type	Constraints
dept_id	INT	PRIMARY KEY
dept_name	VARCHAR	UNIQUE, NOT NULL
location	VARCHAR	NOT NULL

2. Employees Table

Column	Type	Constraints
emp_id	INT	PRIMARY KEY
first_name	VARCHAR	NOT NULL
last_name	VARCHAR	NOT NULL
email	VARCHAR	UNIQUE, NOT NULL
phone	VARCHAR	CHECK (phone LIKE '--____')
hire_date	DATE	NOT NULL
job_title	VARCHAR	NOT NULL
salary	DECIMAL	CHECK (salary > 0)

dept_id	INT	FOREIGN KEY REFERENCES Departments(dept_id)
manager_id	INT	FOREIGN KEY REFERENCES Employees(<u>emp_id</u>) (self-referential)

3. Projects Table

Column	Type	Constraints
project_id	INT	PRIMARY KEY
project_name	VARCHAR	NOT NULL
start_date	DATE	NOT NULL
end_date	DATE	NULL
dept_id	INT	FOREIGN KEY REFERENCES Departments(dept_id)



4. Employee_Project Table (Many-to-Many)

Column	Type	Constraints
emp_id	INT	FOREIGN KEY REFERENCES Employees(<u>emp_id</u>), PRIMARY KEY(<u>emp_id</u> , project_id)
project_id	INT	FOREIGN KEY REFERENCES Projects(project_id)
hours_allocated	INT	CHECK (hours_allocated > 0)

Sample Data Set

Departments Table

dept_id	dept_name	Location
1	HR	New York
2	IT	San Francisco
3	Finance	Chicago
4	Marketing	Boston
5	Operations	Seattle

6	Legal	Washington D.C.
7	Sales	Dallas
8	R&D	Austin
9	Procurement	Denver
10	Customer Care	Miami

2. Employees Table

emp_id	first_name	last_name	Email	phone	hire_date	job_title	salary	dept_id	manager_id
101	Alice	Johnson	alice.j@corp.com	123-456-7890	2020-03-15	HR Manager	75000	1	NULL
102	Bob	Smith	bob.s@corp.com	234-567-8901	2019-05-20	IT Analyst	65000	2	104
103	Charlie	Brown	charlie.b@corp.com	345-678-9012	2021-01-10	Finance Executive	58000	3	106
104	Diana	Prince	diana.p@corp.com	456-789-0123	2018-07-12	IT Manager	90000	2	NULL
105	Ethan	Hunt	ethan.h@corp.com	567-890-1234	2022-02-25	Marketing Lead	62000	4	NULL
106	Fiona	Hall	fiona.h@corp.com	678-901-2345	2017-11-01	Finance Manager	85000	3	NULL
107	Greg	Miles	greg.m@corp.com	789-012-3456	2023-04-15	IT Support	45000	2	104
108	Hannah	White	hannah.w@corp.com	890-123-	2021-	HR	50000	1	101

			orp.com	4567	09-05	Executive			
109	Ian	Scott	ian.s@corp.com	901-234-5678	2020-11-20	Operations Analyst	56000	5	NULL
110	Julia	Adams	julia.a@corp.com	012-345-6789	2019-12-18	Legal Advisor	70000	6	NULL

3. Projects Table

project_id	project_name	start_date	end_date	dept_id
201	Payroll System	2023-01-01	NULL	3
202	Website Upgrade	2023-02-10	NULL	2
203	Recruitment Drive	2023-03-05	NULL	1
204	Ad Campaign	2023-05-20	NULL	4
205	New CRM Tool	2023-04-15	NULL	7
206	Compliance Portal	2023-06-10	NULL	6
207	Inventory System	2023-07-01	NULL	5
208	AI Research	2023-08-05	NULL	8
209	Customer Feedback	2023-09-10	NULL	10
210	Procurement System	2023-10-01	NULL	9

4. Employee_Project Table

emp_id	project_id	hours_allocated
102	202	120
104	202	80
103	201	100

106	201	150
101	203	50
105	204	70
107	202	60
109	207	90
110	206	110
108	203	40

Section A: DDL (Schema Creation & Modification)

1. Write SQL statements to create the above tables with the specified constraints
2. Alter the Employees table to add a column bonus DECIMAL(8,2) with default value 0.
3. Drop the column bonus from Employees.

Section B: DML (Insert, Update, Delete)

4. Insert at least 10 rows into Departments, Employees, Projects, and Employee_Project.(use the above data set)
5. Try inserting an employee with a negative salary (should fail due to CHECK constraint).
6. Update the salary of the employee with emp_id = 103 by 15%.
7. Delete an employee record who has resigned (choose any emp_id).
8. Increase all employees' salaries in the IT department by 5%.
9. Change the department of an employee to "Research".(should fail due to FK constraint)

Section C: DQL (Select Queries)

10. List all employees and their details.
11. Show all employees in the "HR" department.
12. Find employees with salaries between 50,000 and 80,000.
13. Retrieve employees hired after 2020.
14. Show employees who are in either the IT or Finance department.
15. Find employees whose email ends with "@corp.com".
16. List all employees with salary > 60,000 AND located in "New York".
17. Display employees in descending order of salary.
18. Count the number of employees in each department.
19. Show the average salary of employees department-wise.
20. Display departments where the average salary is greater than 70,000.
21. Find the number of employees in each project.
22. Display departments with more than 3 employees.
23. Show the sum of all salaries department-wise.
24. List all distinct department IDs from the Employees table.
25. Show employee names with the year they were hired.
26. Show employees grouped by the year of hire.
27. List employees hired in the last 90 days.
28. List the no of years of experience of all the employees

Section D: Joins

29. List all employees with their department names (INNER JOIN).

30. Display all departments along with employees, including those departments without employees (LEFT JOIN).
31. Show employees and the projects they are working on (JOIN 3 tables: Employees, Employee_Project, Projects).
32. List projects along with total hours allocated by employees.
33. Write a query to find employees who are working on more than one project.
34. Show all projects handled by the 'Finance' department.

Section E: PL/SQL Programming

1. Write a procedure GetEmpInfo that takes emp_id as input and displays name, salary, and department.
2. Write a PL/SQL block that checks if an employee's salary is above 50,000. If yes, print "High Salary" ;Otherwise print "Standard Salary".
3. Write a PL/SQL program to display the top 10 rows in the Emp table based on their job and salary
4. Write a stored procedure GiveBonus that takes department ID and a designation as input, along with a bonus amount, and updates the salary of all employees in that department who have the specified designation by adding the bonus amount to their current salary.
5. Create a trigger to prevent inserting employees with a salary less than 30,000.
6. Create a trigger to avoid any transactions(insert, update, delete) on EMP table on Saturday & Sunday.

Course: 4 – DATABASE MANAGEMENT SYSTEMS
Credits:3
BLUE PRINT

SECTION -A

Answer any 5 questions .Each question carries 4 marks. (5 x 4 =20)

1. Unit-I
2. Unit-I
3. Unit-II
4. Unit-III
5. Unit-III
6. Unit-IV
7. Unit-V
8. Unit-V

SECTION- B

Answer all questions. Each question carries 10 marks. (5 x 10 =50)

(Each question (both A or B) from each Unit.

9. A) Unit I
Or
C) Unit I
10. A) Unit II
Or
C) Unit II
11. A) Unit III
Or
C) Unit III
12. A) Unit IV
Or
C) Unit IV
13. A) Unit V
Or
C) Unit V

MODEL PAPERS

Course: 1 – COMPUTER FUNDAMENTALS AND OFFICE AUTOMATION

Credits:3

MODEL PAPER

SECTION -A

Answer any 5 questions .Each question carries 4 marks. (5 x 4 =20)

1. Write down the binary equivalent of the following:
(i) $(FA3)_{16}$ (ii) $(777)_8$ (iii) $(1020)_{10}$ iv) $(11010)_2 = (?)_{10}$ v) $(11111)_{16} = (?)_2$
2. Discuss the characteristics of computer ? Draw Block diagram of computer?
3. Write about memory hierarchy?
4. What are the main features of MS-Excel?
5. Write the process of working with Tables in Google docs?
6. Illustrate Lookup functions with examples?
7. Write about working of charts and Graphs in Excel?
8. Write about Pivot Tables and Pivot charts ?

SECTION- B

Answer all questions. Each question carries 10 marks. (5 x 10 =50)

(Each question (both A or B) from each Unit.

9. A) Explain all computer generations with their technologies?
Or
B) Explain about Peripheral devices?
10. A) Discuss various types of primary and secondary memories.
Or
B) What is Network & Topology? Explain different types of Networks?
11. A) What is mail merge ? Explain steps involved in mail merge?
Or
B) Define Slide? Explain Animations and Transition in PowerPoint?
12. A) Discuss the role of formulas in MS-Excel? Explain the three types of addressing modes available in MS-Excel.
Or
B) Explain Functions in Excel with clear syntax and examples for each?
13. A) Explain about What-If Analysis? Write about Data Validation?
Or
B) Explain about Data bars ,Color scales and Icon sets in Conditional formatting ?

Course: 2– PROBLEM SOLVING USING C

Credits:3

MODEL PAPER

SECTION -A

Answer any 5 questions .Each question carries 4 marks. (5 x 4 =20)

1. Write about flowcharts and symbols used in flowcharts?
2. Write about standard Datatypes?
3. Write about Jump control statements?
4. Write about 2D arrays?
5. Write about Character Handling functions?
6. Write a program for factorial using Recursion?
7. Differentiate between pointers and Arrays ?
8. Write about DMA functions ?

SECTION- B

Answer all questions. Each question carries 10 marks. (5 x 10 =50)

(Each question (both A or B) from each Unit.

9. A) Explain different types of Software?
Or
B) Explain various Operators in C?
10. A) Explain about Decision making statements?
Or
B) Write a program to print Prime numbers from 1 - 100?
11. A) Write a program for Matrix Multiplication?
Or
B) Explain various String Handling Functions?
12. A) Explain various storage Classes?
Or
B) Explain about Pointer Arithmetic?
13. A) Explain about Nested Structures ?
Or
B) Explain various File Operations?

Course: 3 – DATA STRUCTURES USING C
Credits:3

MODEL PAPER

SECTION -A

Answer any 5 questions .Each question carries 4 marks. (5 x 4 =20)

1. Write about Time complexity?
2. Differentiate between linked list and array?
3. Write about the insertion operation in linked list?
4. Write about push and pop operation in Stack?
5. Write about the applications of Queues?
6. Write about Hashing?
7. Write about Binary tree representation?
8. Write about Minimum cost spanning tree?

SECTION- B

Answer all questions. Each question carries 10 marks. (5 x 10 =50)

(Each question (both A or B) from each Unit.

9. **A)** Explain about different types of Data structures?
 Or
 B) Explain about Asymptotic Notations?
10. **A)** Explain various operations in Doubly linked list?
 Or
 B) Write about insertion and Deletion operations in Single Linked List?
11. **A)** Explain various operations of Linked Stack?
 Or
 B) Explain different types of Queues ?
12. **A)** Write an algorithm for Quick sort?
 Or
 B) Write an algorithm for Binary search?
13. **A)** Explain various Tree traversal techniques ?
 Or
 B) Explain about Graph Representations ?

Course: 4 – DATABASE MANAGEMENT SYSTEMS

Credits:3

BLUE PRINT

SECTION -A

Answer any 5 questions .Each question carries 5 marks. (5 x 4 =20)

1. Differentiate between Data and Information?
2. Write about the costs and risks of Database approach?
3. Write about Relationship classifications?
4. Write about Relational DataModel?
5. Write about the advantages of Relational Algebra?
6. Write about Datatypes in SQL?
7. Write various Aggregate functions in SQL?
8. Write about Procedures in PL/SQL?

SECTION- B

Answer all questions. Each question carries 10 marks. (5 x 10 =50)

(Each question (both A or B) from each Unit.

9. A) Explain the components of Database Management System?
Or
B) Differentiate between File based systems & Database systems?
10. A) Explain about basic building blocks of Entity Relationship?
Or
B) Explain about Generalization and Specialization?
11. A) Explain about CODD rules?
Or
B) Explain various Normal Forms in Relational Model?
12. A) Write about DDL & DML commands?
Or
B) Write about different types of Joins?
13. A) Write various Control Structures in PL/SQL?
Or
B) Write about Triggers in PL/SQL?

Annexure -6

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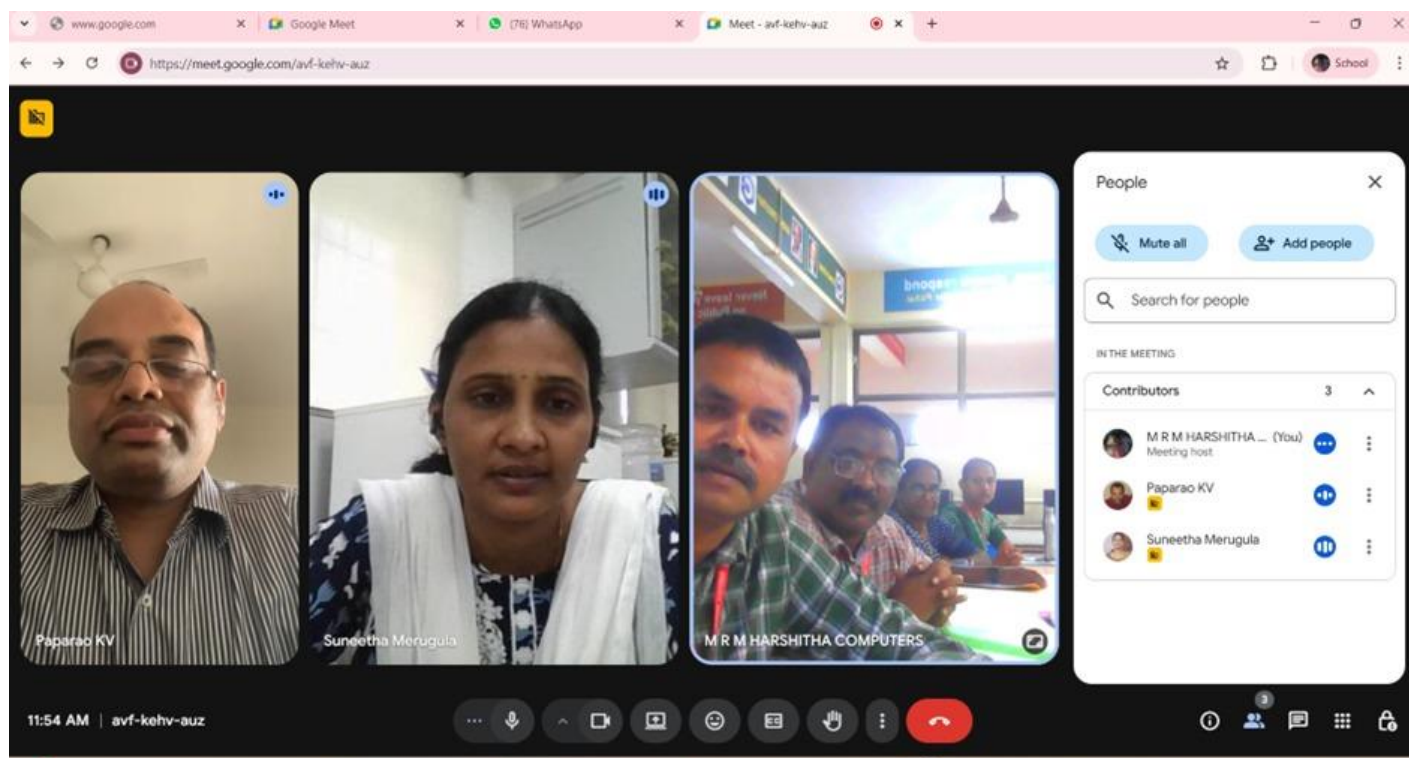
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SPACES DEGREE COLLEGE (AUTONOMOUS), PAYAKARAOPETA

DEPARTMENT OF COMPUTER SCIENCE

BOARD OF STUDIES MEETING



Date: 23-10-2025

Time: 11 a.m to 12.30 p.m

Mode: off-line & On-line

Link: <https://meet.google.com/avf-kehv-auz>





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