PUNJABI UNIVERSITY, PATIALA

SYLLABUS,
OUTLINE OF PAPERS AND TESTS

FOR

BACHELOR OF COMPUTER APPLICATIONS (B.C.A.)
PART – II (Sem III & IV)

For 2024-25, 2025-26 & 2026-27 Session

Programme Code : BCAB3PUP

(This Scheme is for Regular Students of Affiliated Colleges, Constituent Colleges and Center for Distance & Online Education)

PUNJABI UNIVERSITY PATIALA

OUTLINE OF PAPERS AND TESTS
for
B.C.A. Second Year(3rdSemester)

Programme Code : BCAB3PUP

Code	Title of Paper	Credit	Hours per Week	University Examination	Internal Assessment	Max. Marks	Exam. Duration Hours
BCAB2101T	English Communication Skills – I	4	4	70	30	100	3
BCAB2102T	Management Information System	4	4	70	30	100	3
BCAB2103T	Discrete Mathematics	4	4	70	30	100	3
BCAB2104T	Computer Organization and Architecture	4	4	70	30	100	3
BCAB2105T	Object Oriented Programming using C++	4	4	70	30	100	3
BCAB2106L	Software Lab – IV (Object Oriented Programming using C++ Lab)	2	4	70	30	100	3
BCAB2107T	Punjabi (Compulsory) -III or Punjabi Compulsory – III (Mudla Gyan) **	4	4	70	30	100	3
ERSB2101Q	Environmental and Road Safety Awareness **(Qualifying Exam) ***		4	70	30	100	3
		26	**Total**	**490**	**210**	**700**	

Note:

1. The break up of marks for the internal assessment for Theory/Practical except BCAB2101T will be as under:
   - i. One or two tests out of which minimum one best will be considered for assessment. — 20 Marks
   - ii. Attendance — 5 Marks
   - iii Class participation and behaviour — 5 Marks

2. The break up of marks for the internal assessment for BCAB2101T: English Communication Skills – I will be as under:
   - i. Formal assessment through Interview/Self Introduction/Recitation etc. — 15 Marks
   - ii. Conversation Skills (particularly listening and speaking to be evaluated through oral examination) — 5 Marks
   - iii. Attendance — 5 Marks
   - iv. Class participation and behaviour — 5 Marks

* ERSB2101Q : Environmental and Road Safety Awareness is a compulsory qualifying paper as per university guidelines, the marks for this paper are not counted for the total marks for the degree

***** Only those students who have not studied Punjabi up to matriculation can opt for Punjab Compulsory (Mudla Gyan). The code for the paper is same.***

OUTLINE OF PAPERS AND TESTS
for
B.C.A. Second Year(4th Semester)

Programme Code: BCAB3PUP

Code	Title of Paper	Credit	Hours per Week	University Examination	Internal Assessment	Max. Marks	Exam. Duration Hours
BCAB2201T	English Communication Skills – II	4	4	70	30	100	3
BCAB2202T	Computer Networks	4	4	70	30	100	3
BCAB2203T	Computer Oriented Numerical and Statistical Methods	4	4	70	30	100	3
BCAB2204T	Relational Database Management Systems	4	4	70	30	100	3
BCAB2205L	Software Lab – V (Computer Oriented Numerical and Statistical Methods Lab)	2	4	70	30	100	3
BCAB2206L	Software Lab – VI (Relational Database Management Systems Lab)	2	4	70	30	100	3
BCAB2207T	Punjabi (Compulsory) -IV or Punjabi Compulsory – IV (Mudla Gyan) **	4	4	70	30	100	3
		24		**490**	**210**	**700**	

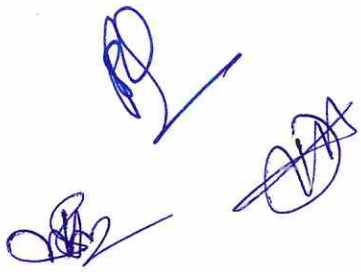
Note:

1. The break up of marks for the internal assessment for Theory/Practical except BCAB2201T will be as under:
   - i. One or two tests out of which minimum one best will be considered for assessment. — 20 Marks
   - ii. Attendance — 5 Marks
   - iii Class participation and behaviour — 5 Marks

2. The break up of marks for the internal assessment for BCAB2201T: English Communication Skills – II will be as under:
   - i. Formal assessment through Interview/Self Introduction/Recitation etc. — 15 Marks
   - ii. Conversation Skills (particularly listening and speaking to be evaluated through oral examination) — 5 Marks
   - iii. Attendance — 5 Marks
   - iv. Class participation and behaviour — 5 Marks

***** Only those students who have not studied Punjabi up to matriculation can opt for Punjab Compulsory (Mudla Gyan). The code for the paper is same.***

COMMON SYLLABUS OF ENGLISH WILL BE AS PER UG (BOARD OF STUDIES) IN FACULTY OF LANGUAGE PUNJABI UNIVERSITY, PATIALA



BCAB2102T : Management Information Systems

Total Marks: 100
University Examination: 70
Internal Assessment: 30

Maximum Time: 3 Hrs.
Minimum Pass Marks: 35%
Lectures to be delivered: 45-55 Hrs.

A) Instructions for paper-setter

The question paper will consist of three sections A, B & C. Sections A & B will have four questions from the respective sections of the syllabus and will carry 30% marks each. Section C will have 6-12 short answer type questions which will cover the entire syllabus uniformly and will carry 40% marks in all.

B) Instructions for candidates

1. Candidates are required to attempt two questions each from sections A & B of the question paper and the entire section C .
2. Use of non-programmable scientific calculator is allowed.

Course Objectives: The aim of this course is:

- To describe the role of information technology and decision support systems in business and record the current issues with those of the firm to solve business problems.
- To introduce the fundamental principles of computer-based information systems analysis and design and develop an understanding of the principles and techniques used.
- To enable students understand the various knowledge representation methods and different expert system structures as strategic weapons to counter the threats to business and make business more competitive.
- To enable the students to use information to assess the impact of the Internet and Internet technology on electronic commerce and electronic business and understand the specific threats and vulnerabilities of computer systems.
- To provide the theoretical models used in database management systems to answer business questions.

Learning Outcomes: Upon completion of this course, students will be able to:

- Relate the basic concepts and technologies used in the field of management information systems:
- Compare the processes of developing and implementing information systems.
- Outline the role of the ethical, social, and security issues of information systems.
- Translate the role of information systems in organizations, the strategic management processes, with the implications for the management.
- Apply the understanding of how various information systems like DBMS work together to accomplish the information objectives of an organization.

SECTION-A

Management Information system: Meaning and definition, Role of information system, Nature and scope of MIS.
Information and system concepts: Definition and types of information, Information quality, dimensions of information, value of information, general model of human as an information processor. System related concepts, elements of a system, and types of system.
Role and importance of Management: Introduction, levels and functions of management.
Structure and classification of MIS, Components of MIS, Framework for understanding MIS: Robert Anthony's hierarchy of management activity, Information requirements and levels of management.

SECTION-B

Decision making concept, types of decisions, methods of choosing among alternatives, Role of MIS in decision making, Simon's model of decision making, Structured and unstructured decisions.
Development of MIS: Stages in the development of MIS, System development approaches: Waterfall model, Prototyping, Iterative enhancement model, Spiral model.
Applications of information systems in Functional areas: Marketing MIS, Financial MIS, Production MIS, Personnel MIS.
Decision Support Systems: Definition and characteristics, MIS versus DSS, Tools and Models for decision support.

Text/ Reference Books:

1. D.P. Goyal, Management Information Systems: Managerial Perspectives, Macmillan India Ltd.

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1. Robert G. Murdick, Joel E. Ross, James R. Claggett, Information Systems for Modern Management, Prentice Hall of India Pvt. Ltd.
2. Gordon B. Davis, M.H. Olson, Management Information Systems: Conceptual Foundations, Structure & Development, McGraw-Hill Book Co.
3. W.S. Jawadekar, Management Information Systems, Tata McGraw-Hill Publishing Co.

BCAB2103T : Discrete Mathematics

Total Marks: 100
University Examination: 70
Internal Assessment: 30

Maximum Time: 3 Hrs.
Minimum Pass Marks: 35%
Lectures to be delivered: 45-55 Hrs.

A) Instructions for paper-setter

The question paper will consist of three sections A, B & C. Sections A & B will have four questions from the respective sections of the syllabus and will carry 30% marks each. Section C will have 6-12 short answer type questions which will cover the entire syllabus uniformly and will carry 40% marks in all.

B) Instructions for candidates

1. Candidates are required to attempt two questions each from sections A & B of the question paper and the entire section C .
2. Use of non-programmable scientific calculator is allowed.

Course Objective:

The main objectives of the course are to:

- Introduce concepts of mathematical logic for analyzing propositions and proving theorems.
- Use sets for solving applied problems, and use the properties of set operations
- algebraically.
- Work with relations and investigate their properties.
- Investigate functions as relations and their properties.
- Introduce basic concepts of graphs, digraphs and trees.

Learning Outcome:

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

- Understand the fundamental concepts of discrete mathematical structures
- Apply Normal forms/Rules of Inference for solving suitable problems.
- Apply the method of characteristic roots for solving different recurrence relations and make an effective document.
- Analyze various graph techniques to construct a tree.

SECTION-A

Set Theory: Sets, Type of sets, Set operations, Principle of Inclusion-Exclusion, Cartesian prodouct of sets, Partitions.
Logic : Propositions, Implications, Precedence of logical operators, Translating English sentences into logical expressions, Propositional equivalence
Principle of Mathematical induction.
Relations: Relations and diagraph, n-ary relations and their applications, properties of relations, representing relations, closure of relation, equivalence relation, operation on relations, partial ordering.

SECTION- B

Functions: Functions, One-to-one Functions, Onto Functions, Inverse and Composition of Functions, Floor Function, Ceiling Function.
Basic Concepts (Only Definition): Big-O Notation, Big-Omega and Big-Theta Notation.
Recurrence Relations: Solving Recurrence Relations, Generating Functions for sorting recurrence relations.
Graphs: Introduction to Graph, Graph terminology, Representing graphs and Graph Isomorphism, Connectivity, Euler Paths and Circuits, Hamiltonian paths and circuits, Shortest Path Problems, Planar Graphs.
Trees: Trees, labelled trees, Tree Traversal, Undirected trees, Spanning Trees, Minimum spanning trees.

Text/Reference Books :

1. Discrete Mathematical Structures-Bernard Kolman, Robert C. Busby, Sharon C. Ross, 4th Edition, Pearson Education Asia.
2. Discrete Mathematics-Richard Johnsonbaugh, 5th Edition, Pearson Education, Asia.
3. Elements of Discrete Mathematics, Second Edition, Tata McGraw Hill.
4. Discrete Mathematics, Seymon Lipschutz& Max Lans Lipson, Tata McGraw Hill.

BCAB2104T : Computer System Organization and Architecture

Total Marks: 100
University Examination: 70
Internal Assessment: 30

Maximum Time: 3 Hrs.
Minimum Pass Marks: 35%
Lectures to be delivered: 45-55 Hrs.

A) Instructions for paper-setter

The question paper will consist of three sections A, B & C. Sections A & B will have four questions from the respective sections of the syllabus and will carry 30% marks each. Section C will have 6-12 short answer type questions which will cover the entire syllabus uniformly and will carry 40% marks in all.

B) Instructions for candidates

1. Candidates are required to attempt two questions each from sections A & B of the question paper and the entire section C .
2. Use of non-programmable scientific calculator is allowed.

Course Objective:

- To enable the students to learn the basic functions, principles and concepts of Computer
- Architecture.
- To learn the fundamental aspects of Computer Architecture and design.
- To focus on processor design, control unit design techniques.
- To study on I/O interfacing.

Learning outcome:

On successful completion of the course the students should have

- Understood Computer Architecture.
- Understood I/O, Registers and memory.
- Understood processor design, control unit design.
- Understood I/O interfacing

SECTION-A

Computer System Organisation: CPU Organisation, Instruction Execution (instruction cycle, types of instructions), RISC v/s CISC, Design Principles for Modern Computers, Instruction level parallelism, Processor level parallelism.
Primary memory: Memory addresses, Byte Ordering, Error-correcting codes, Cache memory.
Secondary memory: Memory hierarchy, SCSI disk, RAID.
Instruction Set Architecture: Instruction formats, Expanding opcodes, types of addressing modes, data transfer and manipulation instructions, Program control(status-bit conditions, conditional branch instructions, program interrupt, types of interrupt).

SECTION-B

Register Transfer Language: Register Transfer, Bus and memory transfer, Arithmetic micro-operations, Logic micro-operations, Shift micro-operations, Arithmetic logic sift unit
Micro-programmed control, control word, control memory (concepts only)
Input-output Organisation- I/O interfaces (I/O bus and interface modules, I/O versus memory bus, isolated versus memory-mapped I/O).
Asynchronous Data transfer (strobe control, handshaking), modes of transfer (programmed I/O, interrupt-initiated I/O, software considerations), Direct memory access.

Text/Reference Books:

1. Jyotsna Sengupta, Fundamentals of Computer Organization and Architecture, NuTech Books, Deep and Deep Publications, New Delhi.
2. M. Morris Mano, Digital Logic and Computer Design, Prentice Hall of India.
3. Andrew S. Tannenbaum, "Structured Computer Organisation" 4th Edition, Prentice Hall.
4. J.P.Hayes Tata McGraw-Hill, Computer Organization and Architecture TMH
5. William Stallings, "Computer System Architecture", PHI

BCAB2105T :Object Oriented Programming using C++

Total Marks: 100
University Examination: 70
Internal Assessment: 30

Maximum Time: 3 Hrs.
Minimum Pass Marks: 35%
Lectures to be delivered: 45-55 Hrs.

A) Instructions for paper-setter

The question paper will consist of three sections A, B & C. Sections A & B will have four questions from the respective sections of the syllabus and will carry 30% marks each. Section C will have 6-12 short answer type questions which will cover the entire syllabus uniformly and will carry 40% marks in all.

B) Instructions for candidates

1. Candidates are required to attempt two questions each from sections A & B of the question paper and the entire section C .
2. Use of non-programmable scientific calculator is allowed.

Course Objective

- To familiarize with Object Oriented concepts
- To develop the skills of programming in C++
- To understand the difference between object oriented and procedure oriented programming.

Learning Outcome

- An understanding of the principles behind the object oriented development process.
- Competence in the use of object oriented programming language in the development of small to medium sized application programs

SECTION-A

Evolution of OOP: Procedure Oriented Programming, OOP Paradigm, Advantages and disadvantages of OOP over its predecessor paradigms.
Characteristics of Object Oriented Programming: Abstraction, Encapsulation, Data hiding, Inheritance, Polymorphism, code Extensibility and Reusability, User defined Data Types.
Introduction to C++: Identifier and keywords, Constants, Operators
Pointers: Pointer Operations, Pointer Arithmetic, Pointers and Arrays, Multiple indirections, Pointer to functions.
Function : Prototyping, Definition and Call, Scope Rules, Parameter Passing Value, by address and by reference, Functions returning references, Const Functions, recursion, function overloading, Default Arguments, Const Arguments.
Classes, Objects and Members: Class Declaration and Class Definition, Defining member functions, Defining Object, making functions inline, Members access control, Nested Classes, This Pointer.

SECTION-B

Object as function arguments, array of objects, functions returning objects, const members and member functions. Static data members and static member functions. Friend functions and Friend classes.
Constructors: Properties, types of constructors (Default, parameterized and copy), Dynamic constructors, Multiple constructors in classes.
Destructors: Properties, Virtual destructors, Destroying objects, Rules for constructors and destructors, Array of objects.
Dynamic memory allocation using new and delete operators.
Inheritance: Defining derived classes, inheriting private members, single inheritance, types of derivation, function, function redefining, constructors in derived class.
Types of inheritance: Single, Multiple, Multi-level and Hybrid,
Types of base classes: Direct, Indirect, Virtual, Abstract, Code Reusability.
Polymorphism: Methods of achieving polymorphic behavior. Polymorphism with pointers, virtual functions, late binding, pure virtual functions and abstract base class. Difference between function overloading, redefining and overriding.
Operator overloading: Overloading binary operator, overloading unary operators, rules for operator overloading, operator overloading using friend function. Function overloading, early binding.

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Open/ Close Files commands. Read/write operations on files.

Text/ Reference Books:

1. E. Balagurusamy, Object Oriented Programming with C++, Tata McGraw-Hill.
2. Deitel and Deitel, "C++ How to Program", Pearson Education.
3. Herbert Schildt, The Complete Reference C++, Tata McGraw-Hill.
4. Deitel and Deital, C++ How to program, Pearson Education.
5. Robert Lafore, *Object Oriented Programming in Turbo C++*, Galgotia Publications.
6. BajaneStautrup, *The C++ Programming Language*, Addition.-Wesley Publication Co.
7. Stanley B. Lippman, LoseeLajoie, C++ Primer; Pearson Education.
8. E. Balagurusamy, *Object-Oriented Programming with C++*, Tata McGraw-Hill.
9. D. Ravichandran, Programming with C++, Tata McGraw-Hill Publishing Company Ltd.

38/C

BCAB2106L : Software Lab – IV (Object Oriented Programming using C++ Lab)
(Based on Paper BCAB2105T : Object Oriented Programming using C++)

Total Marks: 100*
University Examination: 70
Internal Assessment: 30

Maximum Time: 3 Hrs.
Minimum Pass Marks: 35%
Practical sessions : 45-55 Hrs.

***The breakup of marks for the practical will be as under:**

i.	**Internal Assessment**	**30 Marks**
ii.	**Viva Voce (External Evaluation)**	**30 Marks**
iii.	**Lab Record, Program Development and Execution (External Evaluation)**	**40 Marks**

This laboratory course will comprise of exercises to supplement what is learnt under paper BCA-214: Object Oriented Programming using C++.

Students are required to develop the following programs in C++ language with internal documentation:

1. Create a class to store student information with data members as roll no, name, marks in 3 subjects total and average using constructor where ever required.
2. Write a program to implement various operators.
3. Write a program to implements 2-D Array.
4. Write a program to implement array of objects.
5. Write a program to implement const members and member functions.
6. Write a program to implement Static data members and static member functions.
7. Write a program to implement Friend functions and Friend classes.
8. Write a program to implement various types of constructors.
9. Write a program to implement Virtual destructors.
10. Write a program to implement Dynamic memory allocation using new and delete operators.
11. Write a program to read an array and display an array using dynamic memory allocation.
12. Write a program to implement various types of inheritance.
13. Write a program to implement role of constructor and destructor in inheritance.
14. Write a program to implement virtual function and abstract class concept.
15. Write a program to create memory space for a class object using new operator and to destroy it using delete operator.
16. Develop an Object Oriented program in C++ to read emp name, emp code, designation, experience and age. Construct the database with suitable member functions for initializing and destroying the data using constructor and destructor and dynamic memory allocation operators new and delete.
17. Write a program in C++ to prepare mark sheet of an University exam by reading stuname, rollno, subname, subcode, internal marks, external marks. Design a base class consisting data members such as student name, roll no, sub name. Derived class consists data members such as sub code, internal marks, external marks, construct oops data to search for a record i.e. be printed.

35/C

ERSB2101Q : Environmental and Road Safety Awareness (Qualifying Exam)

Common Syllabus Supplied by Department of Zoology, Punjabi University, Patiala.

BCAB2107T : PUNJABI COMPULSORY - III

AS APPROVED BY DEPARTMENT OF PUNJABI

BCAB2107T : ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ (ਮੁੱਢਲਾ ਗਿਆਨ) -III

AS APPROVED BY DEPARTMENT OF PUNJABI

COMMON SYLLABUS OF ENGLISH WILL BE AS PER UG (BOARD OF STUDIES) IN FACULTY OF LANGUAGE PUNJABI UNIVERSITY, PATIALA

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BCAB2202T : Computer Networks

Total Marks: 100
University Examination: 70
Internal Assessment: 30

Maximum Time: 3 Hrs.
Minimum Pass Marks: 35%
Lectures to be delivered: 45-55 Hrs.

A) Instructions for paper-setter

The question paper will consist of three sections A, B & C. Sections A & B will have four questions from the respective sections of the syllabus and will carry 30% marks each. Section C will have 6-12 short answer type questions which will cover the entire syllabus uniformly and will carry 40% marks in all.

B) Instructions for candidates

1. Candidates are required to attempt two questions each from sections A & B of the question paper and the entire section C .
2. Use of non-programmable scientific calculator is allowed.

Course Objectives

- Become familiar with the basics of computer networks
- Become familiar with network architectures
- Become familiar with fundamental protocols
- Become familiar with basic network computing techniques

Learning Outcomes

Upon completion of this module, students will be able to:

- Have a good understanding of the OSI Reference Model and in particular have a good knowledge of Layers 1-3.
- Analyze the requirements for a given organizational structure and select the most
- Appropriate networking architecture and technologies

SECTION-A

Introduction to Computer networks, Applications, Network hardware and Software (protocol hierarchies, design issues for layers, interfaces and services: connection oriented and connection less), Network structure and architecture- point to point, multicast, broadcast, Classification of networks-LAN, MAN and WAN. Reference models, the OSI reference model, TCP / IP reference model. Comparison between OSI and TCP / IP models. Data Link Layer: Design issues, Services to network layer, Framing, Error control, Flow control, Elementary data link protocols- unrestricted simplex protocol, simplex stop and wait protocol, simplex protocol for a noisy channel.

SECTION-B

Network layer: Design issues, Services to the transport layer, Routing algorithms- Static/ non-adaptive and dynamic/adaptive algorithms. Congestion control algorithms – the leaky bucket algorithm, the token bucket algorithm. Transport layer, design issues, connection management-addressing, establishing and releasing connection, transport layer protocols- TCP, UDP.

Application layer: The DNS Name Space, Electronic Mail, The World Wide Web, Network security: Introduction to cryptography, substitution cipers, transposition cipers, one-time pads, two fundamental cryptographic principles, public-key algorithms (RSA, other Public-key algorithms), digital signatures (symmetric-key signatures, public key-signatures, message digests

Text / Reference Books:

1. B Forouzan, Introduction to data communication and networking
2. A S Tanenbaum, Computer Networks.

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BCAB2203T : Computer Oriented Numerical and Statistical Methods

Total Marks: 100
University Examination: 70
Internal Assessment: 30

Maximum Time: 3 Hrs.
Minimum Pass Marks: 35%
Lectures to be delivered: 45-55 Hrs.

A) Instructions for paper-setter

The question paper will consist of three sections A, B & C. Sections A & B will have four questions from the respective sections of the syllabus and will carry 30% marks each. Section C will have 6-12 short answer type questions which will cover the entire syllabus uniformly and will carry 40% marks in all.

B) Instructions for candidates

1. Candidates are required to attempt two questions each from sections A & B of the question paper and the entire section C .
2. Use of non-programmable scientific calculator is allowed.

Course Objective: The objective of this course is to enable students to obtain an intuitive and working understanding of numerical methods for the basic problems of numerical analysis and gain an experience in the implementation of numerical methods using a computer. They would also gain an appreciation of the concept of error in these methods and need to analyze and predict it.

Learning Outcomes: Be aware of the use of numerical methods in modern scientific computing,

- Be familiar with finite precision computation,
- Be familiar with calculation and interpretation of errors in numerical methods

SECTION-A

Basic Number System: Floating point representation of numbers, arithmetic operation with normalised floating point numbers and its consequences, errors in numbers.

Solution of transcendental equations: Bi-section method, Regula-falsi method, Newton/Raphson method, Secant method

Solution of simultaneous algebraic equations: Gauss elimination method, pivoting, ill-conditioned equations, Gauss-Seidel iterative method, comparison of direct and iterative method.

Interpolation: Newton`s divided difference method, Lagrange`s interpolation.

Curve fitting: Linear, Polynomial and Exponential curve fitting.

SECTION-B

Measures of Central tendency: Measures of Central tendency: Introduction to Central Tendency, Purpose and Functions of Average, Characteristics of a Good Average, Types of Averages, Meaning of Arithmetic Mean, Calculation of Arithmetic Mean, Merit and Demerits of Arithmetic Mean, Meaning of Median, Calculation of Median, Merit and Demerits of Median, Meaning of Mode, Calculation of Mode, Merit and Demerits of Mode, Harmonic Mean-Properties-Merit and Demerits.

Dispersion: Meaning of Dispersion, Objectives of Dispersion, Properties of a good Measure of Dispersion, Methods of Measuring Dispersion, Range Introduction, Calculation of Range, Merit and Demerits of Range, Mean Deviation, Calculation of Mean Deviation, Merit and Demerits of Mean Deviation, Standard Deviation Meaning, Calculation of Standard Deviation, Merit and Demerits of Standard Deviation, Coefficient of Variation, Calculation of Coefficient Variance, Merit and Demerits of Coefficient of Variation.

Correlation: Meaning and types of correlation, correlation and causation, Methods of correlation: Karl Pearson correlation coefficient, rank correlation coefficient.

Regression analysis: Linear regression - method of least squares for estimation of regression coefficient.

Text/ Reference Books:

1. V. Rajaraman, "Computer Oriented Numerical Methods", PHI, New Delhi, 1994
2. Murray R Spiegel, Larry J. Stephens - "Statistics" Schaum's Outlines
3. J.H. Mathews," Numerical Methods for Computer Science, Engineering and Mathematics", PHI,
4. M K. Jain, S.R.K. Iyengar and R.K. Jain," Numerical Methods for Scientific and Enginerring Computation", Wiley Eastern Limited, New Delhi,
5. S.C. Chopra and R.P.C Anale,"Numarical Methods for Engineers", McGraw-Hill, New York

BCAB2204T : Relational Database Management Systems

Total Marks: 100
University Examination: 70
Internal Assessment: 30

Maximum Time: 3 Hrs.
Minimum Pass Marks: 35%
Lectures to be delivered: 45-55 Hrs.

A) Instructions for paper-setter

The question paper will consist of three sections A, B & C. Sections A & B will have four questions from the respective sections of the syllabus and will carry 30% marks each. Section C will have 6-12 short answer type questions which will cover the entire syllabus uniformly and will carry 40% marks in all.

B) Instructions for candidates

1. Candidates are required to attempt two questions each from sections A & B of the question paper and the entire section C.
2. Use of non-programmable scientific calculator is allowed.

Course Objective:

- To give fundamental knowledge database and management system.
- To explain the basic concepts of architecture of database.
- To make the learners acquainted with the use of data management issues .

Learning Outcome:

- Understanding the core terms, concepts, and tools of relational database management systems.
- Understanding database design and logic development for database programming.
- Apply SQL or Relational Algebra operations to find solutions for a given application
- Apply normalization techniques to improve database design

SECTION-A

Database Management Systems: Definition, Characteristics, Advantages of Using DBMS Approach and disadvantages of traditional file environment systems, Three Schema Architecture, Data Independence – Physical and Logical data Independence, Database Administrators and its responsibilities.

Introduction to ER Model: Weak Entity Sets, Strong Entity Sets, mapping cardinalities, generalization, specialization, aggregation.

Relational Database [RDBMS]: The Relational Database Model, Concepts and Terminology, Characteristics of Relations, CODD's 12 rules for a fully RDBMS. Constraints: Integrity Constraints- Entity, Domain and Referential Integrity constraints, Business Rules, Keys - Super Keys, Candidate Keys, Primary Keys, Secondary Keys and Foreign Keys.

Relational Algebra: Basic Operations, Additional Operations, Example Queries.

Normalization: Functional Dependency, Full Functional Dependency, Partial Dependency, Transitive Dependency, Normal Forms.

SECTION-B

Transaction Management: Transaction Concept, ACID Properties, Transaction States. Database Concurrency: Problems of Concurrent databases, Serializability and Recoverability, Concurrency Control Methods - Two Phase Locking, Timestamping. Database Recovery: Recovery Concepts, Recovery Techniques-Deferred update, Immediate Update, Shadow Paging.

Introduction to Oracle: Oracle as client/server architecture, getting started, creating, modifying, and dropping databases. Tables - Inserting, updating, deleting data from databases. SELECT statement, Data constraints (Null values, Default values, primary, unique and foreign key concepts), Queries for Relational Algebra.

Computing expressions, renaming columns, logical operators, range searching, pattern matching, Oracle functions, grouping data from tables in SQL, manipulating dates.

Working with SQL: triggers, use of data base triggers, types of triggers, how to apply database triggers, BEFORE vs. AFTER triggers, combinations, syntax for creating and dropping triggers.

Text/ Reference Books:

1. B.P. Desai, "Database management system" BPB publications, New Delhi.
2. C.J. Date, "An Introduction to Data Base Systems", Narosa Publishers

3. Jeffrey D. Ullman. "Principles of Database Systems", Galgotia Pub.
4. D. Kroenke, "Database Processing", Galgotia Publications.
5. Henry F. Korth, "Database System Concepts", McGraw Hill. Inc.
6. Naveen Prakash, "Introduction to Database Management", TMH

21/C

BCAB2205L : Software Lab – V (Computer Oriented Numerical and Statistical Methods Lab)
(Based on paper BCAB2203T : Computer Oriented Numerical and Statistical Methods)

Total Marks: 100*
University Examination: 70
Internal Assessment: 30

Maximum Time: 3 Hrs.
Minimum Pass Marks: 35%
Practical sessions : 45-55 Hrs.

***The breakup of marks for the practical will be as under:**

i.	**Internal Assessment**	**30 Marks**
ii.	**Viva Voce (External Evaluation)**	**30 Marks**
iii.	**Lab Record, Program Development and Execution (External Evaluation)**	**40 Marks**

This laboratory course will comprise of exercises to supplement what is learnt under paper BCAB2203T: Computer Oriented Numerical and Statistical Methods.

Students are required to develop the following programs in C/C++ language with internal documentation:

1. Write a program to compute the mean and weighted mean of raw data.
2. Write a program to compute the mean and weighted mean of discrete series (x, f).
3. Write a program to compute the mean and weighted mean of continuous series.
4. Write a program to compute the mode and median of raw data.
5. Write a program to compute the median of discrete series (x, f).
6. Write a program to compute the median of continuous series.
7. Write a program to compute the mode of discrete series (x, f).
8. Write a program to compute the mode of continuous series.
9. Write a program to compute the standard deviation and variance of discrete series.
10. Write a program to compute the standard deviation and variance of continuous series.
11. Write a program to compute the correlation using Karl Pearson's Correlation
12. Write a program to compute the regression coefficients.
13. Write a program for Bisection method.
14. Write a program for Regula-falsi method.
15. Write a program for Secant method.
16. Write a program for Newton-Raphson method.
17. Write a program for Gauss-Elimination method.
18. Write a program for Lahrange's Interpolation method.
19. Write a program for Newton-Interpolation method.

BCAB2206L : Software Lab – VI
(based on paper BCAB2204T : Relational Database Management Systems

Total Marks: 100*
University Examination: 70
Internal Assessment: 30

Maximum Time: 3 Hrs.
Minimum Pass Marks: 35%
Practical sessions : 45-55 Hrs.

***The breakup of marks for the practical will be as under:**

i.	**Internal Assessment**	**30 Marks**
ii.	**Viva Voce (External Evaluation)**	**30 Marks**
iii.	**Lab Record, Program Development and Execution (External Evaluation)**	**40 Marks**

This laboratory course will comprise of exercises to supplement what is learnt under paper BCA-225: Relational Database Management System with Oracle.

Students are required to practices writing SQL statements for

1. Creating the Table
2. Querying the record using order by clause
3. Querying the record using group by clause
4. Querying the record using multiple conditions
5. Create Synonyms
6. Create Sequences
7. Create Views
8. Create Indexes
9. Create triggers
10. Create cursors for procedures

BCAB2207T : PUNJABI COMPULSORY - IV

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BCAB2207T : ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ (ਮੁੱਢਲਾ ਗਿਆਨ) **-IV**

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