

**OUTLINE OF PAPERS AND TESTS**  
for  
**B.C.A. Second Year (3<sup>rd</sup> Semester)**  
**2018-19, 2019-20 and 2020-21 Session**

Code	Title of Paper	Hours per Week	University Examination	Internal Assessment	Max. Marks	Exam. Duration Hours
BCA-211	English Communication Skills – I	4	75	25*	100	3
BCA-212	Punjabi (Compulsory) or Punjabi Compulsory (Mudla Gyan)**	4	75	25	100	3
BCA-213	Discrete Mathematics	4	75	25	100	3
BCA-214	Computer System Organization and Architecture	4	75	25	100	3
BCA-215	Object Oriented Programming using C++	4	75	25	100	3
BCA-216	Fundamentals of Database Management System	4	75	25	100	3
BCA-217	Software Lab – IV (Object Oriented Programming using C++ Lab)	4	60	40	100	3
BCA-218	Software Lab – V (DBMS using MS Access Lab)	4	60	40	100	3
		<b>Total</b>	<b>570</b>	<b>230</b>	<b>800</b>	

**Note:**

1. The break up of marks for the practical will be as under:
  - i. Internal Assessment 40 Marks
  - ii. Viva Voce (External Evaluation) 20 Marks
  - iii. Lab Record Program Development and Execution (External Evaluation) 40 Marks
2. The break up of marks for the internal assessment for theory papers (except BCA-211) will be as under:
  - i. One or two tests out of which minimum one best will be considered for assessment. 15 Marks
  - ii. Attendance 5 Marks
  - iii. Class participation and behaviour 5 Marks

\*The break up of marks for the internal assessment for BCA-211: English Communication Skills – I will be as under:

- i. Formal assessment through Interview/Self Introduction/Recitation etc. 10 Marks
- ii. Conversation Skills (particularly listening and speaking to be evaluated through oral examination) 5 Marks
- iii. Attendance 5 Marks
- iv. Class participation/behaviour/assignment 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.**

**OUTLINE OF PAPERS AND TESTS**  
for  
**B.C.A. Second Year (4<sup>th</sup> Semester)**  
**2018-19, 2019-20 and 2020-21 Session**

Code	Title of Paper	Hours per Week	University Examination	Internal Assessment	Max. Marks	Exam. Duration Hours
BCA-221	English Communication Skills – II	4	75	25*	100	3
BCA-222	Punjabi (Compulsory) or Punjabi Compulsory (Mudla Gyan) **	4	75	25	100	3
BCA-223	Computer Networks	4	75	25	100	3
BCA-224	Management Information Systems	4	75	25	100	3
BCA-225	Computer Oriented Numerical and Statistical Methods	4	75	25	100	3
BCA-226	Relational Database Management Systems with Oracle	4	75	25	100	3
BCA-227	Software Lab – VI (Computer Oriented Numerical and Statistical Methods Lab)	4	60	40	100	3
BCA-228	Software Lab – VII (Oracle Lab)	4	60	40	100	3
BCA-229	Environmental and Road Safety Awareness ( <b>Qualifying Exam</b> )	4	--	--	100	3
		<b>Total</b>	<b>570</b>	<b>230</b>	<b>800</b>	

**Note:**

1. The break up of marks for the practical will be as under:
  - i. Internal Assessment 40 Marks
  - ii. Viva Voce (External Evaluation) 20 Marks
  - iii. Lab Record Program Development and Execution (External Evaluation) 40 Marks
2. The break up of marks for the internal assessment for theory papers (except Paper BCA-221) will be as under:
  - i. One or two tests out of which minimum one best will be considered for assessment. 15 Marks
  - ii. Attendance 5 Marks
  - iii. Class participation and behaviour 5 Marks

\*The break up of marks for the internal assessment for BCA-221: English Communication Skills – II will be as under:

- i. Formal assessment through Interview/Self Introduction/Recitation etc. 10 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 Punjabi Compulsory (Mudla Gyan). The code for the paper is same.**

**BCA-211: English Communication Skills – I**

**Common Syllabus Supplied by Department of English, Punjabi University, Patiala.**

**BCA-212: Punjabi (Compulsory)/ Punjabi Compulsory (Mudla Gyan)**

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

## **BCA-213: Discrete Mathematics**

**Max Marks: 75**

**Min Pass Marks: 35%**

**Maximum Time: 3 Hrs.**

**Lectures to be delivered: 45-55 Hrs**

### **A) INSTRUCTION FOR THE PAPER SETTER**

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective section of the syllabus carrying 15 marks for each question. Section C will consist of 5-10 short answer type questions carrying a total of 15 marks, which will cover the entire syllabus uniformly. Candidates are required to attempt five questions in all by selecting at least two questions each from the section A and B. Section C is compulsory.

### **B) INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions in all by selecting at least two questions each from the section A and B. Section C is compulsory.

### **SECTION-A**

**Set Theory:** Sets, Type of sets, Set operations, Principle of Inclusion-Exclusion, Cartesian product 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.

**Graphs:** Introduction to Graph, Graph terminology, Representing graphs and Graph Isomorphism, Connectivity, Euler Paths and Circuits, Hamillonian paths and circuits, Shortest Path Problems, Planar Graphs.

**Trees :** Trees, labelled trees, Tree Traversal, Undirected trees, Spanning Trees, Minimum spanning trees.

### **Text Book :**

1. Discrete Mathematical Structures-Bernard Kolman, Robert C. Busby, Sharon C. Ross, 4th Edition, Pearson Education Asia.

### **Reference Books :**

1. Discrete Mathematics-Richard Johnsonbaugh, 5th Edition, Pearson Education, Asia.
2. Elements of Discrete Mathematics, Second Edition, Tata McGraw Hill.
3. Discrete Mathematics, Seymon Lipschutz & Max Lans Lipson, Tata McGraw Hill.

## **BCA-214: Computer System Organization and Architecture**

**Max Marks: 75**

**Min Pass Marks: 35%**

**Maximum Time: 3 Hrs.**

**Lectures to be delivered: 45-55 Hrs**

### **A) INSTRUCTION FOR THE PAPER SETTER**

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective section of the syllabus carrying 15 marks for each question. Section C will consist of 5-10 short answer type questions carrying a total of 15 marks, which will cover the entire syllabus uniformly. Candidates are required to attempt five questions in all by selecting at least two questions each from the section A and B. Section C is compulsory.

### **(B) INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions in all by selecting at least two questions each from the section A and B. Section C is compulsory.

### **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 shift 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 Book:**

1. Jyotsna Sengupta, Fundamentals of Computer Organization and Architecture, NuTech Books, Deep and Deep Publications, New Delhi.

### **Reference Books:**

1. M. Morris Mano, Digital Logic and Computer Design, Prentice Hall of India.
2. Andrew S. Tannenbaum, "Structured Computer Organisation" 4<sup>th</sup> Edition, Prentice Hall.
3. J.P.Hayes Tata McGraw-Hill, Computer Organization and Architecture TMH
4. William Stallings, "Computer System Architecture", PHI

## BCA-215: Object Oriented Programming using C++

**Max Marks: 75**

**Min Pass Marks: 35%**

**Maximum Time: 3 Hrs.**

**Lectures to be delivered: 45-55 Hrs**

### A) INSTRUCTION FOR THE PAPER SETTER

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective section of the syllabus carrying 15 marks for each question. Section C will consist of 5-10 short answer type questions carrying a total of 15 marks, which will cover the entire syllabus uniformly. Candidates are required to attempt five questions in all by selecting at least two questions each from the section A and B. Section C is compulsory.

### B) INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all by selecting at least two questions each from the section A and B. Section C is compulsory.

### 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.

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

### Text Books:

1. E. Balagurusamy, Object Oriented Programming with C++, Tata McGraw-Hill.
2. Deitel and Deitel, "C++ How to Program", Pearson Education.

**Reference Books:**

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

## BCA-216: Fundamentals of Database Management System

**Max Marks: 75**

**Min Pass Marks: 35%**

**Maximum Time: 3 Hrs.**

**Lectures to be delivered: 45-55 Hrs**

### A) INSTRUCTION FOR THE PAPER SETTER

The question paper will consist of *three sections A, B and C*. Section A and B will have four questions from the respective section of the syllabus carrying 15 marks for each question. Section C will consist of 5-10 short answer type questions carrying a total of 15 marks, which will cover the entire syllabus uniformly. Candidates are required to *attempt five questions in all by selecting at least two questions each from the section A and B. Section C is compulsory.*

### B) INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all by selecting at least two questions each from the section A and B. Section C is compulsory.

### SECTION-A

**Introduction:** Database Approach, Characteristics of a Database Approach, Database System Environment. **Roles in Database Environment:** Database Administrators, Database Designers, End Users, Application Developers.

**Database Management Systems:** Definition, Characteristics, Advantages of Using DBMS Approach, Classification of DBMSs. **Architecture:** Data Models, Categories of Data Models- Conceptual Data Models, Physical data Models, Representational Data Models, such as, Object Based Models, Record Based Models, Database Schema and Instance, Three Schema Architecture, Data Independence – Physical and Logical data Independence.

**Database Conceptual Modelling by E-R model:** Concepts, Entities and Entity Sets, Attributes, Mapping Constraints, E-R Diagram, Weak Entity Sets, Strong Entity Sets.

**Enhanced E-R Modelling:** Aggregation, Generalization, Converting ER Diagrams to Tables.

**Relational Data Model:** Concepts and Terminology, Characteristics of Relations.

**Constraints: Integrity Constraints-** Entity and Referential Integrity constraints, Keys- Super Keys, Candidate Keys, Primary Keys, Secondary Keys and Foreign Keys.

### SECTION-B

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

**Database Design:** Informal Design Guidelines for Relation Schemas, Problems of Bad Database Design,

**Normalization:** Functional Dependency, Full Functional Dependency, Partial Dependency, Transitive Dependency, Normal Forms– 1NF, 2NF, 3NF, Boyce-Codd NF,

**MS-ACCESS:** introduction to MS-ACCESS, working with databases and tables, queries in Access, Applying integrity constraints, Introduction to forms, sorting and filtering, controls, Reports and Macro: creating reports, using Macros.

### Text Books:

1. Elmisry Navathe, Introduction to Database Systems, Pearson Education India.
2. Content Development Group” Working with MS-OFFICE 2000 “, TMH.

### Reference Books:

1. Henry F. Korth, Abraham, Database System Concepts, Tata McGraw Hill.
2. Naveen Prakash, Introduction to Database Management”, TMH.
3. C.J. Date, An Introduction to Data Base Systems, Pearson Education India.

**BCA-217: Software Lab – IV (Object Oriented Programming using C++ Lab)  
(Based on Paper BCA-215: Object Oriented Programming using C++)**

**Max Marks: 100\***

**Maximum Time: 3 Hrs.**

**Min Pass Marks: 35%**

**Practical Sessions to be conducted: 40-50 Hrs**

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

<b>i.</b>	<b>Internal Assessment</b>	<b>40 Marks</b>
<b>ii.</b>	<b>Viva Voce (External Evaluation)</b>	<b>20 Marks</b>
<b>iii.</b>	<b>Lab Record, Program Development and Execution (External Evaluation)</b>	<b>40 Marks</b>

This laboratory course will comprise of exercises to supplement what is learnt under paper BCA-215: 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 using Abstract Data Type (ADT) to find largest and smallest elements in an array.
3. Write a program in C++ to implement Bubble sort and Selection Sort
4. Write a program in C++ to implement Quick Sort.
5. Write a program using ADT to perform linear search.
6. Write a program using ADT to perform binary search.
7. Write a program using ADT to add and subtract two matrices.
8. Write a program using ADT to Multiply and Transpose two matrices.
9. Write a program to read 2 integers and perform simple arithmetic operations using pointer technique. (Use new and delete operators)
10. Write a program to read an array and display an array using dynamic memory allocation.
11. Write C++ programs to implement Stack ADT using array.
12. Write C++ programs to implement Queue ADT using array.
13. Write a program to create memory space for a class object using new operator and to destroy it using delete operator.
14. 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.
15. 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.

**BCA-218: Software Lab – V (DBMS using MS Access Lab)**  
**(Based on Paper BCA-216: Fundamentals of Database Management System)**

**Max Marks: 100\***

**Maximum Time: 3 Hrs.**

**Min Pass Marks: 35%**

**Practical Sessions to be conducted: 40-50 Hrs**

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

<b>i.</b>	<b>Internal Assessment</b>	<b>40 Marks</b>
<b>ii.</b>	<b>Viva Voce (External Evaluation)</b>	<b>20 Marks</b>
<b>iii.</b>	<b>Lab Record, Program Development and Execution (External Evaluation)</b>	<b>40 Marks</b>

This laboratory course will comprise of exercises to supplement what is learnt under paper BCA-216: Fundamentals of Database Management System.

Students are required to practice following:

1. Creating tables in MS ACCESS using different ways.
2. Import and export data from MS ACCESS.
3. Creating queries in MS ACCESS for selection, projection, Cartesian product, union,
4. Intersection and difference.
5. Creating queries in MS ACCESS for different types of joins.
6. Creating forms in MS ACCESS
7. Creating application using switchboard.

**BCA-221: English Communication Skills – II**

**Common Syllabus Supplied by Department of English, Punjabi University, Patiala.**

**BCA-222: Punjabi (Compulsory)/ Punjabi Compulsory (Mudla Gyan)**

**Common Syllabus supplied by Department of Punjabi, Punjabi University, Patiala.**

## **BCA-223: Computer Networks**

**Max Marks: 75**

**Min Pass Marks: 35%**

**Maximum Time: 3 Hrs.**

**Lectures to be delivered: 45-55 Hrs**

### **A) INSTRUCTION FOR THE PAPER SETTER**

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective section of the syllabus carrying 15 marks for each question. Section C will consist of 5-10 short answer type questions carrying a total of 15 marks, which will cover the entire syllabus uniformly. Candidates are required to attempt five questions in all by selecting at least two questions each from the section A and B. Section C is compulsory.

### **B) INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions in all by selecting at least two questions each from the section A and B. Section C is compulsory.

### **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 ciphers, transposition ciphers, 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 Book:**

1. B Forouzan, Introduction to data communication and networking

### **Reference Books:**

1. A S Tanenbaum, Computer Networks.

## **BCA-224: Management Information Systems**

**Max Marks: 75**

**Maximum Time: 3 Hrs.**

**Min Pass Marks: 35%**

**Lectures to be delivered: 45-55 Hrs**

### **A) INSTRUCTIONS FOR THE PAPER SETTER**

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective section of the syllabus carrying 15 marks for each question. Section C will consist of 5-10 short answer type questions carrying a total of 15 marks, which will cover the entire syllabus uniformly. . Candidates are required to attempt five questions in all by selecting at least two questions each from the section A and B. Section C is compulsory.

### **B) INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt five questions in all by selecting at least two questions each from the section A and B. Section C is compulsory.

### **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 Book:**

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

### **Reference Books:**

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.

## **BCA-225: Computer Oriented Numerical and Statistical Methods**

**Max Marks: 75**

**Maximum Time: 3 Hrs.**

**Min Pass Marks: 35%**

**Lectures to be delivered: 45-55 Hrs**

### **A) INSTRUCTIONS FOR THE PAPER SETTER**

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective section of the syllabus carrying 15 marks for each question. Section C will consist of 5-10 short answer type questions carrying a total of 15 marks, which will cover the entire syllabus uniformly. Candidates are required to attempt five questions in all by selecting at least two questions each from the section A and B. Section C is compulsory.

### **B) INSTRUCTIONS FOR THE CANDIDATES**

1. Candidates are required to attempt five questions in all by selecting at least two questions each from the section A and B. Section C is compulsory.
2. Use of Non-Programmable Scientific calculator is allowed.

### **SECTION-A**

**Roots of Polynomials:** Conventional Methods - Muller's Method, Bairstow's Method.

**Algebraic Equations:** Gauss-Jordan method, LU Decomposition, Matrix Inverse -Gauss-Seidel.

**Numerical Differentiation - Integration:** Trapezoidal Rule, Simpson's Rule, Differential equations: Taylor's method, Euler's method, Runge-Kutta methods of order 2 and 4, Predictor - corrector methods.

**Interpolation:** Newton's divided difference method, Lagrange's interpolation.

**Curve fitting:** Linear, Polynomial and Exponential curve fitting.

### **SECTION-B**

**Statistics:** Diagrammatic and Graphical representation of Numerical Data, Formation of frequency distribution, Histogram, Cumulative Frequency - Polygon and Ogives.

**Measures of Central tendency:** Mean, Median, Mode. Measures of Dispersion: Mean deviation, Standard deviation, variance, Quartile deviation and coefficient of variation, Moments (upto 4th), Measures of Skewness and Kurtosis for grouped and ungrouped data.

**Correlation:** Meaning and types of correlation, correlation and causation, Methods of correlation: product moment correlation coefficient - rank correlation coefficient.

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

Concept of sampling and Sampling distributions, Chi square tests for goodness of fit and test for independence of attributes in contingency table.

### **Text Books:**

1. V. Rajaraman, "Computer Oriented Numerical Methods", PHI, New Delhi, 1994
2. Murray R Spiegel, Larry J. Stephens - "Statistics" Schaum's Outlines

### **Reference Books:**

1. J.H. Mathews," Numerical Methods for Computer Science, Engineering and Mathematics", PHI,
2. M K. Jain, S.R.K. Iyengar and R.K. Jain," Numerical Methods for Scientific and Engineering Computation", Wiley Eastern Limited, New Delhi,
3. S.C. Chopra and R.P.C Anale,"Numerical Methods for Engineers", McGraw-Hill, New York

## BCA-226: Relational Database Management System with Oracle

**Max Marks: 75**

**Maximum Time: 3 Hrs.**

**Min Pass Marks: 35%**

**Lectures to be delivered: 45-55 Hrs**

### A) INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective section of the syllabus carrying 15 marks for each question. Section C will consist of 5-10 short answer type questions carrying a total of 15 marks, which will cover the entire syllabus uniformly. . Candidates are required to attempt five questions in all by selecting at least two questions each from the section A and B. Section C is compulsory.

### B) INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all by selecting at least two questions each from the section A and B. Section C is compulsory.

#### SECTION-A

Introduction to RDBMS Product and their Features, Difference between DBMS and RDBMS, Relationship among application programs, RDBMS,

Basic File Operations: Opening Files, Closing Files, Reading and Writing, Seeking

File Organization: Field and Record structure in file, Record Types, Types of file organization, Sequential, Indexed, and Hashed.

**Transaction Management:** Transaction Concept, Properties, Transaction States, Concurrent Execution, Serializability, Conflict Serializability, View Serializability, Recoverability, Recoverable Schedule, Cascadless Schedule

**Concurrency Control:** Lock Based Protocol, Locks, Granting of Locks, Two Phase Locking Protocol, Timestamp Based Protocol, Timestamp, Timestamp ordering protocol, Thomas's Write Rule, Validation Based Protocol, Deadlock Handling, Deadlock Prevention, Deadlock Detection, Deadlock Recovery

#### SECTION-B

**Recovery System:** Failure Classification, Transaction Failure, System Crash, Disk Failure, Storage Structures, Storage Types, Data Access, Recovery & Atomicity, Log based Recovery, Deferred Database Modification, Immediate Database Modification, Checkpoints, Recovery with Concurrent Transaction, Transaction Rollback, Restart Recovery, Remote Backup System

**Relational Query Language:** DDL, DML, DCL.

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

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, database triggers Vs. SQL\*forms, types of triggers, how to apply database triggers, BEFORE vs. AFTER triggers, combinations, syntax for creating and dropping triggers.

#### Text Book :

1. B.P. Desai, "Database management system" BPB publications, New Delhi.

#### Reference Books:

1. C.J. Date, "An Introduction to Data Base Systems", Narosa Publishers
2. Jeffrey D. Ullman, "Principles of Database Systems", Galgotia Pub.
3. D. Kroenke., "Database Processing", Galgotia Publications.
4. Henry F. Korth, "Database System Concepts", McGraw Hill. Inc.
5. Naveen Prakash, "Introduction to Database Management", TMH

**BCA-227: Software Lab – VI (Computer Oriented Numerical and Statistical Methods Lab)  
(Based on paper BCA-225: Computer Oriented Numerical and Statistical Methods)**

**Max Marks: 100\***

**Maximum Time: 3 Hrs.**

**Min Pass Marks: 35%**

**Practical Sessions to be conducted: 40-50 Hrs**

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

<b>i.</b>	<b>Internal Assessment</b>	<b>40 Marks</b>
<b>ii.</b>	<b>Viva Voce (External Evaluation)</b>	<b>20 Marks</b>
<b>iii.</b>	<b>Lab Record, Program Development and Execution (External Evaluation)</b>	<b>40 Marks</b>

This laboratory course will comprise of exercises to supplement what is learnt under paper BCA-225: 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 Lahrangle's Interpolation method.
19. Write a program for Newton-Interpolation method.

**BCA-228: Software Lab – VII (Oracle Lab)**  
**(based on paper BCA-226: Relational Database Management System with Oracle)**

**Max Marks: 100\***

**Maximum Time: 3 Hrs.**

**Min Pass Marks: 35%**

**Practical Sessions to be conducted: 40-50 Hrs**

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

<b>i.</b>	<b>Internal Assessment</b>	<b>40 Marks</b>
<b>ii.</b>	<b>Viva Voce (External Evaluation)</b>	<b>20 Marks</b>
<b>iii.</b>	<b>Lab Record, Program Development and Execution (External Evaluation)</b>	<b>40 Marks</b>

This laboratory course will comprise of exercises to supplement what is learnt under paper BCA-226: Relational Database Management System with Oracle.

Students are required to practice 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

**BCA-229: Environmental and Road Safety Awareness (Qualifying Exam)**

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