Bachelor of Vocation (Software Development)

Third Semester

Course Code	Course Type	Course Title	Teaching (Hours/Week)			Marks Distribution		Total Marks	Credits
			L	T	P	External	Internal		
BVSD-301	General Educational	Operating System	4	1	0	60	40	100	5
BVSD-302	General Educational	Computer System Architecture	4	1	0	60	40	100	5
BVSD-303	Skill	Object Oriented Programming using 'C++'	4	1	0	60	40	100	5
BVSD-304	Skill	Relational Database Management System	4	1	0	60	40	100	5
BVSD-305	Skill	Software Lab – V (based on paper BVSD-303)	0	0	5	50	--	50	5
BVSD-306	Skill	Software Lab – VI (based on paper BVSD-304)	0	0	5	50	--	50	5
		Total				**340**	**160**	**500**	**30**

1. The Breakup of marks for practical will be as under
   a. Lab record 30% Marks
   b. Program Development and Execution 40% Marks
   c. Viva-voce 30% Marks
2. The Breakup of marks for the internal assessment will be as under:
   a. MST/Internal Examinations 50% Marks
   b. Attendance 20% Marks
   c. Assignment/Co-curricular etc. 20% Marks
   d. Conduct of Student 10% Marks

Mr.Mukesh Kumar Dr. Raman Maini Dr.Sarabjeet Singh Dr.Rajan Manro

Mr. Sandeep Sharma Mr. Parduman Singh Ms. Rashmi Arora Dr. Navdeep Singh

Dr. Harjeet Singh Mr. Devinder Singh Ms. HarsimratDeo Ms. RituWalia

Ms. Devinder Kaur Ms. Taranpreet Kaur Dr. Sangeeta Joshi Mr. Birinder Singh Sarao

Ms. Manpreet Kaur Mr.Joga Singh

Bachelor of Vocation (Software Development)

Fourth Semester

Course Code	Course Type	Course Title	Teaching (Hours/Week)			Marks Distribution		Total Marks	Credits
			L	T	P	External	Internal		
BVSD-401	General Educational	Computer Networks	4	1	0	60	40	100	5
BVSD-402	General Educational	Software Engineering	4	1	0	60	40	100	5
BVSD-403	Skill	Data Structures	4	1	0	60	40	100	5
BVSD-404	Skill	Programming in Java	4	1	0	60	40	100	5
BVSD-405	Skill	Software Lab – VII (Based on paper BVSD- 403)	0	0	5	50	--	50	5
BVSD-406	Skill	Software Lab – VIII (based on paper BVSD-404)	0	0	5	50	--	50	5
DA-4001	Qualifying	Drug Abuse: Problem, Management and Prevention				35	15	50	--
		Total				**340**	**160**	**500**	**30**

1. The Breakup of marks for practical will be as under
   a. Lab record 30% Marks
   b. Program Development and Execution 40% Marks
   c. Viva Voce 30% Marks
2. The Breakup of marks for the internal assessment will be as under:
   a. MST/Internal Examinations 50% Marks
   b. Attendance 20% Marks
   c. Assignment/Co-curricular etc. 20% Marks
   d. Conduct of Student 10% Marks

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Ms. Devinder Kaur Ms. Taranpreet Kaur Dr. Sangeeta Joshi Mr. Birinder Singh Sarao

Ms. Manpreet Kaur Mr.Joga Singh

BVSD-301 Operating System

Max Marks: 100 **Maximum Time: 3 Hrs.**
External Examination: 60 **Min Pass Marks: 35%**
Internal Assessment: 40 **Lectures to be delivered: 45-55 Hrs.**

Course Objectives

i. To learn the fundamentals of Operating Systems.
ii. To learn the mechanisms involved in memory management in contemporary OS
iii. To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols System Software.

Course Learning Outcomes

After Completion of the course the students will be able to:

i. Describe the role of operating system in the management of various computer resources.
ii. Understand the process management policies and scheduling of processes by CPU.
iii. Evaluate the requirement for process synchronization and coordination handled by operating system.
iv. Describe and analyze the memory management and its allocation policies.
v. Identify use and evaluate the storage management policies with respect to different storage management technologies

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three units I, II and III. Each of unit I and II will have four questions from the respective sections of the syllabus and each question carry 9 marks. Unit III will consist of one compulsory question having 12 parts of short-answer type covering the entire syllabus uniformly and each question will carry 2 marks.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions each from unit I and II and the entire unit III.

UNIT- I

Operating System – Definition, Need, Services
Types of operating systems: simple batch system, multiprogramming, time sharing system, parallel system, distributed system, real time system. Operating system services, system calls.
Process Management – process definition, process states, process states transition diagram, process scheduling. Basic concepts of thread, Difference between process and thread.
CPU Scheduling – Basic concepts, scheduling criteria, scheduling algorithms – FCFS, SJF, Round Robin, Priority and Multilevel queue scheduling, Multilevel feedback queue scheduling.

UNIT- II

Deadlocks – Characteristics of deadlocks, methods for handling deadlocks, deadlock prevention, deadlock. Avoidance, deadlock detection and recovery.
Memory Management – Logical versus Physical address space, swapping, contiguous allocation, Paging, Concept of Virtual memory, Implementation by Demand Paging, Page replacement algorithms – FIFO, Optimal, LRU, Concept of thrashing.

File Management – Allocation methods: contiguous allocation, linked allocation and indexed allocation; **Device Management** – Disk Scheduling: FCFS, SSTF, SCAN, C-SCAN, LOOK.

Text Books:

1. Abraham Silberschatz, Peter B. Galvin, Operating Sytem Concepts, Addison –Wesley Publishing Co. Engineering, Third Edition ,Pankaj Jalote, Narosa Publications. 5th Edition.
2. Andrew S. Tanenbaum, "Modern Operating Systems", Prentice Hall of India Pvt. Ltd.

Reference Books:

1. William Stallings, "Operating System", Prentice Hall of India.
2. Pramod Chandra P. Bhatt – "An Introduction to Operating Systems, Concepts and Practice, PHI.
3. Harvey M. Deitel, "Operating Systems",Pearson Education Pvt. Ltd.

Teaching Plan:

Week	Content
1-2	**Operating System –** Definition, Need, Services, Types of operating systems: simple batch system, multiprogramming, time sharing system, parallel system, distributed system, real time system. Operating system services, system calls.
3-4	**Process Management** – process definition, process states, process states transition diagram, process scheduling. Basic concepts of thread, Difference between process and thread.
5-6	**CPU Scheduling** – Basic concepts, scheduling criteria, scheduling algorithms – FCFS, SJF, Round Robin, Priority and Multilevel queue scheduling, Multilevel feedback queue scheduling.
7-8	**Deadlocks** – Characteristics of deadlocks, methods for handling deadlocks, deadlock prevention, deadlock. Avoidance, deadlock detection and recovery.
9-10	**Management** – Logical versus Physical address space, swapping, contiguous allocation, Paging, Concept of Virtual memory, Implementation by Demand Paging, Page replacement algorithms – FIFO, Optimal, LRU, Concept of thrashing.
11-12	**File Management** – Allocation methods: contiguous allocation, linked allocation and indexed allocation;
13-14	**Device Management** – Disk Scheduling: FCFS, SSTF, SCAN, C-SCAN, LOOK.

BVSD-302: Computer System Architecture

Max Marks: 100 **Maximum Time: 3 Hrs.**

External Examination: 60 **Internal Assessment: 40 Min Pass Marks: 35%** **Lectures to be delivered: 45-55 Hrs.**

Course Objectives:

i. This course introduces the students to the fundamental concepts of digital computer organization, design andarchitecture.
ii. It aims to develop a basic understanding of the building blocks of the computer system and highlights howthese blocks are organized together to architect a computer system.

Course Learning Outcomes

On successful completion of the course, students will be able to:

i. Design Combinational Circuits using basic building blocks.
ii. Describe memory organizations and register transfer operations.
iii. Determine various stages of instruction cycle and describe interrupts and their handling.

Instructions for External Examination: The question paper will consist of three sections A, B and C. Sections A and B will have four questions each from the respective Units of the syllabus and students will attempt any two questions, each question will carry **9** marks. Section C will have **8** short answer type questions which willcover the entire syllabus uniformly and will carry 3 marks.

UNIT-I

Logic Gates: AND, OR, NOT, NAND, NOR, XOR, XNOR, NAND & NOR as Universal Gates, Logic Gates Applications.

Combinational Logic Circuits: Half Adder & Half Subtractor, Full Adder & Full Subtractor, Multiplexer, Demultiplexer, Encoder, Decoder.

Computer organization: Structure of Computer, Instruction Codes, Instruction formats (Three address, two address, one address and zero address), instruction cycle. Addressing modes.

UNIT-II

Register Transfer and Micro operations: Register Transfer language, Arithmetic, Logic and shift micro-operations

Memory Organization: Memory Hierarchy, RAM (Static and Dynamic), ROM Associative memory, Cache memory organization, Virtual memory organization. Interrupt: Types of Interrupts.

Text Books:

1. M.M. Mano “Computer System Architecture”, PHI.
2. R.P.Jain “Modern Digital Electronics”, Tata Mc Graw Hill.

Reference Books:

1. J.P.Hayes: Computer Architecture and Organizations”, Mc Graw Hill
2. Stallings “Computer Organization and Architecture” PHI.

Teaching Plan:

Week	Content
1-2	**Logic Gates:** AND, OR, NOT, NAND, NOR, XOR, XNOR, NAND & NOR as Universal Gates, Logic Gates Applications.
3-4	**Combinational Logic Circuits**: Half Adder & Half Subtractor, Full Adder & Full Subtractor,
5-6	Multiplexer, Demultiplexer, Encoder, Decoder.
7-8	**Computer Organization:** Structure of Computer, Instruction Codes, Instruction formats (Three address, two address, one address and zero address),
9	Instruction cycle. Addressing modes.
10-11	**Register Transfer and Micro operations:** Register Transfer language, Arithmetic, Logic and shift micro-operations
12-13	**Memory Organization**: Memory Hierarchy, RAM (Static and Dynamic), ROM Associative memory,
14-15	Cache memory organization, Virtual memory organization. Interrupt: Types of Interrupt.

BVSD-303 Object Oriented Programming using 'C++'

Max Marks: 100 **Maximum Time: 3 Hrs.**
External Examination: 60 **Min Pass Marks: 35%**
Internal Assessment: 40 **Lectures to be delivered: 45-55 Hrs.**

Course Objectives

i. To understand how C++ improves C with object-oriented features
ii. To learn the syntax and semantics of the C++ programming language.
iii. To understand the concept of data abstraction, encapsulation, inheritance, polymorphism and file handling.

Course Learning Outcomes

On completion of this course, the student will be able to:

i. Apply object-oriented paradigm for problem solving.
ii. Select a suitable programming construct and in-built data structure for the given problem.
iii. Design, develop, document and debug modular programs.

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three units I, II and III. Each of unit I and II will have four questions from the respective sections of the syllabus and each question carry 9 marks. Unit III will consist of one compulsory question having 12 parts of short-answer type covering the entire syllabus uniformly and each question will carry 2 marks.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions each from unit I and II and the entire unit III.

UNIT-I

Introduction: Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Data Types, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Formatted and Console I/O, Manipulators, Storage classes.

Conditional Statements (if construct, switch case construct), Understanding syntax and utility of Iterative Statements (while, do-while, and for loops), Use of break and continue in Loops, Using Nested Statements, Arrays.

Classes and Objects: Basics of Object Oriented Programming (OOP), Difference between C & C++, Class Declaration and Class Definition, Defining member functions, Functions returning value, Void functions, Inline Functions, Return data type of functions, Functions parameters, Differentiating between Declaration and Definition of Functions, inline functions, Members access control, this pointer.

Objects: Object as function arguments, array of objects, functions returning objects, Const member. Static data members and Static member functions, Friend functions and Friend classes

UNIT-II

Constructors: properties, types of constructors, Dynamic constructors, Constructor overloading.
Destructors: Properties, Virtual destructor. Destroying objects. Rules for constructors and destructors. Array of objects. Understanding a Pointer Variable, Simple use of Pointers, Dynamic memory allocation using new and delete operators, Nested and container classes, Scopes: Local, Global, Namespace and Class.
Inheritance: Defining derived classes, Types of inheritance, types of derivation- public, private, protected, function redefining, constructors in derived class, Types of base classes – abstract and virtual.

Operator overloading: rules for operator overloading binary operator, overloading unary operators, Function overloading. Polymorphism: virtual functions, late binding, pure virtual functions and abstract base class Difference between function overloading, redefining, and overriding.

Text Books:

1. E. Balaguruswamy, "Object Oriented Programming with C++", Tata McGraw's Hill.
2. Deitel & Deitel, "C++ How to Program", Pearson Education.

References:

1. Herbert Schildt, "The Complete Reference C++", Tata McGraw-Hill.
2. Robert Lafore, "Object Oriented Programming in C++", Galgotia Publications.
3. Bjarne Strautrup, "The C++ Programming Language", Addition- Wesley Publication Co.
E. Balagurusamy, " Object Oriented Programming with C++", Tata McGraw-Hill.
5. Anshuman Sharma, "Learn Programming in C++", Lakhanpal Publishers.

Teaching Plan:

Week	Content
1-2	**Introduction:** Basics of Object Oriented Programming (OOP), Difference between C & C++, Manipulators, Storage classes.
3-4	**Classes and Objects:** Class Declaration and Class Definition, Defining member functions, inline functions, Nesting of member functions, Members access control, this pointer
5-6	Object as function arguments, array of objects, functions returning objects, Const member. Static data members and Static member functions, Friend functions and Friend classes
7-8	**Constructors:** properties, types of constructors, Dynamic constructors, Constructor overloading.
9-10	**Destructors:** Properties, Virtual destructor. Destroying objects. Rules for constructors and destructors. Array of objects. Dynamic memory allocation using new and delete operators, Nested and container classes, Scopes: Local, Global, Namespace and Class.
11-12	**Inheritance:** Defining derived classes, Types of inheritance, types of derivation- public, private, protected, function redefining, constructors in derived class, Types of base classes – abstract and virtual.
13-14	**Operator overloading:** rules for operator overloading binary operator, overloading unary operators, Function overloading. Polymorphism: virtual functions, late binding, pure virtual functions and abstract base class Difference between function overloading, redefining, and overriding.

BVSD-304: Relational Database Management System

Max Marks: 100 **Maximum Time: 3 Hrs.**
External Examination: 60 **Min Pass Marks: 35%**
Internal Assessment: 40 **Lectures to be delivered: 45-55 Hrs.**

Course Objectives

i. To understand basic database concepts, including the structure and operation of the relational data model.
ii. It prepares the student to be in a position to use and design databases for different applications.

Course Learning Outcomes

On completion of this course, the student will be able to:

i. Understand database concepts and structures and query language.
ii. Understand the relational model
iii. Understand Functional Dependency and Functional Decomposition.
iv. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS
v. Apply various Normalization techniques.
vi. Understand the principles of storage structure and recovery management.

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three units I, II and III. Each of units I and II will have four questions from the respective sections of the syllabus and each question carry 9 marks. unit III will consist of one compulsory question having 12 parts of short-answer type covering the entire syllabus uniformly and each question will carry 2 marks.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions each from unit I and II and the entire unit III.

UNIT-I

Introduction of DBMS: Limitations of File System Approach, Advantages of Database Approach, Data Modeling for a Database, Three level Architecture of DBMS, Components of a DBMS. Database Schema, Database Administrator.
Entity relationship model : concepts, mapping cardinalities, entity relationship diagram, weak sets, strong entity sets, aggregation, generalization, converting ER diagram to tables.
Relational Database: Relational Data Structure, Types of Keys, Integrity Rules, Views, Relational Algebra, Basic operations, additional operations.
SQL Fundamentals: Data Definition Language, Data Manipulation Language, Data Control Language.

UNIT -II

Relational Database design : CODD 12 rules, Functional dependency, decomposition**.**
Normalization: First, Second, Third Normal Forms, Dependency Preservation, Boyce-Codd Normal Form, Multi-valued Dependencies and Fourth Normal Form and Fifth Normal Form.

Transaction Management, Concurrency Control, Database Recovery Techniques, Database Security and Integrity, Distributed Database.

Text Books:

1. Elmasry, Navathe, “Fundamentals of Database System”, Pearson Education.
2. Henry F. Korth, A Silberschhatz, “Database Concepts," Tata McGraw Hill.

Reference Books:

1. C.J. Date ," An Introduction to Database Systems”, Pearson Education.
2. Oracle SQL Complete Reference”, Tata McGrawHill.

Teaching Plan:

Week	Content
1-2	**Introduction of DBMS:** Limitations of File System Approach, Advantages of Database Approach, Data Modelling for a Database, Three level Architecture of DBMS, Components of a DBMS. Database Schema, Database Administrator. **Entity relationship model:** concepts, mapping cardinalities, entity relationship diagram, weak sets, strong entity sets, aggregation, generalization, converting ER diagram to tables.
3-4	**Relational Database:** Relational Data Structure, Types of Keys, Integrity Rules, Views, Relational Algebra, Basic operations, additional operations. **SQL Fundamentals**: Data Definition Language, Data Manipulation Language, Data Control Language.
5-6	**Relational Database design :** CODD 12 rules, Functional dependency, decomposition**.**
7-8	**Normalization**: First, Second, Third Normal Forms, Dependency Preservation, Boyce-Codd Normal Form, Multi-valued Dependencies and Fourth Normal Form and Fifth Normal Form.
9-10	Transaction Management, Concurrency Control, Database Recovery Techniques, Database Security and Integrity, Distributed Database

BVSD – 305 Software Lab – V
(Based on BVSD-303 Object Oriented Programming using 'C++')

Max Marks: 50 **Maximum Time: 3 Hrs**
External Examination: 50
Min Pass Marks: 35% **Practical Sessions to be conducted: 40-50 Hrs**

Course Objectives

i. To learn how to design C++ classes for code reuse.
ii. To learn how to implement copy constructors and class member functions.
iii. To learn how inheritance and virtual functions implement dynamic binding with polymorphism.

Course Learning Outcomes

On completion of this course, the student will be able to:

i. Understand Object oriented approach for finding solutions to various problems with the help of C++ language.
ii. To understand Object oriented approach for finding Solutions to various problems with the help of C++ language.
iii. Create computer based solutions to various real-world problems using C++

Implement programs in C++:

1. Write a program to find area of rectangle using the concept of classes & object.
2. Write a program to implement the concept of array of object.
3. Write a program to show the use of friend function.
4. Write a program to show the use of constructor overloading.
5. Write a program to show the use of copy constructor.
6. Write a program to show the use of destructors.
7. Write a program to show the use of virtual function.
8. Write a program to implement the concept of multilevel inheritance.
9. Write a program to implement the concept of multiple inheritance.
10. Write a program of unary operator overloading
11. Write a program of Binary operator overloading.
12. Write a program to demonstrate how to insert and extract an object to and from data files.
13. Write a program to count the total number of account objects in a file and then display information of a particular account object.

The Breakup of marks for practical will be as under :

a. Lab record 15 Marks
b. Program Development and Execution 20 Marks
c. Viva Voce 15 Marks

BVSD – 306 Software Lab – VI
(Based on BVSD-304: Relational Database Management System)

Max Marks: 50 **Maximum Time: 3 Hrs**
External Examination: 50
Min Pass Marks: 35% **Practical Sessions to be conducted: 40-50 Hrs**

Objectives of the Lab:

i. This practical will enable students to retrieve data from relational databases using SQL.
ii. Students will also learn about triggers, cursors, stored procedures etc.

Course Outcomes:

On completion of this course, the student will be able to:

i. Able to understand various queries and their execution
ii. Populate and query a database using SQL DML/DDL commands.
iii. Declare and enforce integrity constraints on a database
iv. Programming PL/SQL including stored procedures, stored functions, cursors, packages
v. Able to design new database and modify existing ones for new applications and reason about the efficiency of the result

Syllabus Contents:

1. Introduction to SQL and installation of SQL Server / Oracle.
2. Data Types, Creating Tables, Retrieval of Rows using Select Statement, Conditional Retrieval of Rows, Alter and Drop Statements.
3. Working with Null Values, Matching a Pattern from a Table, Ordering the Result of a Query, Aggregate Functions, Grouping the Result of a Query, Update and Delete Statements.
4. Set Operators, Nested Queries, Joins, Sequences.
5. Views, Indexes, Database Security and Privileges: Grant and Revoke Commands, Commit and Rollback Commands.
6. PL/SQL Architecture, Assignments and Expressions, Writing PL/SQL Code, Referencing Non-SQL parameters.
7. Stored Procedures and Exception Handling.
8. Triggers and Cursor Management in PL/SQL.

The Breakup of marks for practical will be as under:

a. Lab record 15 Marks
b. Program Development and Execution 20 Marks
c. Viva Voce 15 Marks

BVSD- 401 COMPUTER NETWORKS

Max Marks: 100 **Maximum Time: 3 Hrs.**
External Examination: 60 **Min Pass Marks: 35%**
Internal Assessment: 40 **Lectures to be delivered: 45-55 Hrs.**

Course Objectives

i. Build an understanding of the fundamental concepts of computer networking
ii. Familiarize the students with the reference models.
iii. Introduce the students to network security.

Course Learning Outcomes

On completion of this course, the student will be able to:

i. Familiar with the different Network Models.
ii. Understand different network technologies and their application.
iii. Update with different advanced network technologies that can be used to connect different networks
iv. Familiar with various hardware and software that can help run a smooth network

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three units I, II and III. Each of unit I and II will have four questions from the respective sections of the syllabus and each question carry 9 marks. Unit III will consist of one compulsory question having 12 parts of short-answer type covering the entire syllabus uniformly and each question will carry 2 marks.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions each from unit I and II and the entire unit III.

UNIT – I

Introduction to Computer Networks: Network definition; network topologies, network classifications; network protocol, layered network architecture, overview of OSI reference model, overview of TCP/IP protocol suite.

Data Communication Fundamentals and Techniques Analog and digital signal; data-rate limits, digital to digital line encoding schemes, pulse code modulation parallel and serial transmission; digital to analog modulation, multiplexing techniques- FDM, TDM; transmission media**.**

Networks Switching Techniques and Access mechanisms Circuit switching, packet switching- connectionless datagram switching, connection-oriented virtual circuit switching, dial-up modems, digital subscriber line, cable TV for data transfer.

Data Link Layer Functions and Protocol Error detection and error correction techniques, data-link control- framing and flow control; error recovery protocols- stop and wait ARQ, go-back-n ARQ, Point to Point Protocol on Internet.

UNIT- II

Multiple Access Protocol and Networks CSMA/CD protocols; Ethernet LANS; connectingLAN and back-bone networks- repeaters, hubs, switches, bridges, router and gateways.

Networks Layer Functions and Protocols Routing, routing algorithms, Congestion control algorithm, network layer protocol of Internet- IP protocol, Internet control protocols.

Transport Layer Functions and Protocols Transport services- error and flow control,Connection establishment and release- three way handshake, transport layer protocols-TCP, UDP.

Overview of Application layer protocol Overview of DNS protocol; overview of WWW & HTTP protocol

TextBook:

Andrew S. Tanenbaum, "Computer Networks", Third Edition, PHI Publications.

References:

i. Data & Computer Communications by William Stallings, Pearson Education.
ii. D.E. Corner, "Computer Networks and Internets', Second Edition, Addison-Wesley Publication
iii. Computer Networks by Forouzan, Tata McGrawhill Publications.

Teaching Plan:

Week	Content
1-2	**Introduction to Computer Networks:** Network definition; network topologies, network classifications; network protocol, layered network architecture, overview of OSI reference model, overview of TCP/IP protocol suite.
3-4	**Data Communication Fundamentals and Techniques** Analog and digital signal; data-rate limits, digital to digital line encoding schemes, pulse code modulation parallel and serial transmission; digital to analog modulation, multiplexing techniques- FDM, TDM; transmission media**.**
5-6	**Networks Switching Techniques and Access mechanisms** Circuit switching, packet switching- connectionless datagram switching, connection-oriented virtual circuit switching, dial-up modems, digital subscriber line, cable TV for data transfer. **Data Link Layer Functions and Protocol** Error detection and error correction techniques, data-link control- framing and flow control; error recovery protocols- stop and wait ARQ, go-back-n ARQ, Point to Point Protocol on Internet.
7-8	**Multiple Access Protocol and Networks** CSMA/CD protocols; Ethernet LANS; connecting-LAN and back-bone networks- repeaters, hubs, switches, bridges, router and gateways.
9-10	**Networks Layer Functions and Protocols** Routing, routing algorithms, Congestion control algorithm, network layer protocol of Internet- IP protocol, Internet control protocols.
11-12	**Transport Layer Functions and Protocols** Transport services- error and flow control,Connection establishment and release- three way handshake, transport layer protocols-TCP, UDP.
13-14	**Overview of Application layer protocol** Overview of DNS protocol; overview of WWW & HTTP protocol

BVSD-402 Software Engineering

Max Marks: 100
External Examination: 60
Internal Assessment: 40 **Maximum Time: 3 Hrs**
Min Pass Marks: 35% **Lectures to be delivered: 45-55 Hrs**

Objectives of the Subject:

i. Knowledge of basic Software engineering methods and practices and their appropriate application.
ii. Describe software engineering layered technology and Process frame work.
iii. A general understanding of software process models such as the waterfall and evolutionary models.

Course Learning Outcomes

i. An ability to identify, formulate, and solve complex problems.
ii. Introduces the concept of coding and testing a software.
iii. Familiarize the maintenance of the software.

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three units I, II and III. Each of unit I and II will have four questions from the respective sections of the syllabus and each question carry 9 marks. Unit III will consist of one compulsory question having 12 parts of short-answer type covering the entire syllabus uniformly and each question will carry 2 marks.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions each from unitI and II and the entire unit III.

UNIT- I

Introduction: The Problem Domain, Software Engg. Challenges, Software Engg. Approach. Software development life cycle, its phases, Software development process models: Waterfall, Prototyping, Iterative;
Software Process: Characteristics of software process, Project management process, Software configuration management process. Project Planning – activities, COCOMO model.
Software Metrics: Definition, Importance, Categories of metrics. Software Quality – Attributes, Cyclomatic complexity metric.
Software Requirements Analysis: Need for SRS, Data flow diagrams, Data Dictionary, entity relationship diagram, Characteristics and components of SRS, validation, metrics

UNIT- II

Software Design: Design principles, Module-level concepts, Structure Chart and Structured Design methodology, verification, metrics: network metrics, information flow metrics.
Coding: Programming Principles and Guidelines, Verification- code inspections, static analysis.
Software Testing: testing fundamentals, Black Box Testing: Equivalence class partitioning, Boundary value analysis, cause-effect graphing; White Box Testing: Control flow and Data flow based testing, mutation testing; levels of testing, test plan, test case specification, test case execution and analysis,
Software maintenance: Categories of maintenance. Software Reliability – Definition, uses of reliability studies.

Text Books:

1. An Integrated approach to Software Engineering, Third Edition ,Pankaj Jalote, Narosa Publications.
2. Software Engineering , Revised Second Edition , K.K. Aggarwal, Yogesh Singh, New Age International Publishers.

Reference Book:

Software Engineering – A Practitioner's Approach, Fifth Edition, Roger. S. Pressman, McGraw Hill

Teaching Plan:

Week	Content
1-2	**Introduction:** The Problem Domain, Software Engg. Challenges, Software Engg. Approach. Software development life cycle, its phases, Software development process Models: Waterfall, Prototyping, Iterative.
3-4	**Software Process:** Characteristics of software process, Project management process, Software configuration management process. Project Planning – activities, COCOMO model.
5-6	**Software Metrics** – Definition, Importance, Categories of metrics. Software Quality – Attributes, Cyclomatic complexity metric.
7-8	**Software Requirements Analysis** – Need for SRS, Data flow diagrams, Data Dictionary, entity relationship diagram, Characteristics and components of SRS, validation, metrics
9-10	**Software Design:** Design principles, Module-level concepts, Structure Chart and Structured Design methodology, verification, metrics : network metrics, information flow metrics
11-12	**Coding :** Programming Principles and Guidelines, Verification- code inspections, static analysis.
13-14	**Control flow and Data flow based testing**, mutation testing; levels of testing, test plan, test case specification, test case execution and analysis, **Software maintenance:** Categories of maintenance. Software Reliability – Definition, uses of reliability studies.

BVSD-403 Data Structures

Max Marks: 100 **Maximum Time: 3 Hrs.**
External Examination: 60 **Min Pass Marks: 35%**
Internal Assessment: 40 **Lectures to be delivered: 45-55 Hrs.**

Course Objectives

i. This course provides the students with concept of the fundamentals of different types of data structures and also the ways to implement them.
ii. To introduce various techniques for representation of the data in the real world.
iii. To develop application using data structures.

Course Learning Outcomes

On completion of this course, the student will be able to:

i. Able to analyze the algorithms to determine the time and computation complexity and justify the correctness.
ii. Student will be able to handle operation like searching, insertion, deletion, traversing on various Data Structures and determine time and computational complexity.
iii. Student will able to write an algorithm Selection Sort, BubbleSort, InsertionSort, QuickSort, MergeSort, HeapSort and compare their performance in term of Space and Time complexity
iv. Students will be able to choose appropriate Data Structure as applied to specific problem definition.

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three units I, II and III. Each of unit I and II will have four questions from the respective sections of the syllabus and each question carry 9 marks. Unit III will consist of one compulsory question having 12 parts of short-answer type covering the entire syllabus uniformly and each question will carry 2 marks.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions each from unit I and II and the entire unit III.

UNIT – I

Data Structure: Introduction to data structure and algorithm, complexity of an algorithm. Algorithm analysis: Time space trade off, Big O notation, Algorithmic notations & Complexity.

Arrays: Introduction, one dimensional and multidimensional array, memory representation of arrays, Operations on arrays: Insertion, Deletion, searching, sorting .

Stacks: Introduction, Operation on stacks, Implementation of stacks, Application of stacks: evaluation of arithmetic expressions, Parenthesis matching, String Reversal, Polish & Reverse Polish Notation.

Queues: Introduction, operation on queues, circular queue, memory representation of queues, Dequeues, Priority queues, application of queues.

UNIT – II

Linked List: Introduction to operation on linked list, circular linked list, doubly linked list, header linked list, implementation of linked list, application of linked lists.

Trees: Introduction to Trees, Binary Tree; Binary Search Tree, Heaps: Insertion and Deletion.

Searching: Linear search, Binary Search.

Sorting: Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Shell Sort, Radix Sort, Quick Sort .

Text Book:

1. Seymour Lipschultz, “Data Structures using C", McGraw-Hill,
2. Tanenbaum, Y. Lanhgsam and A.J. Augenstein, "Data Structures Using C", Prentice Hall of India, Loomis, “Data and File Structures”.

References:

1. Seymour Lipschultz, “Theory and Problems of Data Structures", McGraw-Hill.
2. E. Horowitz and S. Sahni, “Data Structures with Pascal", Galgotia, 3rd Edition,
3. Robert Sedgewick, “Algorithms in C”, Pearson Education.
4. M. J. Folk, B. Zoellick, G Riccardi, “File Structures”, Pearson Education

Teaching Plan:

Week	Content
1-2	**Data Structure:** Introduction to data structure and algorithm, complexity of an algorithm. Algorithm analysis: Time space trade off, Big O notation, Algorithmic notations & Complexity.
3-4	**Arrays:** Introduction, one dimensional and multidimensional array, memory representation of arrays, Operations on arrays: Insertion, Deletion, searching, sorting.
5-6	**Stacks:** Introduction, Operation on stacks, Implementation of stacks, Application of stacks: evaluation of arithmetic expressions, Parenthesis matching, String Reversal, Polish & Reverse Polish Notation
7-8	**Queues:** Introduction, operation on queues, circular queue, memory representation of queues, Dequeues, Priority queues, application of queues.
9-10	**Linked List:** Introduction to operation on linked list, circular linked list, doubly linked list, header linked list, implementation of linked list, application of linked lists.
11-12	**Trees:** Introduction to Trees, Binary Tree; Binary Search Tree, Heaps: Insertion and Deletion.
13-14	**Sorting:** Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Shell Sort, Radix Sort, Quick Sort .

BVSD-404 Programming with Java

Max Marks: 100
External Examination: 60
Internal Assessment: 40 **Maximum Time: 3 Hrs**
Min Pass Marks: 35% **Lectures to be delivered: 45-55 Hrs**

OBJECTIVE

Objectives of the Subject:

i. Understand fundamentals of programming such as variables, conditional and iterative execution,
ii. methods, etc.
iii. Understand fundamentals of object-oriented programming in Java.
iv. Define classes, invoking methods, using class libraries etc

Course Outcomes:

i. Students will be able to implement Object Oriented programming concept using basic syntaxes of control Structures, strings and function for developing skills of logic building activity.
ii. Identify classes, objects, members of a class and the relationships among them needed for a finding the solution to particular problem.
iii. Demonstrates how to achieve reusability using inheritance, interfaces and packages and describes faster application development can be achieved.

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three units I, II and III. Each of unit I and II will have four questions from the respective sections of the syllabus and each question carry 9 marks. Unit III will consist of one compulsory question having 12 parts of short-answer type covering the entire syllabus uniformly and each question will carry 2 marks.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions each from unitI and II and the entire unit III.

UNIT –I

Introduction to Java: evolution, features, comparison with C and C++; Java program structure; tokens, keywords, constants, variables, data types, type casting, statements.
Operators and expressions: arithmetic, relational, logical, assignment, increment, decrement, conditional, bitwise and special operators. Operator precedence & associativity rules.
Control statements: if else, switch case, for, while, do while, break, continue, labelled loops.
Class: syntax, instance variable, class variables, methods, constructors, overloading of constructors and methods.

UNIT –II

Inheritance: types of inheritance, use of super, method overriding, final class, abstract class, wrapper classes. Arrays, Strings and Vectors, Packages and Interfaces, visibility controls.
Errors and Exceptions: Types of errors, Exception classes, Exception handling in java, use of try, catch, finally, throw and throws. Taking user input, Command line arguments.
Multithreaded Programming: Creating Threads, Life cycle of thread, Thread priority, Thread synchronization, Inter-thread communication.

Applets: Introduction, Applet Class, Applet Life Cycle, Graphics in Applet, Event-Handling.
File and I/O Streams: File Class, Streams, Byte Streams, Filtered Byte Streams, Random Access File Class, Character Streams

Text Book:
1. Patrick Naughton and Herbert Schildt, "The Complete Reference Java 2", TMH

Reference Books:
1. Horstmann, Cay S. and Gary Cornell, "Core Java
2. Fundamentals Vol. 1", Pearson Education.
3. E. Balagurusamy "Programming with Java", TMH

Teaching Plan:

Week	Content
1-2	**Introduction to Java:** evolution, features, comparison with C and C++; Java program structure; tokens, keywords, constants, variables, data types, type casting, statements. **Operators and expressions**: Arithmetic, relational, logical, assignment, increment, decrement, conditional, bitwise and special operators. Operator precedence & associativity rules.
3-4	**Control statements:** if else, switch case, for, while, do while, break, continue, labeled loops. **Class:** syntax, instance variable, class variables, methods, constructors, overloading of constructors and methods.
5-6	**Inheritance:** types of inheritance, use of super, method overriding, final class, abstract class, wrapper classes. Arrays, Strings and Vectors, Packages and Interfaces, visibility controls
7-8	**Errors and Exceptions:** Types of errors, Exception classes, Exception handling in java, use of try, catch, finally, throw and throws.
9-10	**Multithreaded Programming:** Creating Threads, Life cycle of thread, Thread priority, Thread synchronization, Inter-thread communication.
11-12	**Applets:** Introduction, Applet Class, Applet Life Cycle, Graphics in Applet, Event-Handling.
13-14	**File and I/O Streams:** File Class, Streams, Byte Streams, Filtered Byte Streams, Random Access File Class, Character Streams

BVSD – 405 Software Lab – VII
(Based on BVSD-403: Data Structures)

Max Marks: 50 **Maximum Time: 3 Hrs**
External Examination: 50
Min Pass Marks: 35% **Practical Sessions to be conducted: 40-50 Hrs**

Objectives of the Lab:

i. To develop skills to design programs for linear and non linear data structures.
ii. To Strengthen the ability to identify and apply the suitable data structure for the given real world problem.
iii. To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures

Course Outcomes:

On completion of this course, the student will be able to:

i. Students will be able to apply operations like searching, insertion, deletion, traversing on various Data Structures and determine time and computational complexity.
ii. Student will able to write an program Selection Sort, BubbleSort, InsertionSort, QuickSort, MergeSort, HeapSort and compare their performance in term of Space and Time complexity
iii. Students will be able to choose appropriate Data Structure as applied to specific problem definitions.

List of Practicals:

1. Write a program using Array.
2. Write a program to push and pop operations in stack.
3. Write programs of searching.
4. Write programs of sorting.
5. Write a program for insertion and deletion in the queue.
6. Write a program for insertion and deletion in the Linked List.
7. write a program for traversing on various data structures.

The Breakup of marks for practical will be as under :

a. Lab record 15 Marks
b. Program Development and Execution 20 Marks
c. Viva Voce 15 Marks

BVSD – 406 Software Lab – VIII (Based on BVSD-404)

Max Marks: 100 **Maximum Time: 3 Hrs**
External Examination: 50 **Practical Sessions to be conducted: 40-50 Hrs**
Internal Assessment:50
Min Pass Marks: 35%

Objectives of the Subject:
The objective of the course is to build software development skills using Java programming for real world applications.

Course Outcome:
After Completion of the course the students will be able to:

1. This course will teach the implementation of basic concepts and techniques which form
2. The object-oriented programming paradigm.
3. Prepare students to be in a position to write object-oriented programs using Java.
4. To Build an application using user Interface Components.

Implement programs in Java

This laboratory course will comprise as exercises to supplement what is learnt under paper BCA-502. Students are required to develop the following programs with internal documentation:

1. WAP to demonstrate the concept of class.
2. WAP that illustrates the use of constructor.
3. WAP for constructor overloading.
4. WAP for single inheritance using super keyword.
5. WAP for multilevel inheritance.
6. WAP to demonstrate method overriding.
7. WAP that implements multiple inheritance through interface.
8. WAP to demonstrate importing multiple packages.
9. WAP to demonstrate creating threads by extending Thread class.
10. WAP to demonstrate creating threads by implementing Runnable interface.
11. WAP that illustrates the use of exception handling.

The Breakup of marks for practical will be as under :

a. Lab record 15 Marks
b. Program Development and Execution 20 Marks
c. Viva Voce 15 Marks