DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY

UTTAR PRADESH, LUCKNOW

EVALUATION SCHEME & SYLLABUS
(*Second Year*)

for

Bachelor of Computer Applications
BCA

(Under Graduate Three Year Course in Computer Application)

As per
National Education Policy 2020
(Effective from the Session: 2025-26)

BCA Second Year Evaluation Scheme, 2025-26

SEMESTER-III

S. No.	Subject Code	Subject Name	Periods			Sessional			ESE	Total	Credit
			L	T	P	CT	TA	Total			
1.	BBC301	Object Oriented Programming in C++	3	1	0	20	10	30	70	100	4
2.	BBC302	Web Technology	3	1	0	20	10	30	70	100	4
3.	BBC303	Business Communication	3	0	0	20	10	30	70	100	3
4.	BBC304	Computer Organization	3	1	0	20	10	30	70	100	4
5.	BBC305	Universal Human Values and Professional Ethics	3	0	0	20	10	30	70	100	3
6.	BBC351	Object Oriented Programming in C++ Lab	0	0	3	30	20	50	50	100	2
7.	BBC352	Web Technology Lab	0	0	3	30	20	50	50	100	2
		Total	15	3	6			250	450	700	22

CT: Class Test **TA**: Teacher Assessment **L/T/P**: Lecture/ Tutorial/ Practical

SEMESTER-IV

S. No.	Subject Code	Subject Name	Periods			Sessional			ESE	Total	Credit
			L	T	P	CT	TA	Total			
1.	BBC401	Java Programming	3	1	0	20	10	30	70	100	4
2.	BBC402	DBMS	3	1	0	20	10	30	70	100	4
3.	BBC403	Operating Systems	3	1	0	20	10	30	70	100	4
4.	BBC404	Technical Communication	3	0	0	20	10	30	70	100	3
5.	BBC405	Indian Tradition, Culture And Society	3	0	0	20	10	30	70	100	3
6.	BBC451	Java Programming Lab	0	0	3	30	20	50	50	100	2
7.	BBC452	DBMS Lab	0	0	3	30	20	50	50	100	2
8.	BVA451	Sports and Yoga*	0	0	3		100	100			0
		Total	15	3	9					700	22

CT: Class Test **TA**: Teacher Assessment **L/T/P**: Lecture/ Tutorial/ Practical

**** Non-credit Course***

Note: ***The Startup and Entrepreneurial Activity Assessment will be done in the VI semester, under which a student will have to undergo a startup/entrepreneurship activity of at least 60 hours till the V semester.***

BCA

SECOND YEAR SYLLABUS

SEMESTER-III

BBC301: OBJECT ORIENTED PROGRAMMING IN C++		
Course Outcome (CO)		**Bloom's Knowledge Level (KL)**
At the end of course, the student will be able to		
CO 1	List the significance, key features and principles of object-oriented programming.	K2
CO 2	Analyze basic structural, behavioral and architectural models using object oriented software engineering approach.	K4
CO 3	Illustrate object-oriented modeling techniques for analysis.	K3
CO 4	Use the basic features of data abstraction and encapsulation, constructors, destructors in C++ programs.	K3
CO 5	Utilize templates and file handling mechanisms effectively.	K3
DETAILED SYLLABUS		**3-1-0**
Unit	**Topic**	**Proposed Lecture**
I	Introduction: Introducing Object – Oriented Approach, Relating to other paradigms (functional and data decomposition). Basic concepts: Class, Object, Abstraction, Encapsulation, Inheritance, Polymorphism, Review of C, Difference between C and C++, cin, cout, new, delete, operators.	**08**
II	Classes and Objects: Encapsulation, Information hiding, Abstract data types, Object & classes, Attributes, Methods, C++ class declaration, State identity and behavior of an object, Constructors and destructors, Instantiation of objects, Default parameter value, object types, C++ garbage collection, Dynamic memory allocation, Meta class / Abstract classes.	**08**
III	Inheritance and Polymorphism: Inheritance, Class hierarchy, Derivation – public, private & protected, Aggregation, composition vs classification hierarchies, Polymorphism, Categorization of polymorphism techniques, Method polymorphism, Polymorphism by parameter, Operator overloading, Parametric Polymorphism.	**08**
IV	Generic Programming: Introduction to Generic Programming, Class Templates, Class templates with multiple parameters, Template function, Function template with multiple parameters, Overloading of Template functions, Standard Template Library.	**08**
V	**Streams, Files and Exception Handling:** Overview of Stream Class Hierarchy, Streams classes, Stream Errors, Disk File I/O with streams, file pointers, Exception handling mechanism, Error handling in file I/O with member function, Multiple catch statements.	**08**

Suggested Readings:

1. Venugopal A.R., Rajkumar, Ravishanker T., "Mastering C++", TMH.
2. Lippman S.B. and Lajoie J., "C++ Primer", Addison Wesley.
3. Lafore R., "Object Oriented Programming using C++", Galgotia Publications.
4. Balagurusamy E., "Object Oriented Programming with C++", TMH
5. Salaria R.S., "Mastering Object-Oriented Programming with C++", Khanna Publishing House

6. Sehlidt H., "The Complete Reference C++", TMH.
7. Gottfried B. S., "Schaum's Outline of Programming with C++", TMH.
8. Stanley B. Lippman and Lajoie J., "C++ Primer", Pearson Education.
9. Stroustrup B., "The C++ Programming Language", Pearson Education.

BBC302: WEB TECHNOLOGY		
Course Outcome (CO)		**KL**
At the end of course, the student will be able to		
CO 1	Apply the knowledge of HTML and DHTML to develop web application.	K3
CO 2	Understand and apply the elements of Creating Style Sheet (CSS) , Bootstrap	K3
CO 3	Understand, analyze and apply the role of JavaScript in the workings of the web and web applications, Understand XML.	K3
CO 4	Apply and build dynamic web applications using servlet and JSP.	K3
CO 5	Develop Spring-based Java applications using Java configuration, annotation-based configuration, beans and their scopes, and properties, Develop web application using Spring Boot.	K3
DETAILED SYLLABUS		**3-1-0**
Unit	**Topic**	**Lecture**
I	**Web Page Designing:** Introduction and Web Development Strategies, History of Web and Internet, Protocols Governing Web, HTML-Introduction, HTML Tags, HTML-Grouping Using Div & Span, HTML-Lists, HTML-Images, HTML- Hyperlink, HTML Table, HTML- Iframe, HTML-Form, Dynamic HTML, Document Object Model, Features of DHTML, DHTML Events	**08**
II	**CSS:** Creating Style Sheet, CSS Properties , CSS Styling , Working with block elements and objects, Working with Lists and Tables , CSS Id and Class, Box Model(Introduction, Border properties, Padding Properties, Margin properties), CSS Advanced(Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector), Introduction to Bootstrap	**08**
III	**Java Script and XML:** Introduction to JavaScript, Creating Variables in JavaScript, Creating Functions in JavaScript, UI Events, Returning Data from Functions, Working with Conditions, looping in JavaScript, Block Scope Variables, Working with Objects, Creating Object using Object Literals, Manipulating DOM Elements with JavaScript , Introduction to XML, Defining XML tags	**08**
IV	**Web Application development using JSP & Servlets:** Servlet Overview and Architecture, Interface Servlet and the Servlet Life Cycle, Handling HTTP get Requests, Handling HTTP post Requests, Redirecting Requests to Other Resources, Session Tracking, Cookies, Session Tracking with Http Session. Java Server Pages (JSP) , Implicit Objects, Scripting, Standard Actions, Directives, Custom Tag Libraries	**08**
V	**Spring & Spring Boot:** Spring Core Basics-Spring Dependency Injection concepts, Introduction to Design patterns, Factory Design Pattern, Strategy Design pattern, Spring Inversion of Control, AOP, Bean Scopes Singleton, Prototype, Request, Session, Application, Spring Boot Configuration, Spring Boot Annotations, Spring Boot Actuator, Spring Boot Build Systems, Spring Boot Code Structures	**08**

Suggested Readings:

1. Burdman J., "Collaborative Web Development – Strategies and Best practices for Web Teams", Addison-Wesley.
2. Xavier C, "Web Technology & Design", New Age International Publishers.
3. Bayross I., "Web Technologies", BPB Publications.
4. Schieldth H., "The Complete Reference – HTML & CSS", McGraw Hill.
5. Bergsten H., "Java Server Pages", SPD O' Reilly.
6. Walls C., "Spring Boot in Action", Manning Publications.
7. Bakliwal S., "Hands-on Application Development using Spring Boot", BPB Publications

BBC303: BUSINESS COMMUNICATION		
	Course Outcome (CO)	**Bloom's Knowledge Level (KL)**
	At the end of course, the student will be able to	
CO 1	Understand business communication strategies and principles for effective communication in domestic and international business situations.	**K2**
CO 2	Understand and appropriately apply modes of expression, i.e., descriptive, expositive, narrative, scientific, and self-expressive, in written, visual, and oral communication.	**K3**
CO 3	Develop the ability to research and write a documented paper and/or to give an oral presentation.	**K3**
CO 4	Develop the ability to communicate via electronic mail, Internet, and other technologies for presenting business messages.	**K3**
CO 5	Understand and apply basic principles of critical thinking, problem solving, and technical proficiency in the development of exposition and argument.	**K3**
	DETAILED SYLLABUS	**3-0-0**
Unit	**Topic**	**Proposed Lecture**
I	**Basic Principles of Communication:** Introduction, Role of communication, defining and classifying communication, process of communication, importance of communication in management, communication in the workplace, barriers to communication.	**08**
II	**Oral Communication:** What is oral Communication, principles of successful oral communication, non – verbal communication, Written communication: –characteristics of verbal & non-verbal communication.	**08**
III	**Business Correspondence:** Business letter writing, reports, Parts of a report, Business Letter Layout-Full Block, Modified Block, Semi-Block Principles of Effective Letter Writing. Statement of purpose Job Application Letter and Resume, Paragraph writing.	**08**
IV	**Presentation Skill and Group Communication:** Principles of effective presentation; Making effective presentation; Listening skills; Group discussion, Interview preparation, conducting meeting, Drafting Notice, Agenda and resolution, Public Relations.	**08**
V	**Language and Writing Skills:** Letter of Complaints, Sales Letters, Adjustments letter, Consumer Grievance Letters. **Reports:** Layout, Types and parts of a report: Feasibility reports, Investigative reports,	**08**

Suggested Readings:

1. Chaturvedi P.D., "The Art and Science of Business Communication", Pearson.
2. Chhabra T. N., "Business Communication", Sun India Publications.
3. Bovee & Thill, "Business Communication Essentials A Skill–Based Approach to Vital Business", English Pearson.
4. Kumar K. & Salaria R.S., "Effective Communication Skills", Khanna Publishing House.
5. Bisen & Priya, "Business Communication", New Age International Publication.
6. Kalkar S. and Gupta S., "Business Communication" Orient Blackswan.
7. Bhatia V., "Business Communications", Khanna Publishing House.

BBC304: COMPUTER ORGANIZATION		
Course Outcome (CO)	**Bloom's Knowledge Level (KL)**	
At the end of course, the student will be able to		
CO 1	Describe functional units of digital system and explain how arithmetic and logical operations are performed by computers.	K_2
CO 2	Describe the operations of control unit and write sequence of instructions for carrying out simple operation.	K_2
CO 3	Describe various types of processor organization and addressing modes.	K_2
CO 4	Describe the various modes in which IO devices communicate with CPU and memory.	K_2
CO 5	Design various types of memory and its organization.	K_3
DETAILED SYLLABUS		**3-1-0**
Unit	**Topic**	**Proposed Lecture**
I	Register Transfer Language, Bus and Memory Transfers, Bus Architecture, Arithmetic Logic, Shift Microoperation, Arithmetic Logic Shift Unit, Design of Fast adders, Arithmetic Algorithms (addition, subtraction, Booth Multiplication).	**08**
II	**Control Design:** Hardwired & Micro Programmed (Control UNIT)-Fundamental Concepts (Register Transfers, performing of arithmetic or logical operations, fetching a word from memory, storing a word in memory), Execution of a complete instruction, Multiple-Bus organization, Hardwired Control, Micro programmed control(Microinstruction, Microprogram sequencing, Wide-Branch addressing, Microinstruction with Next-address field, Prefetching Microinstruction).	**08**
III	**Processor Design:** Processor Organization- General register organization, Stack organization, Addressing mode, Instruction format, Data transfer & manipulations, Program Control, Reduced Instruction Set Computer.	**08**
IV	**Input-Output Organization:** I/O Interface, Modes of transfer, Interrupts & Interrupt handling, Direct Memory access, Input-Output processor, Serial Communication.	**08**
V	**Memory Organization:** Memory Hierarchy, Main Memory (RAM and ROM Chips), Auxiliary memory, Cache memory, Virtual Memory, Memory management hardware.	**08**

Suggested Readings:

1. Mano M., "Computer System Architecture", Pearson.
2. Hamacher C., Vranesic Z. and Zaky S., "Computer Organization", Tata McGraw Hill.
3. Tanenbaum A. S., "Structured Computer Organization", Pearson Education.
4. Stallings W., "Computer Organization and Architecture", Pearson Education.
5. Hayes J. P., "Computer Architecture and Organization", McGraw Hill.

BBC305: UNIVERSAL HUMAN VALUES AND PROFESSIONAL ETHICS		
	Course Outcome (CO)	**Bloom's Knowledge Level (KL)**
	At the end of course, the student will be able to	
CO1	Understand the need, basic guidelines, content and process of value education.	K_2
CO2	Initiate a process of dialog with in themselves to know what they 'really want to be' in their life and profession.	K_2
CO3	Understand the meaning of happiness and prosperity for a human being.	K_2
CO4	Understand harmony at all the levels of human living, and live accordingly.	K_2
CO5	Understanding of harmony in existence in their profession and lead an ethical life.	K_2
	DETAILED SYLLABUS	**3-0-0**
Unit	**Topic**	**Proposed Lecture**
I	**Introduction:** Understanding the need, content and process for Value Education, Classification of Value Education: understanding personal values, social values, and moral values & spiritual values; Understanding the difference between ideology and values, Self-Exploration–content and process; Natural Acceptance; Understanding Harmony with self, Society and Nature, Meaning and nature of human values; Significance of human values in life; Relation between values and ethics.	**08**
II	**Understanding Harmony in the Human Being:** Understanding the relationship among: Self, Identity and Personality; Understanding human being as a co-existence of the 'I' and the 'Body', Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha, Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Swasthya.	**08**
III	**Understanding Harmony in the Family and Society:** Understanding Happiness and Prosperity - basic Human Aspirations, Right understanding, Relationship and Physical Facilities, Understanding harmony in the Family, Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*; foundational values of relationship, Understanding the meaning of *Vishwas*; Difference between intention and competence, Understanding the meaning of *Samman*, Difference between respect and differentiation; Understanding the harmony in the society (society being an extension of family): *Samadhan*, *Samridhi*, *Abhay*, *Sah-astitva* as comprehensive Human Goals, Visualizing a universal harmonious order in society- Undivided Society (*Akhand Samaj*), Universal Order (*Sarvabhaum Vyawastha*)- from family to world family.	**08**
IV	**Understanding Harmony in the Nature and Existence:** Nature; Characteristics and scope of professional ethics; Types of professional ethics; Understanding the harmony in the nature, and scope of professional ethics Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature, Understanding Existence as Co-existence (*Sah-astitva*) of mutually	**08**

	interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence.	
V	**Implications of Holistic Understanding of Harmony on Professional Ethics:** Value based Life and Profession; Issues in Professional Ethics – The Current Scenario; Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in Professional Ethics, Holistic Technologies, Production Systems and Management Models – Typical Case Studies, Strategies for Transition towards Value-based Life and Profession.	**08**

Suggested Readings:

1. Gaur R. R., Sangal R and Bagaria G.P., "A Foundation Course in Human Values and Professional Ethics", Excel Books.
2. Naarazan R.S., "A text book on Professional Ethics & Human Values", New Age.
3. Tripathi A. N., "Human Values", New Age.
4. Govindarajan, M., Natarajan, S. and Kumar S. V. S., "Professional Ethics and Human Values", PHI.
5. Kiran D. R.,"Professional Ethics and Human Values", McGraw Hill Education (India).
6. Dhar P. L., Gaur R.R., "Science and Humanism", Commonwealth Publishers.
7. Banerjee B. P., "Foundations of Ethics and Management", Excel Books.

BBC351: OBJECT ORIENTED PROGRAMMING IN C++ LAB		
Course Outcome (CO)		**KL**
At the end of course, the student will be able to		
CO 1	Use the Concept of Data Abstraction and Encapsulation in C++ programs.	K3
CO 2	Interpret C++ program using the concept such as polymorphism, virtual function, exception handling and template.	K3
CO 3	Apply object- o r i e n t e d techniques to analyze, design and develop a complete solution for a given problem.	K3

1. Write a program using functions.
2. Write a program using functions with default arguments.
3. Write a program to implement call by value, call by address, and call by reference.
4. Write a program to understand objects, member functions, and constructors.
5. Write a program using classes with primitive data members.
6. Write a program using classes with arrays as data members.
7. Write a program using classes with pointers as data members.
8. Write a program using classes with constant data members.
9. Write a program using classes with static member functions.
10. Write a program to demonstrate compile-time polymorphism.
11. Write a program to demonstrate operator overloading.
12. Write a program to demonstrate function overloading.
13. Write a program to demonstrate run-time polymorphism.
14. Write a program to implement inheritance.
15. Write a program to demonstrate virtual functions.
16. Write a program using virtual base classes.
17. Write a program using templates.
18. Write a program for file handling.
19. Write a program to perform sequential file access.
20. Write a program to perform random file access.

Note: The instructor may add/delete/modify experiments, wherever he/she feels in a justified manner.

BBC352: WEB TECHNOLOGY LAB		
Course Outcome (CO)		**Bloom's Knowledge Level (KL)**
At the end of course, the student will be able to		
CO 1	Design web pages using HTML, DHTML.	K5
CO 2	Design web pages using Cascading Styles sheets.	K5
CO 3	Develop dynamic web pages using JavaScript.	K5
CO 4	Develop an interactive web applications using JSP.	K5
CO 5	Create web applications using Spring & Spring Boot.	K5

DETAILED SYLLABUS

1. Create a simple webpage using HTML
2. Create a HTML page, which has properly aligned paragraphs with image along with it.
3. Write a program to display list of items in different styles.
4. Use frames to Include Images and Videos.
5. Design a website with different methods of embedding CSS in a web page.
6. Add a Cascading Style sheet for designing the web page.
7. Write programs using Java script for Web Page to display browsers information.
8. Design a dynamic web page with validation using JavaScript.
9. Write a program using JavaScript to demonstrate the concept of built-in array methods.
10. Write a program using JavaScript to demonstrate the concept of nested functions.
11. Write programs using JavaScript for Web Page to display browsers information.
12. Write a program using JavaScript to merge property of two objects.
13. Write a program using JavaScript to include a JS file into another JS file.
14. Develop a Servlet to validate user name and password stored in database. Display authorized user is she/he is Authorized else display unauthorized user.
15. Write JSP & Servlet program to store student details sent from registration form in to database table.
16. Write appropriate JSP pages to insert, update and delete data in student table in a single application with proper Linking of JSP pages and session management.
17. Write a java program/servlet application to connect to a database and extract data from the table containing Employee's information and display them.
18. Write program to demonstrate the concept of spring and spring boot.

Note: The instructor may add/delete/modify experiments, wherever he/she feels in a justified manner.

BCA

SECOND YEAR SYLLABUS

SEMESTER-IV

BBC401: JAVA PROGRAMMING		
Course Outcome (CO**)**	**Bloom's Knowledge Level (KL)**	
At the end of course, the student will be able to		
CO1	List the significance, key features, and principles of Object-Oriented Programming in Java.	K_1
CO2	Analyze basic structural, behavioral, and architectural models using object-oriented software engineering in Java.	K_4
CO3	Illustrate object-oriented modeling techniques and build GUI/web-based applications using Java APIs.	K_3
CO4	Use the core Java features like abstraction, encapsulation, constructors, and garbage collection in Java programs.	K_3
CO5	Utilize Java generics and file handling mechanisms effectively for modular programming.	K_3
DETAILED SYLLABUS		**3-1-0**
Unit	**Topic**	**Proposed Lecture**
I	**Introduction:** History of Java, Characteristics of Java, The Java Environment, Java Source File Structure and Compilation. Fundamental Programming Structures in Java: Data type, Variables, Comments, Operators, Methods & Classes, Constructors, Arrays, Control Statements, Access specifies.	**08**
II	**Inheritance, Interfaces, and Packages:** OOP in Java, Inheritance and its types, super and this keyword, final and static keyword, method overloading and overriding, abstract classes and methods. Defining an interface, implement interfaces, accessing implementations through interface references, extending interface. **Packages**- Defining, creating and accessing a package, importing packages.	**08**
III	**Exception handling & File I/O:** Define Exception, advantages of exception handling, Exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, creating own exception. Introduction to file I/O(Input/Output).	**08**
IV	Java Awt & Swing: Differences Swing and AWT, Creating a Swing Applet and Application, Programming using Panes, Labels, Text fields, Buttons, Scroll Bars, Lists, Combo box, Progress Bar, Menus and Toolbars, Layouts, Windows, Dialog Boxes, Inner frame. JDBC: Introduction to JDBC, Java.sql package, Introduction to MySQL Database, Server and connectivity to remote database.	**08**
V	**Java Servlets:** Servlet basics, Servlet API basic, Life cycle of a Servlet, Running Servlet, Debugging Servlets, Thread-safe Servlets, HTTP Redirects, Cookies, Introduction to Java Server pages (JSP).	**08**

Suggested Readings:

1. Radha Krishna P., "Object Oriented Programming through Java", Universities Press.
2. Eckel B., "Thinking in Java", Prentice Hall.
3. Malhotra S. and Choudhary S., "Programming in Java", Oxford University Press.
4. Schildt H., "Java: The Complete Reference", McGraw Hill.
5. Horstmann C.S., "Core Java Volume I – Fundamentals", Pearson Education.
6. Basham B., Sierra K. and Bates B., "Head First Servlets and JSP", O'Reilly Media.
7. Balagurusamy E., "Programming with Java: A Primer", McGraw-Hill Education.

BBC402: DATABASE MANAGEMENT SYSTEMS		
Course Outcome (CO)		**Bloom's Knowledge Level (KL)**
At the end of course, the student will be able to understand:		
CO 1	The features of a database system and its representation through data models.	K_1
CO 2	Understanding of ER Model and basis of database constraints.	K_5
CO 3	Formulate solution to a query problem using SQL Commands, relational algebra, tuple calculus and domain calculus.	K_5, K_6
CO 4	Understanding of normalization, a given relation to the desired normal form.	K_2, K_3
CO 5	Understanding of transaction processing and concurrency control process.	K_2
DETAILED SYLLABUS		**3-1-0**
Unit	**Topic**	**Proposed Lecture**
I	**Introduction:** Overview, Database System vs File System, Database System Concept and Architecture, Data Model Schema and Instances, Data Independence and Database Language and Interfaces, Data Definitions Language, DML, Overall Database Structure. Data Modeling Using the Entity Relationship Model: ER Model Concepts, Notation for ER Diagram, Mapping Constraints, Keys, Concepts of Super Key, Candidate Key, Primary Key, Generalization, Aggregation, Reduction of an ER Diagrams to Tables, Extended ER Model, Relationship of Higher Degree.	**08**
II	**Relational data Model and Language:** Relational Data Model Concepts, Integrity Constraints, Entity Integrity, Referential Integrity, Keys Constraints, Domain Constraints, Relational Algebra, Relational Calculus, Tuple and Domain Calculus. Introduction to SQL: Characteristics of SQL, Advantage of SQL. SQL Data Type and Literals. Types of SQL Commands. SQL Operators and their Procedure. Tables, Views and Indexes. Queries and Sub Queries. Aggregate Functions. Insert, Update and Delete Operations, Joins, Unions, Intersection, Minus, Cursors, Triggers, Procedures in SQL/PL SQL	**08**
III	**Data Base Design & Normalization:** Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependence, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.	**08**
IV	**Transaction Processing Concept:** Transaction System, Testing of Serializability, Serializability of Schedules, Conflict & View Serializable Schedule, Recoverability, Recovery from Transaction Failures, Log Based Recovery, Checkpoints, Deadlock Handling. Distributed Database: Distributed Data Storage, Concurrency Control, Directory System	**08**
V	**Concurrency Control Techniques:** Concurrency Control, Locking Techniques for Concurrency Control, Time Stamping Protocols for Concurrency Control, Validation Based Protocol, Multiple Granularity, Multi Version Schemes, Recovery with Concurrent Transaction, Case Study of Oracle.	**08**

Suggested Readings:

1. Silbertschatz A., Korth H. and Sudarshan S., "Database Concepts", McGraw Hill.
2. Date C. J., "An Introduction to Database Systems", Addision Wesley.
3. Elmasri R. and Navathe S., "Fundamentals of Database Systems", Pearson Education.
4. O'Neil P., "Databases", Elsevier Publications.
5. Ramakrishnan R. and Gehrke J., "Database Management Systems", McGraw Hill.
6. Leon A. and Leon M., "Database Management Systems", Vikas Publishing House.
7. Desai B.C., "An Introduction to Database Systems", Galgotia Publications.
8. Majumdar A. K. and Bhattacharya P., "Database Management System", Tata McGraw Hill.

BBC403: OPERATING SYSTEMS		
Course Outcome (CO**)**	**Bloom's Knowledge Level (KL)**	
At the end of course, the student will be able to		
CO 1	Explain main components, services, types and structure of operating systems.	K_2
CO 2	Apply the various algorithms and techniques to handle the various concurrency control issues.	K_3
CO 3	Compare and apply various CPU scheduling algorithms for process execution.	K_2
CO 4	Identify occurrence of deadlock and describe ways to handle it.	K_3
CO 5	Explain and apply various memory, I/O and disk management techniques.	K_5
DETAILED SYLLABUS		**3-1-0**

Unit	Topic	Proposed Lecture
I	**Introduction**: Operating System Structure- Layered structure, System Components, Operating system functions, Classification of Operating systems- Batch, Interactive, Time-sharing, Real-Time System, Multiprocessor Systems, Multiuser Systems, Multi process Systems, Multithreaded Systems, Operating System services, Reentrant Kernels, Monolithic and Microkernel Systems.	**08**
II	**Concurrent Processes**: Process Concept, Principle of Concurrency, Producer / Consumer Problem, Mutual Exclusion, Critical Section Problem, Dekker's solution, Peterson's solution, Semaphores, Test and Set operation, Classical Problem in Concurrency- Dining Philosopher Problem, Sleeping Barber Problem, Inter Process Communication models and Schemes, Process generation.	**08**
III	**CPU Scheduling:** Scheduling Concepts, Performance Criteria, Process States, Process Transition Diagram, Schedulers, Process Control Block (PCB), Process address space, Process identification information, Threads and their management, Scheduling Algorithms, Multiprocessor Scheduling. Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock.	**08**
IV	**Memory Management:** Basic bare machine, Resident monitor, Multiprogramming with fixed partitions, Multiprogramming with variable partitions, Protection schemes, Paging, Segmentation, Paged segmentation, Virtual memory concepts, Demand paging, Performance of demand paging, Page replacement algorithms, Thrashing, Cache memory organization, Locality of reference.	**08**
V	**I/O Management and Disk Scheduling**: I/O devices, and I/O subsystems, I/O buffering, Disks to rage and disk scheduling, RAID. File System: File concept, File organization and access mechanism, File directories, and File sharing, File system implementation issues, File System protection and security.	**08**

Suggested Readings:

1. Silberschatz A., Galvin P.B. and Gagne G., "Operating Systems Concepts", Wiley Publication
2. Halder S. and Arvind A. A "Operating Systems", Pearson Education.
3. Dietel H.M, "An Introduction to Operating System", Pearson Education.
4. Stallings W., "Operating Systems: Internals and Design Principles", Pearson Education.
5. Harris J.A., "Operating Systems (Schaum's Outlines)", McGraw Hill Education.

BBC404: TECHNICAL COMMUNICATION		
Course Outcome (CO)	**Bloom's Knowledge Level (KL)**	
At the end of course, the student will be able to		
CO 1	Understand the nature and remember the objectives of Technical Communication relevant for the work place as a software Engineers.	K_1, K_2
CO 2	Analyze and understand the key concepts of writing, designing and speaking.	K_2, K_4
CO 3	Utilize the technical writing skills for the purposes of Technical Communication and its exposure in various dimensions.	K_3

CO 4	Buildup interpersonal communication traits that will make the transition from institution to workplace smoother and help them to excel in their jobs.	K_4, K_6
CO 5	Evaluate and apply technical communication to build their personal brand and handle crisis communication.	K_3, K_5
DETAILED SYLLABUS		**3-0-0**
Unit	**Topic**	**Proposed Lecture**
I	**Fundamentals of Communication and Voice Dynamics:** Role and Purpose of Technical Communication, Types & Flow of Communication, Barriers to Effective Communication, 7 C's of Communication, Code and Content; Stimulus & Response, Vowel Sounds, Consonant Sounds, Tone: Rising and Falling Tone.	**08**
II	**Communication Skills for Career Building:** CV and Résumé Writing, Interview Skills, Group Discussion, Effective Profiling, Communication and Networking: Building relationships, Writing the Statement of Purpose (SOP) for admission in Higher Studies, Seminar & Conference Paper Writing, Expert Technical Lecture: Writing and Presenting.	**08**
III	**Communication Skills for Presentation: Writing, Designing, and Speaking:** Thesis and Project Report Writing, Technical Proposal Writing, How to Pitch an Idea: Process, Preparation and Structure, Elements of Speech Delivery: Passion, Poise & Illustrations.	**08**
IV	**Communication and Leadership Development:** Leadership Communication, Communication and Social competence: context, feelings, intentions, behaviors, Providing and Receiving feedback, Difference between Tact and Intelligence, Emotional Intelligence: Trust through Communication, Thinking Skills: Meaning and Types.	**08**
V	**Digital Communication and Personality Making:** Content Creation for Social Media: Emails, Webinars, podcasts, Blogs. Effective and Ethical use of Social Media by Text and Technique, Speech and Personality, Personality Analysis: Types of Personality; Concept of Personality: Maslow, Freud, Vivekananda, Jung Typology &Personality Assessment.	**08**

Suggested Readings:

1. Raman M. & Sharma S., "Technical Communication – Principles and Practices", Oxford Univ. Press.
2. Mitra B. K., "Personality Development and Soft Skills", Oxford Univ. Press.
3. Pfeiffer, "Technical Communication", Pearson.
4. Pillai S. and Fernandez A., "Soft Skills & Employability", Cambridge University Press.
5. Pandey L. U. B., "Practical Communication: Process and Practice", A.I.T.B.S. Publications India Ltd.
6. M. Ashraf Rizvi, "Effective Technical Communication", McGraw Hill Education India Pvt. Ltd.

BBC405: INDIAN TRADITION, CULTURE AND SOCIETY		
Course Outcome (CO)		**Bloom's Knowledge Level (KL)**
At the end of course, the student will be able to understand		
CO 1	Students will be able explain society, state and polity in India in traditional and modern context.	K_2, K_3
CO 2	Students will be acquaint with essence of Indian Literature, Culture, Tradition and Practices.	K_2
CO 3	Students will be able to visualize the root of Indian Religion, Philosophy and Practices.	K_3, K_4
CO 4	Students will be able to understand Science, Management and Indian Knowledge System.	K_1, K_2
CO 5	Students will connect up and explain Cultural Heritage of India and root of Performing Arts.	K_2, K_3
DETAILED SYLLABUS		**3-0-0**
Unit	**Topic**	**Proposed Lecture**
I	**Module 1- Society State and Polity in India** State in Ancient India: Evolutionary Theory, Force Theory, Mystical Theory Contract Theory, Stages of State Formation in Ancient India, Kingship , Council of Ministers Administration Political Ideals in Ancient India Conditions' of the Welfare of Societies, The Seven Limbs of the State, Society in Ancient India, Purusārtha, Varnāshrama System, Āshrama or the Stages of Life, Marriage, Understanding Gender as a social category, The representation of Women in Historical traditions, Challenges faced by Women. Four-class Classification, Slavery.	**08**
II	**Module 2- Indian Literature, Culture, Tradition, and Practices** Evolution of script and languages in India: Harappan Script and Brahmi Script. The Vedas, the Upanishads, the Ramayana and the Mahabharata, Puranas, Buddhist And Jain Literature in Pali, Prakrit And Sanskrit, Kautilya's Arthashastra, Famous Sanskrit Authors, Telugu Literature, Kannada Literature, Malayalam Literature, Sangama Literature Northern Indian Languages & Literature, Persian and Urdu , Hindi Literature.	**08**
III	**Module 3- Indian Religion, Philosophy, and Practices** Pre-Vedic and Vedic Religion, Buddhism, Jainism, Six System Indian Philosophy, Shankaracharya, Various Philosophical Doctrines, Other Heterodox Sects, Bhakti Movement, Sufi movement, Socio religious reform movement of 19th century, Modern religious practices.	**08**
IV	**Module 4- Science, Management and Indian Knowledge System** Astronomy in India, Chemistry in India, Mathematics in India, Physics in India, Agriculture in India, Medicine in India, Metallurgy in India, Geography, Biology, Harappan Technologies, Water Management in India, Textile Technology in India, Writing Technology in India, Pyrotechnics in India Trade in Ancient India/, India's Dominance up to Pre-colonial Times.	**08**

V	**Module 5- Cultural Heritage and Performing Arts Indian Architect** Engineering and Architecture in Ancient India, Sculptures, Seals, coins, Pottery, Puppetry, Dance, Music, Theatre, drama, Painting, Martial Arts Traditions, Fairs and Festivals, Current developments in Arts and Cultural, Indian's Cultural Contribution to the World. Indian Cinema.	**08**

Suggested Readings:

1. Sivaramakrishna V., "Cultural Heritage of India-Course Material", Bharatiya Vidya Bhavan, Mumbai.
2. Baliyan S., "Indian Art and Culture", Oxford University Press, India.
3. Jitatmanand S., "Modern Physics and Vedant", Bharatiya Vidya Bhavan.
4. Thapar R., "Readings In Early Indian History", Oxford University Press, India.
5. Fritz of Capra, Tao of Physics.
6. Fritz of Capra, The wave of Life.
7. Jha V. N., "Tarkasangraha of Annam Bhatta", International Chinmay Foundation, Velliarnad, Amakuam (English Translation).
8. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkatta.
9. Jha G. N. and Jha R. N., "Yoga-darshanam with Vyasa Bhashya", Vidyanidhi Prakasham.
10. Jha R. N., "Science of Consciousness Psychotherapy and Yoga Practices", Vidyanidhi Prakasham, Delhi.
11. Sharma P. R., Shodashang Hridayam (English Translation).
12. Basham A. L., "The Wonder that was India", Rupa & Co., New Delhi.
13. Sharma R. S., "Aspects of Political Ideas and Institutions in Ancient India", Motilal Banarsidass.

BBC451: JAVA PROGRAMMING LAB		
Course Outcome (CO)		**Bloom's Knowledge Level (KL)**
At the end of course, the student will be able to		
CO 1	Understand basic syntax and core Java concepts like input/output, strings, and command-line arguments.	K_2
CO 2	Apply Object-Oriented Programming concepts like inheritance, encapsulation, file handling.	K_3, K_4
CO 3	Illustrate GUI applications and use Java APIs like AWT/Swing with JDBC.	K_3

LIST OF PROGRAMS:

1. Write a program to find the number of arguments provided at runtime.
2. Write a program to calculate the simple interest by entering input by the user.
3. Write a program to create a simple class to find out the area and perimeter of rectangle and box using super and this keyword.
4. Write a program to design a class account using the inheritance and static that show all function of bank (withdrawal, deposit).
5. Write a program to design a string class that performs String method (equal, reverse the string, change case).
6. Write a program that import the user define package and access the member variable of classes that contained by package.
7. Write a program to create a class component that shows controls and event handling on controls (Math calc)
8. Write a program to draw a line, rectangle, oval using the graphics method.
9. Write a program to create a Menu using the frame.
10. Write a program to implement the Grid Layout and Card Layout.
11. Write a program to create Frame to display the student information.
12. Write a program to process student information and marks sheet using method overloading.
13. Write a program to create an employee class and calculate the Gross salary of employee using inheritance.
14. Write a program to illustrate the inheritance and use of the Super key word.
15. Write a program to create a new txt file in the disk.
16. Write a program to read string data from the File.
17. Write a program to read data from the File.
18. Write a program to create a Notepad using Swing.
19. Write a program to create a calculator.
20. Write a program to maintain student database using JDBC.

Note: The instructor may add/delete/modify experiments, wherever he/she feels in a justified manner.

BBC452: DATABASE MANAGEMENT SYSTEMS LAB		
Course Outcome (CO)		**Bloom's Knowledge Level (KL)**
At the end of course, the student will be able to		
CO 1	Write SQL commands for DDL, DML and DCL.	K_5
CO 2	Write SQL commands to query a database.	K_3

CO3	Write PL/SQL programs for implementing stored procedures, stored functions, cursors, trigger and packages.	K_4

LIST OF PRACTICALS

1. Install oracle/ MYSQL.
2. Create Entity-Relationship Diagram using case tools.
3. Write SQL statements Using ORACLE /MYSQL:
    a) Write basic SQL SELECT statements.
    b) Restrict and sort data.
    c) Display data from multiple tables.
    d) Aggregate data using group function.
    e) Manipulate data.
    f) Create and manage tables.
4. Create cursor.
5. Create procedure and functions.
6. Create packages and triggers.
7. Design and implement any one:
    a) Payroll Processing System.
    b) Library Information System.
    c) Student Information System.

Note: The instructor may add/delete/modify experiments, wherever he/she feels in a justified manner.

BVA451: Sports and Yoga-II

Objective of the Course:

- To maintain their mental and physical wellness upright and develop ability in them to cope up with the stress arising in the life.
- To create space in the curriculum to nurture the potential of the students in sports/games/yoga etc.
- To take forward the previous course on the topic to next advance level in terms of practice and specialization.

Syllabus/ Guidelines

Part A: Sports/Games

Some form of Athletics would be compulsory for all students, unless restricted due to medical / physical reasons.

In addition to this, a student has to opt for **at least one Sport/Game** out of the remaining mentioned below. The chosen game may be same which was taken up by the students in previous year of study or may change the option.

A fair theoretical knowledge and a reasonable amount of field / site practice of the chosen games will be essential.

1. Athletics **Compulsory**
2. Volleyball
3. Basketball
4. Handball
5. Football
6. Badminton
7. Kabaddi
8. Kho-kho
9. Table tennis
10. Cricket

Part B: Yoga

- **Yogic postures**: Prone and Balancing
- **Pranayama:** Breath awareness, Sectional breathing, Nadishuddhi, Bhastrika, Ujjai, Cooling pranayama (Shitali, Shitkari), Bhramari, Udgit Pranayama (with Antar & Bahya Kumbhaka)
- **Practices leading to Meditation:** Pranav and SohamJapa, Yoga Nidra (1,2,3), Antarmauna, AjapaDharana (Stage 1,2,3), Practices leading to Breath Meditation, Practices leading to Om Meditation, Practices leading to Vipassana Meditation, Transcedental Meditation

General Guidelines

1. Institutes must assign minimum of three periods in the Time Table for the activities of Sports/Yoga.
2. Institutes must provide field/facility and offer the minimum of five choices of as many as Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.
4. Student must be made familiar with the terminologies, rules/regulations, dimension/ marking of the play field/area and general knowledge of national/ international level facts/figures related to the chosen game.

Assessment:

The Institute must assign coordinator/ subject teacher for the subject for every batch/group of the students who would be responsible for coordinating the required activities and keep watch on the level of student's participation in the chosen game.

Coordinator/mentor would be responsible for award of the sessional marks based upon following components.

1. Level of understanding and general awareness (20 %)
2. Involvements in the Practice Sessions (50 %)
3. Regularity, Sincerity and Discipline (20 %)
4. Participation in University level / District level / State level / National Level events (10 %)