VEER BAHADUR SINGH PURVANCHAL UNIVERSITY
JAUNPUR, UTTAR PRADESH

Syllabus & Evaluation Scheme

For

Integrated MCA
(5 Years Course)

1st & 2nd Year Syllabus

(Effective from the Session: 2025 - 26)

Integrated MCA First Year Evaluation Scheme, 2024-25

SEMESTER-I

S. No.	Subject Code	Subject Name	Periods			Sessional			ESE	Total	Credit
			L	T	P	CT	TA	Total			
1.	**BMI101**	**Fundamentals of Computer**	3	1	0	20	10	30	70	100	4
2.	**BMI102**	**Mathematical Foundation**	3	1	0	20	10	30	70	100	4
3.	**BMI103**	**Problem Solving Using C**	3	1	0	20	10	30	70	100	4
4.	**BMI104**	**Communication Skills**	3	0	0	20	10	30	70	100	3
5.	**BMI105**	**Environment and Ecology**	3	0	0	20	10	30	70	100	3
6.	**BMI151**	**Problem Solving Using C Lab**	0	0	3	30	20	50	50	100	2
7.	**BMI152**	**Communication Skills 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-II

S. No.	Subject Code	Subject Name	Periods			Sessional			ESE	Total	Credit
			L	T	P	CT	TA	Total			
1.	**BMI201**	**Digital Electronics**	3	1	0	20	10	30	70	100	4
2.	**BMI202**	**Discrete Mathematics**	3	1	0	20	10	30	70	100	4
3.	**BMI203**	**Data Structure**	3	1	0	20	10	30	70	100	4
4.	**BMI204**	**Professional Communication**	3	0	0	20	10	30	70	100	3
5.	**BMI205**	**Information Systems**	3	0	0	20	10	30	70	100	3
6.	**BMI251**	**Data Structure Lab**	0	0	3	30	20	50	50	100	2
7.	**BMI252**	**Professional Communication Lab**	0	0	3	30	20	50	50	100	2
8.	**BVA251**	**Sports and Yoga***	0	0	3		100				0
		Total	15	3	9			**250**	**450**	**700**	**22**

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

*** Non-credit Course**

MCA (Integrated) 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.	BMI301	Object Oriented Programming in C++	3	1	0	20	10	30	70	100	4
2.	BMI302	Web Technology	3	1	0	20	10	30	70	100	4
3.	BMI303	Business Communication	3	1	0	20	10	30	70	100	4
4.	BMI304	Computer Organization	3	0	0	20	10	30	70	100	3
5.	BMI305	Universal Human Values and Professional Ethics	3	0	0	20	10	30	70	100	3
6.	BMI351	Object Oriented Programming in C++ Lab	0	0	3	30	20	50	50	100	2
7.	BMI352	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.	BMI401	Java Programming	3	1	0	20	10	30	70	100	4
2.	BMI402	DBMS	3	1	0	20	10	30	70	100	4
3.	BMI403	Operating Systems	3	1	0	20	10	30	70	100	4
4.	BMI404	Technical Communication	3	0	0	20	10	30	70	100	3
5.	BMI405	Indian Tradition, Culture And Society	3	0	0	20	10	30	70	100	3
6.	BMI451	Java Programming Lab	0	0	3	30	20	50	50	100	2
7.	BMI452	DBMS Lab	0	0	3	30	20	50	50	100	2
8.	BVA451	Sports and Yoga*	0	0	3		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.

FIRST YEAR SYLLABUS

SEMESTER-I

BMI101: FUNDAMENTALS OF COMPUTER

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course, the student will be able to understand		
CO 1	Understand the basics of computer system and its functional units.	K_1, K_2
CO 2	Examine memory hierarchy, cache memory and CPU memory interaction.	K_2
CO 3	Analyze different number systems and apply computer arithmetic.	K_3, K_4
CO 4	Understand the concepts of operating systems and computer networks.	K_2
CO 5	Understand the basics of internet and multimedia.	K_1, K_2

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	**Computer:** Introduction, Characteristics, Limitations, Generations and Classification. **Hardware:** Introduction, Input devices - keyboard, MICR, OMR, bar code reader etc., Output devices -visual display unit, printers, plotters etc. **Software:** Introduction, Types – system and application.	08
II	**Memory Unit:** Introduction, Hierarchy, Primary Memory, Secondary memory, Cache memory, Virtual memory. **Secondary Storage Devices:** Introduction, Magnetic disk, Magnetic tape, Optical disks, Flash memory etc. **Computer Languages:** Introduction, Compiler, Interpreter and Assembler.	08
III	**Computer Codes:** Introduction, Binary, Decimal, Octal, Hexadecimal, 4-bit BCD, 8-bit BCD, ASCII codes. **Conversion of Numbers:** Binary to decimal, Decimal to binary, Binary to octal, Octal to binary, Binary to hexadecimal, etc. **Binary Arithmetic:** Addition, Subtraction, Multiplication, Division. Complements of binary numbers.	08
IV	**Operating System:** Definition, Functions, Types, Classification, Introduction of command based and GUI based operating system. **Windows Operating System:** Introduction, Elements, Use of menus, Tools and Commands. **Computer Networks-** Introduction, Types - LAN, WAN and MAN, Topologies, Data communication.	08
V	**Internet:** Overview, Architecture, History, Functioning, Applications. **Basic Services of Internet:** WWW, Email, FTP, Telnet, Gopher, Search engines, News group, Chat rooms, etc. **Multimedia**: Overview, Components, Software tools, Applications, Transition from conventional media to digital media.	08

Suggested Readings:

1. Sinha P.K. and Sinha P., "Computer Fundamentals", BPB Publications.
2. Balagurusamy E., "Fundamentals of Computers", Tata McGraw Hill.
3. Rajaraman V., "Fundamentals of Computers", PHI.

4. Leon A. and Leon M., "Introduction to Computers", Vikas Publishing House.
5. Norton P., "Introduction to Computers", McGraw Hill Education.
6. Goel A., "Computer Fundamentals", Pearson.
7. Li Z.N. and Drew M.S., "Fundamentals of Multimedia", Pearson Education.

BMI102: MATHEMATICAL FOUNDATION		
Course Outcome (CO)		**Bloom's Knowledge Level (KL)**
At the end of course , the student will be able to understand		
CO 1	Describe and interpret the concept of determinants and matrices.	K_2, K_3
CO 2	Understand the concept of linear equations.	K_2
CO 3	Describe differentiation and its uses.	K_3, K_4
CO 4	Understand the concepts of differential equation, integration and their uses.	K_3, K_4
CO 5	Develop an understanding on concepts of Laplace Transform and Graph theory.	K_1, K_2

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	**Determinants**: Definition, Minors, Cofactors, Properties of Determinants. **Matrices:** Definition, Types of Matrices, Operations on Matrices, Algebra of Matrices, Determinant of a Square Matrix, Elementary transformations, Inverse of a Square Matrix, Rank of a Matrix, , Row - reduced Echelon form, Gaussian/Gauss-Jordan elimination.	**08**
II	**Linear Algebraic system:** Linear dependence and Independence of vectors, Definition of a Vector in 2 and 3 Dimensions. Consistency of linear system of equations and their solution, Characteristic equation, Eigenvalues Eigenvectors Cayley-Hamilton Theorem, Rank & Nullity. Linear transformations.	**08**
III	**Differential Calculus:** Differentiation and derivatives: Derivative, Basic laws of derivative, Successive differentiation (Chain rule), Leibnitz's Theorem, Partial derivatives, Euler's theorem for homogeneous functions, Jacobian.	**08**
IV	**Differential Equations:** Linear differential equations of n^{th} order with constant coefficients, Complementary functions and particular integrals. **Integral Calculus:** Integral, Integration by parts, Beta and Gamma functions: definition and properties.	**08**
V	**Laplace Transform:** Laplace transform, Existence theorem, Laplace transform of derivatives and integrals. First shifting and second shifting theorems, Unit Step function, Convolution theorem. **Introduction to Graph Theory:** Graphs, Paths, Cycles, Euler and Hamilton graphs, Connectivity, Adjacency matrix, Incidence Matrix. Planar graphs.	**08**

Suggested Readings:

1. Strang G., "Calculus", Wellesley-Cambridge Press.
2. Apostol T.M., "Calculus, Volume 1: One-Variable Calculus with an Introduction to Linear Algebra", Wiley India.
3. Jain M.K. and Iyengar S.R.K., "Computational methods for Partial

Differential Equations", New Age International Publishers.
4. Sharma G.C. and Sharma I.J.S., "Engineering Mathematics", CBS Publishers.
5. Dhami H.S., "Differential Calculus", New Age International Publishers.
6. Dass H.K. and Verma R., "Introduction to Engineering Mathematics- Volume I", S. Chand Publishing.
7. Dass H.K and Verma R., "Introduction to Engineering Mathematics- Volume II", S. Chand Publishing.
8. Bali N.P. and Goyal M., "A Textbook of Engineering Mathematics Semester I", University Science Press.
9. Bali N.P. and Goyal M., "A Textbook of Engineering Mathematics Semester II", University Science Press.

BMI103: PROBLEM SOLVING USING C		
Course Outcome (CO)		**Bloom's Knowledge Level (KL)**
At the end of course , the student will be able to understand		
CO 1	Describe the functional components and fundamental concepts of a digital computer system including number systems.	K_1, K_2
CO 2	Construct flowchart and write algorithms for solving basic problems.	K_2, K_3
CO 3	Write 'C' programs that incorporate use of variables, operators and expressions along with data types.	K_2, K_3
CO 4	Write simple programs using the basic elements like control statements, functions, arrays and strings.	K_2, K_3
CO 5	Write advanced programs using the concepts of pointers, structures, unions and enumerated data types.	K_2, K_3
CO 6	Apply pre-processor directives and basic file handling and graphics operations in advanced programming.	K_2, K_3
DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	**Basics of programming:** Approaches to problem solving, Use of high level programming language for systematic development of programs, Concept of algorithm and flowchart, Concept and role of structured programming. **Basics of C**: History of C, Salient features of C, Structure of C Program, Compiling C Program, Link and Run C Program, Character set, Tokens, Keywords, Identifiers, Constants, Variables, Instructions, Data types, Standard Input/Output, Operators and expressions.	**08**
II	**Conditional Program Execution:** if, if-else, and nested if-else statements, Switch statements, **Restrictions on switch values,** Use of break and default with switch, Comparison of switch and if-else. **Loops and Iteration:** for, while and do-while loops, Multiple loop variables, Nested loops, Assignment operators, break and continue statement. **Functions:** Introduction, Types, Declaration of a Function, Function calls, Defining functions, Function Prototypes, Passing arguments to a function Return values and their types, Writing multifunction program, Calling function by value, Recursive functions.	08
III	**Arrays:** Array notation and representation, Declaring one-dimensional array, Initializing arrays, Accessing array elements, Manipulating array elements, Arrays of unknown or varying size, Two-dimensional arrays,	**08**

	Multidimensional arrays. **Pointers:** Introduction, Characteristics, * and & operators, Pointer type declaration and assignment, Pointer arithmetic, Call by reference, Passing pointers to functions, arrayof pointers, Pointers to functions, Pointer to pointer, Array of pointers. **Strings:** Introduction, Initializing strings, Accessing string elements, Array of strings, Passing strings to functions, String functions.	
IV	**Structure:** Introduction, Initializing, defining and declaring structure, Accessing members, Operations on individual members, Operations on structures, Structure within structure, Array of structure, Pointers to structure. **Union:** Introduction, Declaring union, Usage of unions, Operations on union. Enumerated data types **Storage classes**: Introduction, Types- automatic, register, static and external.	**08**
V	**Searching and Sorting:** Introduction to searching and sorting, Linear search, Binary search, Selection sort, Bubble sort. **Dynamic Memory Allocation**: Introduction, Library functions – malloc, calloc, realloc and free. **File Handling:** Basics, File types, File operations, File pointer, File opening modes, File handling functions, File handling through command line argument, Record I/O in files.	**08**

Suggested Readings:

1. Kanetkar Y., "Let us C", BPB Publications.
2. Balagurusamy E., "Programming with ANSI-C", Tata McGraw Hill.
3. Hanly J.R. and Koffman E.B., "Problem Solving and Program Design in C", Pearson Education.
4. Gottfried B.S., "Programming with C Language, Schaum Series, Tata McGraw Hill.
5. Goyal K. K. and Pandey H.M., Trouble Free C", University Science Press.
6. Kernighan and Richie, "C Programming", Prentice Hall of India.
7. Forouzan B.A. and Gilberg R.F., "A Structured Programming Approach Using C, Cengage Learning.
8. Goyal K. K., Sharma M. K. and Thapliyal M. P. "Concept of Computer and C Programming", University Science Press.

BMI104: COMMUNICATION SKILLS		
Course Outcome (CO)		**Bloom's Knowledge Level (KL)**
At the end of course , the student will be able to understand		
CO 1	Understand the basic concepts of communication and make aware of technical issues related to communication.	K_2
CO 2	Analyze the importance of effective communication.	K_2, K_3
CO 3	Develop interpersonal and leadership skills.	K_4
CO 4	Implement presentation and interaction skills for group discussion, debate and interviews.	K_4, K_5
CO 5	Develop effective speaking and writing skills.	K_4
Unit	**DETAILED SYLLABUS** **Topic**	**Proposed**

		Lecture
I	Communication skills: Introduction, Definition, Importance of communication, communication process–source, Message, encoding, channel, Decoding, Receiver, Feedback, Barriers to communication, word choice, vocabulary building.	08
II	Elements of Communication, Introduction to oral communication, Confidence, clarity, and fluency, verbal and Nonverbal communication. Paralinguistic features, proxemics, chronemics.	08
III	Interpersonal Communication Skills, Team work, Empathy, Emotional intelligences, Empathy and listening skills, Time Management, Attitude, Responsibility, Leadership qualities-integrity, values, Trust, Self-confidence and courage, speed reading, problem solving and trouble shooting.	08
IV	Presentation and Interaction Skills: speech delivery, Group discussions-objective and methods, debate and discussions, Public speaking-Audience analysis approach and style. Interviews- Types, Focus and objectives.	08
V	Speaking Skills: Meaning, Elements, Importance and type of speaking skills, Writing Skills- Clarity in writing, Principles of effective writing, Orel presentation.	08

Suggested Reading:

1. Raman M. and Sharma S., "Technical Communication", Oxford University Press.
2. Mehra P., "Business Communication for Managers", Pearson.
3. Wallace H.R., "Personality Development for Life and Work", Cengage India Pvt. Ltd.
4. Pfeiffer W.S., "Public Speaking, William", Pearson.

BMI105: ENVIRONMENT AND ECOLOGY		
Course Outcome (CO)		**Bloom's Knowledge Level (KL)**
At the end of course , the student will be able to understand		
CO 1	Gain in-depth knowledge on natural processes that sustain life, and govern economy.	K_2
CO 2	Estimate and Predict the consequences of human actions on the web of life, global economy and quality of human life.	K_3
CO 3	Develop critical thinking for shaping strategies (scientific, social, economic and legal) for environmental protection and conservation of biodiversity, social equity and sustainable development.	K_4
CO 4	Acquire values and attitudes towards understanding complex environmental economic social challenges, and participate actively in solving current environmental problems and preventing the future ones.	K_3
CO 5	Adopt sustainability as a practice in life, society and industry.	K_3

DETAILED SYLLABUS		
Unit	Topic	Proposed Lecture
I	**Environment:** Definition, Types of Environment, Components of environment, Segments of environment, Scope and importance, Need for Public Awareness.	08

	Ecosystem: Definition, Types of ecosystem, Structure of ecosystem, Food Chain, Food Web, Ecological pyramid. Balance Ecosystem. Effects of Human Activities such as Food, Shelter, Housing, Agriculture, Industry, Mining, Transportation, Economic and Social security on Environment, Environmental Impact Assessment, Sustainable Development.	
II	**Natural Resources:** Introduction, Classification. **Water Resources;** Availability, sources and Quality Aspects, Water Borne and Water Induced Diseases, Fluoride and Arsenic Problems in Drinking Water. **Mineral Resources:** Material Cycles; Carbon, Nitrogen and Sulphur cycles. **Energy Resources:** Conventional and Non-conventional Sources of Energy. **Forest Resources:** Availability, Depletion of Forests, Environment impact of forest depletion on society.	**08**
III	**Pollution and their Effects:** Public Health Aspects of Environmental, Water Pollution, Air Pollution, Soil Pollution, Noise Pollution, Solid waste management.	**08**
IV	**Current Environmental Issues of Importance:** Global Warming, Green House Effects, Climate Change, Acid Rain, Ozone Layer Formation and Depletion, Population Growth and Automobile pollution, Burning of paddy straw.	**08**
V	**Environmental Protection:** Environmental Protection Act 1986, Initiatives by Non-Governmental Organizations (NGO's). **Human Population and the Environment:** Population growth, Environmental Education, Women Education.	**08**

Suggested Readings:

1. Dave, Katewa and Singh, "Textbook of Environment and Ecology", Cengage Learning India Pvt. Ltd.
2. Deswal S., "Environmental Studies" Dhanpat Rai & Co.
3. Ahluwalia V.K., "Environmental Studies" TERI Press, New Delhi.
4. Rajgopalan R., "Environmental Studies", Oxford University Press.
5. Singh and Malviya, "Environment & Ecology", Acme Learning.

BMI151: PROBLEM SOLVING USING C LAB		
Course Outcome (CO)		**Bloom's Knowledge Level (KL)**
At the end of course, the student will be able to		
CO1	Write, compile, debug and execute programs in a C programming environment.	K_3

CO2	Write programs that incorporate use of variables, operators and expressions along with data types.	K_3
CO3	Write programs for solving problems involving use of decision control structures and loops.	K_3
CO4	Write programs that involve the use of arrays, structures and user defined functions.	K_3
CO5	Write programs using graphics and file handling operations.	K_3

1. Program to implement conditional statements in C language.
2. Program to implement switch-case statement in C language
3. Program to implement looping constructs in C language.
4. Program to perform basic input-output operations in C language.
5. Program to implement user defined functions in C language.
6. Program to implement recursive functions in C language.
7. Program to implement one-dimensional arrays in C language.
8. Program to implement two-dimensional arrays in C language.
9. Program to perform various operations on two-dimensional arrays in C language.
10. Program to implement multi-dimensional arrays in C language.
11. Program to implement string manipulation functions in C language.
12. Program to implement structure in C language.
13. Program to implement union in C language.
14. Program to perform file handling operations in C language.
15. Program to perform graphical operations in C language.

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

BMI152: COMMUNICATION SKILLS LAB		
Course Outcome (CO)		**Bloom's Knowledge Level (KL)**
At the end of course, the student will be able to		
CO1	Understanding of basics of listening and writing.	K_2
CO2	Aware about use of reading Newspaper, journals and magazines.	K_3
CO3	Develop skills to face interviews, group discussion, debate and conferences.	K_4

1. Listen and take notes of lecture. Listen and write appropriate words, talks on computers and technology.
2. Self-Introduction, Role Play of celebrities/ politicians/ famous personalities, sharing memorable incidents.
3. Group Discussion.
4. Debate and Extempore.
5. News Paper reading, Journal reading, Magazine reading.
6. Face to face communication.
7. Interviewing techniques.

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

MCA (INTEGRAED)
FIRST YEAR SYLLABUS
SEMESTER-II

BMI201: DIGITAL ELECTRONICS

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able to understand		
CO 1	Apply concepts of Digital Binary System, complements and Binary codes.	K_3
CO 2	Apply the concepts of Boolean Algebra and logic gates.	K_3
CO 3	Understand and implementation of gates.	K_2, K_3
CO 4	Analyze and Design of Combinational logic circuits.	K_4
CO 5	Analysis and design sequential logic circuits with their applications. Implement the design procedure of synchronous and asynchronous sequential circuits.	K_3, K_4

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	**Binary Systems**: Digital computers and Digital systems, Binary Numbers, Number Base conversion, Octal & Hexa-decimal numbers, Complements, Binary codes.	08
II	**Boolean Algebra and Logic Gates**: Basic definitions, Axiomatic definition, Basic theorems and Properties, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates.	08
III	**Simplification of Boolean Functions**: The Map method, two, three, four, five and six variable maps, Product of Sums and Sum of Products simplification, NAND and NOR implementation, Other two-level implementations, Don't-Care conditions, The Tabulation method, Determination and selection of Prime-Implicants.	08
IV	**Combinational Logic**: Design procedure, Adders, Subtractors, Code conversion, Analysis procedure, Multilevel NAND and NOR circuits, Exclusive-OR and Equivalence Functions, Binary Parallel Adder, Decimal Adder, Magnitude comparator, Decoders, Multiplexers.	08
V	**Sequential Logic, Registers and Counters:** Flip-Flops, Triggering of Flip-Flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Flip-Flop Excitation Tables, Design procedure, Design of Counters, Design with State Equations, Registers, Shift Registers, Ripple Counters, Synchronous Counters, Timing Sequences.	08

Suggested Readings:

1. Mano M., "Digital Logic and Computer Design", Pearson.
2. Mano M., "Digital Design", Prentice-Hall of India.
3. Gaur R.K., "Digital Electronics and Micro-computers", Dhanpat Rai Publications.
4. Jain R.P. "Modern Digital Electronics", McGraw-Hill Education.
5. Malvino A.P. and Leach D.P., "Digital Principles and Applications", McGraw-Hill Education.
6. Rajaraman V. and Radhakrishanan T., "An Introduction to Digital Computer Design", Prentice-Hall India Pvt. Ltd.

7. Gill N.S. and Dixit J.B, "Digital Design & Computer Organization", University Science Press.

BMI202: DISCRETE MATHEMATICS		
Course Outcome (CO)		**Bloom's Knowledge Level (KL)**
At the end of course , the student will be able to understand		
CO 1	Use mathematical and logical notation to define and formally reason about basic discrete structures such as Sets, Relations and Functions	K_1, K_2
CO 2	Apply mathematical arguments using logical connectives and quantifiers to check the validity of an argument through truth tables and propositional and predicate logic	K2, K3
CO 3	Identify and prove properties of Algebraic Structures like Groups, Rings and Fields	K_3, K_4
CO 4	Formulate and solve recurrences and recursive functions	K_3, K_4
CO 5	Apply the concept of combinatorics to solve basic problems in discrete mathematics	K_1, K_3

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	**Set Theory:** Definition of sets, Venn Diagrams, proofs of some general identities on sets. **Relation:** Definition, types of relation, composition of relations, Pictorial representation of relation, equivalence relation, partial ordering relation. **Function:** Definition, type of functions, one to one, into and onto function, inverse function, composition of functions, recursively defined functions.	**08**
II	**Mathematical Induction:** Piano's axioms, Mathematical Induction Discrete Numeric Functions and Generating functions, Simple Recurrence relation with constant coefficients, Linear recurrence relation without constant coefficients.	**08**
III	**Algebraic Structures:** Properties, Semi group, Monoid, Group, Abelian group, Properties of group, Subgroup, Cyclic group, Cosets, Permutation groups, Homomorphism, Isomorphism and Automorphism of groups.	**08**
IV	**Propositional Logic:** Preposition, First order logic, Basic logical operations, Tautologies, Contradictions, Algebra of Proposition, Logical implication, Logical equivalence, Normal forms, Inference Theory, Predicates and quantifiers.	**08**
V	**Posets, Hasse Diagram and Lattices:** Introduction, Ordered set, Hasse diagram of partially ordered set, Isomorphic ordered set, Well ordered set, Properties of Lattices and complemented lattices.	**08**

Suggested Readings:

1. Tremblay J.P. and Manohar R., "Discrete Mathematical Structures with Application to Computer Science", Tata McGraw Hill.
2. Lipschutz S. and Lipson M., "Discrete Mathematics", Tata McGraw Hill.
3. Rosen K.H., "Discrete Mathematics and its Applications", Tata McGraw Hill.
4. Sarkar S.K., "A Textbook of Discrete Mathematics", S. Chand Publishing.
5. Sharma J.K., "Discrete Mathematics', Trinity Press.

6. Gupta S.B., "Discrete Mathematics and Structures", University Science Press.

BMI203: DATA STRUCTURE		
Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able to understand		
CO 1	Describe how arrays, linked lists, stacks, queues, trees, and graphs are represented in memory, used by the algorithms and their common applications.	K_1, K_2
CO 2	Discuss the computational efficiency of the sorting and searching algorithms.	K_2
CO 3	Implementation of Trees and Graphs and perform various operations on these data structure.	K_3
CO 4	Understanding the concept of recursion, application of recursion and its implementation and removal of recursion.	K_4
CO 5	Identify the alternative implementations of data structures with respect to its performance to solve a real world problem.	K_5, K_6

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**
I	**Introduction**: Basic Terminology, Elementary Data Organization, Data Structure operations, Algorithm Complexity and Time-Space trade-off Arrays: Array Definition, Representation and Analysis, Single and Multidimensional Arrays, Character String in C, Character string operation, Ordered List, Sparse Matrices, and Vectors. Stacks: Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Array Representation of Stack, Linked Representation of Stack, Operations Associated with Stacks, Applications of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack. Recursion: Recursive definition and processes, Tower of Hanoi Problem, tail recursion, removal of recursion.	**08**
II	**Queues**: Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty. Circular queue, Deque, and Priority Queue, Linked list: Representation and Implementation of Singly Linked Lists, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists, Insertion and deletion Algorithms, doubly linked list, Linked List in Array, Polynomial representation and addition, Generalized linked list.	**08**
III	**Trees**: Basic terminology, Binary Trees, Binary tree representation, algebraic Expressions, Complete Binary Tree. Extended Binary Trees, Array and Linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees. Traversing Threaded Binary trees, Huffman algorithm. Searching and Hashing: Sequential search, binary search, comparison and analysis, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation.	**08**

IV	**Sorting**: Insertion Sort, Bubble Sorting, Quick Sort, Two Way Merge Sort, Heap Sort, Sorting on Different Keys. Binary Search Tree (BST): Introduction, Insertion and Deletion in BST, Complexity of Search Algorithm, Path Length, AVL Trees, B-trees.	**08**
V	**Graphs**: Terminology & Representations, Graphs & Multi-graphs, Directed Graphs, Sequential Representations of Graphs, Adjacency Matrices, Traversal, Connected Component and Spanning Trees, Minimum Cost Spanning Trees. File Structures: Physical Storage Media File Organization, Organization of records into Blocks, Sequential Files, Indexing and Hashing, Primary indices, Secondary indices, B+ Tree index Files, B Tree index Files, Indexing and Hashing Comparisons.	**08**

Suggested Readings:

1. Langsam Y., Augenstin M. and Tannenbaum A., "Data Structures using C and C++", Pearson Education Asia.
2. Horowitz E., Sahni S. and Mehta D., "Fundamentals of Data Structures in C++", Golgotha Book Source, New Delhi.
3. Lipchitz S., "Data Structures", Mc-Graw Hill International.
4. Goyal K. K., Sharma Sandeep & Gupta Atul, "Data Structures and Analysis of Algorithms", HP Hamilton.
5. Tremblay J.P., Sores P.G., "An Introduction to Data Structures with Applications", Tata Mc-Graw Hill International.
6. Salaria R.S., "Data Structures", Khanna Publishing House
7. Berman A.M., "Data structures via C++", Oxford University Press.
8. Weiss W., "Data Structures and Algorithm Analysis in C++", Pearson Education.
9. Patel R.B., "Expert Data Structures with C", Khanna Publishing House.

BMI204: PROFESSIONAL COMMUNICATION

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able to understand		
CO 1	Exhibit adequate Technical and Mass communication skills.	K_1, K_3
CO 2	Understand parts of speech and paragraph development	K_2
CO 3	Demonstrate effective discussion, presentation and writing skills.	K_3, K_5
CO 4	Develop interpersonal communication and listening skills.	K_4
CO 5	Develop confidence and clarity in public speaking projects; be schooled in preparation and research skills for oral presentations.	K_4

DETAILED SYLLABUS

Unit	Topic	Proposed Lecture
I	Technical Communication: features: Distinction between General And Technical Communication; Language as a tool of communications; Levels of communication: Interpersonal, Organizational, Mass communication; The flow of communication: Downward, Upward, Lateral/Horizontal (Peer group): Importance of technical communication; Barriers to Communication.	08
II	Words and Phrases: Word formation, Synonyms and Antonyms; Homophones; Select vocabulary of about 500-1000 New words; correct	08

	Usage: all Parts of Speech; Modals; Concord; Articles; Infinitives; Transformation of sentences; Requisites f Sentence Construction: Paragraph Development: Techniques and Methods- Inductive, Deductive, Spatial , Linear, Chronological etc.	
III	Principles, Sales & Credit letters; Claim and Adjustment Letters; Job Application and Resumes. Reports: Types; Significance; Structure, Style & Writing of Reports. Technical Proposal; Parts; Types; Writing of Proposal; Significance; Negotiation skills.	**08**
IV	Nuances and Modes of Delivery; Body Language; Dimensions of Speech: Syllable; Accent; Pitch; Rhythm; Intonation; Paralinguistic features of voice; Interpersonal communication: Definition; Types; Team work; Attitude; Way to improve Attitude Listening Skills: Types; Methods for improving Listening Skills.	**08**
V	Following essays from the prescribed text book with emphasis on Mechanics of writing. **(i)** Humanistic and Scientific Approaches to Human Activity by Moody E. Prior **(ii)** The Language of Literature and Science by A. Huxley **(iii)** Man and Nature by J. Bronowski **(iv)** Science and Survival by Barry Commoner **(v)** The Mother of the Sciences by A.J. Bahm.	**08**

Suggested Readings:

1. Arora V.N. and Chandra L., "Improve your Writing", Oxford Univ. Press.
2. Singh R.P., "Functional skills in Language and Literature", Oxford Univ. Press.
3. Sharma S., "Communication Skills for Engineers and Scientists", PHI Learning Pvt. Ltd.
4. Sharma R.C. and Mohan K., "Business Correspondence and Report Writing", TMH.
5. Mohan K., "Developing Communication skills", Mecra Bannerji- Macmillan India Ltd.

BMI205: INFORMATION SYSTEMS		
Course Outcome (CO)		**Bloom's Knowledge Level (KL)**
At the end of course , the student will be able to understand		
CO 1	Understand the concepts of information systems and its types.	K_2
CO 2	Analyze the basic structure of management information system and its relevance to information systems.	K_3
CO 3	Know the concepts of planning and control in an organization.	K_2, K_3
CO 4	Describe various business applications of information technologies.	K_2
CO 5	Apply the concepts of information technology and management related to CRM and SCM.	K_4

DETAILED SYLLABUS		
Unit	**Topic**	**Proposed Lecture**

I	**Foundation of Information Systems:** Introduction to information system in business, fundamentals of information systems, solving business problems with information systems, Types of information systems, Effectiveness and efficiency criteria in information system.	**08**
II	**An overview of Management Information Systems:** Definition of a management information system, MIS versus Data processing, MIS & Decision Support Systems, Concept of an MIS, Structure of a Management information system.	**08**
III	**Concepts of planning & control:** Concept of organizational planning, The Planning Process, Computational support for planning, Characteristics of control process, The nature of control in an organization.	**08**
IV	**Business applications of information technology:** Internet & electronic commerce, Intranet, Extranet & Enterprise Solutions, Information System for Business Operations, Information System for Managerial Decision Support, Information System for Strategic Advantage.	**08**
V	**Managing Information Technology:** Enterprise & global management, Security & Ethical challenges, Planning & Implementing changes, CRM, SCM.	**08**

Suggested Readings:

1. O'Brien J., Marakas G.M., and Behl R. "Management Information System", McGrawhill Education.
2. Gordon B.D. and Margrethe H.O., "Management Information System", TMH.
3. O'Brian, "Introduction to Information System", McGrawhill.
4. Murdick, "Information System for Modern Management", PHI.
5. Jawadekar W.S. and Dubey S.S., "Management Information System", McGrawhill.
6. Jain Sarika, "Information System", PPM.
7. Kelkar S.A. "Information Systems – A concise Study", PHI.

BMI251: DATA STRUCTURE LAB

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course, the student will be able to		
CO1	Write and execute programs to implement various searching and sorting algorithms.	K_3
CO2	Write and execute programs to implement various operations on two-dimensional arrays.	K_3
CO3	Implement various operations of Stacks and Queues using both arrays and linked lists data structures.	K_3
CO4	Implement graph algorithm to solve the problem of minimum spanning tree	K_3

1. Write a program to implement Bubble sort /Merge sort/ Insertion sort/ Selection sort/. Quick sort to sort an array of numbers.
2. Write a program to implement Linear Search.
3. Write a program to implement Binary Search.
4. Write a program to implement Stack / Queue/ Circular Queue/ Linked List using array.
5. Write a program to implement Stack using linked list.
6. Write a program to perform conversion of an expression from Infix to Prefix.
7. Write a program to perform conversion of an expression from Infix to Postfix.
8. Write a program to implement Queue/ Circular Queue/ Linked List using dynamic memory allocation.
9. Write a program to implement Binary tree.
10. Write a program to implement Btree.
11. Write a program to traverse a tree in preorder / inorder / post order.
12. Write a program to apply Breadth First Search on a graph.
13. Write a program to apply Depth First Search on a graph.
14. Write a program to find shortest path of a graph.
15. Write a program to implement minimum cost spanning tree.

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

BMI252: PROFESSIONAL COMMUNICATION LAB		
Course Outcome (CO)		**Bloom's Knowledge Level (KL)**
At the end of course, the student will be able to		
CO1	Develop the ability to work as a team member as an integral activity in the workplace.	K_3
CO2	Increase confidence in their ability to read, comprehend, organize, and retain written information. Improve reading fluency.	K_4
CO3	Write coherent speech outlines that demonstrate their ability to use organizational formats with a specific purpose; Deliver effective speeches that are consistent with and appropriate for the audience and purpose.	K_5, K_6
CO4	Develop proper listening skills; articulate and enunciate words and sentences clearly and efficiently.	K_3
CO5	Show confidence and clarity in public speaking projects; be schooled in preparation and research skills for oral presentations.	K_5

Interactive and Communicative Practical with emphasis on Oral Presentation/Spoken Communication based on International Phonetic Alphabets (I.P.A).

LIST OF PRACTICALS

1. Group Discussion: Practical based on Accurate and Current Grammatical Patterns.
2. Conversational skills for Interviews under suitable Professional Communication Lab conditions with emphasis on Kinesics.
3. Communication Skills for Seminars/Conferences/Workshops with emphasis on Paralinguistics / Kinesics.
4. Presentation Skills of Technical Paper/Project Reports/Professional Reports based on proper Stress and Intonation Mechanics.
5. Official /Public Speaking based on Rhythmic Patterns.
6. Theme-Presentation /Key-Note Presentation based on correct argumentation methodologies.
7. Individual Speech Delivery/Conferences with skills to defend Interjections/Quizzes.
8. Argumentative Skills/Role Play Presentation with Stress and Intonation.
9. Comprehensions Skills based on Reading and Listening Practical on a model Audio-Visual Usage.

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

BVA251: SPORTS AND YOGA

Objective of the Course:

- To maintain mental and physical wellness upright and develop ability in the students 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 introduce a practice oriented introductory course on the subject. More involved / advanced course may come up in subsequent years of study.

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, student has to opt for at least one game

out of the remaining mentioned below.

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

a. **Introduction of Yoga**
Introduction of Yoga, Origin of Yoga, Aims and Objective of Yoga, Patanjali Yoga darshan, Hath yoga, Gheranda Samhita, Karm yoga, Gyan yoga.

b. **Asanas, Pranayam and Meditation Practices**
Meaning of Asanas, Objective of Asanas, rules and regulations of Asanas and Pranayams, Types of Yogasana.
Yogic postures: Standing Posture, Sitting posture, Supine posture, Prone posture, balancing Postures, Pranayam according to Patanjali and Hath Yoga, Meditaion Mudras.

c. **Science of Yoga**

Physiological effects of Asanas- Paranayama and meditation,stress management and yoga, Mental health and yoga practice, Health and Personality Development.

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 a minimum of five choices of the 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 the 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 %)

SECOND YEAR SYLLABUS

SEMESTER-III

BMI301: 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.	K_1, K_2
CO 2	Analyze basic structural, behavioral and architectural models using object-oriented software engineering approach.	K_4
CO 3	Illustrate object-oriented modeling techniques for analysis.	K_3
CO 4	Use the basic features of data abstraction and encapsulation, constructors, destructors in C++ programs.	K_3, K_4
CO 5	Utilize templates and file handling mechanisms effectively.	K_3
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.

BMI302: WEB TECHNOLOGY		
Course Outcome(CO)		**Bloom's Knowledge Level (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 and analyze the insights of internet programming to implement complete application over the web.	K_3, K_6
CO 2	Recognize and apply the elements of Creating Style Sheet (CSS) , Understand Bootstrap	K_2, K_4
CO 3	Understand, analyze and apply the role of JavaScript in the workings of the web and web applications, Understand XML.	K_2, K_3
CO 4	Understand, analyze and build dynamic web applications using servlet and JSP.	K_2, K_3
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.	K_2, K_4, K_6
DETAILED SYLLABUS		**3-1-0**
Unit	**Topic**	**Proposed 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

BMI303: BUSINESS COMMUNICATION		
Course Outcome (CO)		**Bloom's Knowledge Level (KL)**
At the end of course, the student will be able to understand		
CO 1	To understand business communication strategies and principles for effective communication in domestic and international business situations.	K_3, K_5
CO 2	To understand and appropriately apply modes of **expression**, i.e., descriptive, expositive, narrative, scientific, and self-**expressive**, in written, visual, and oral communication.	K_3, K_4
CO 3	To develop the ability to research and write a **documented** paper and/or to give an oral **presentation**.	K_3
CO 4	To develop the ability to communicate **via electronic mail**, Internet, and other technologies for **presenting business messages**.	K_3, K_4
CO 5	To understand and apply **basic principles of critical thinking**, problem solving, and technical **proficiency** in the development of exposition and argument.	K_2, K_6
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.

BMI304: COMPUTER ORGANIZATION		
Course Outcome (CO)		**Bloom's Knowledge Level (KL)**
At the end of course, the student will be able to understand		
CO 1	Describe functional units of digital system and explain how arithmetic and logical operations are performed by computers.	K_2, K_3
CO 2	Describe the operations of control unit and write sequence of instructions for carrying out simple operation.	K_2, K_4
CO 3	Describe various types of processor organization and addressing modes.	K_2, K_3
CO 4	Describe the various modes in which IO devices communicate with CPU and memory.	K_2, K_3
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.

BMI305: 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 understand	
CO 1	To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.	K_2, K_4
CO 2	To help students initiate a process of dialog with in themselves to know what they 'really want to be' in their life and profession	K_1, K_2
CO 3	To help students understand the meaning of happiness and prosperity for a human being.	K_2
CO 4	To facilitate the students to understand harmony at all the levels of human living, and live accordingly.	K_2
CO 5	To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life.	K_2, K_4
	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 interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence.	**08**
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.

BMI351: OBJECT ORIENTED PROGRAMMING IN C++ LAB		
Course Outcome (CO)		**Bloom's Knowledge Level (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.	K_3
CO 2	Interpret C++ program using the concept such as polymorphism, virtual function, exception handling and template.	K_3
CO 3	Apply object-oriented techniques to analyze, design and develop a complete solution for a given problem.	K_3, K_4

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.

BMI352: 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.	K_2
CO 2	Design web pages using Cascading Styles sheets.	K_2
CO 3	Develop dynamic web pages using JavaScript.	K_3
CO 4	Develop an interactive web applications using JSP.	K_3
CO 5	Create web applications using Spring & Spring Boot.	K_2
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.

MCA (INTEGRATED)

SECOND YEAR SYLLABUS

SEMESTER-IV

BMI401: JAVA PROGRAMMING		
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 in Java.	K_1
CO 2	Analyze basic structural, behavioral, and architectural models using object-oriented software engineering in Java.	K_4
CO 3	Illustrate object-oriented modeling techniques and build GUI/web-based applications using Java APIs.	K_2, K_3
CO 4	Use the core Java features like abstraction, encapsulation, constructors, and garbage collection in Java programs.	K_3, K_4
CO 5	Utilize Java generics and file handling mechanisms effectively for modular programming.	K_3
		3-1-0
DETAILED SYLLABUS		
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.

BMI402: 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.

BMI403: 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		**3-0-0**
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.

BMI404: 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_5, 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.

BMI405: 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		
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.

BMI451: 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.

BMI452: 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.

Compulsory

1. Athletics
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 %)