GREAT GANGES INSTITUTE OF TECHNOLOGY, UNNAO

Affiliated to C.S.J.M UNIVERSITY, KANPUR

BCA PROGRAM-PROGRAM AND COURSE OUTCOMES-

No.	Program Outcome
PO1	Understand, analyze and develop computer programs in the areas related to algorithm, web design and networking for efficient design of computer based system
PO2	Work in the IT sector as system engineer, software tester, junior programmer, web developer, system administrator, software developer etc
PO3	Apply standard software engineering practices and strategies in software project development using open source programming environment to deliver a quality of product for business success.

Program Educational Objectives

- Equip themselves to potentially rich & employable field of computer applications.

- Pursue higher studies in the area of Computer Science/Applications.

- To bridge the gap between theoretical and practical knowledge of the students by adopting innovative teaching pedagogy

- Take up self-employment in Indian & global software market

- To sharpen soft and hard skills among the students

- Meet the requirements of the Industrial standards.

Program/Class: BCA	Year: First	Semester: I

Course/ paper-1

Course Code: BCA-1001	Course Title: Computer Fundamental &Problem solving techniques

Course outcomes:

CO Number	CO Statement	Knowledge Level
CO1	Familiar with parts of computer	K1
CO2	Understand the input and output devices	K1
CO3	Basic ideas of storage devices, computer Networks and Operating System	K2

Credits:	Compulsory
Max. Marks:	Min. Passing Marks:

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:

Unit	Topics	No. of Lectures Total=40
I	**UNIT-I** **Introduction to Computers** Introduction, Characteristics of Computers, Block diagram of computer. Types of computers and features, Mini Computers, Micro Computers, Mainframe Computers, Super Computers. Types of Programming Languages (Machine Languages, Assembly Languages, High Level Languages). Data Organization, Drives, Files, Directories, Number Systems Introduction to Binary, Octal, Hexadecimal system Conversion, Binary Arithmetic Simple Addition, Subtraction, Multiplication	10
II	**UNIT-II** **Memory Organization** Types of Memory (Primary And Secondary) RAM, ROM, PROM, EPROM. Secondary Storage Devices (FD, CD, HD, Pen drive) I/O Devices (Scanners, Plotters, LCD, Plasma Display). Cache, Virtual memory, RAID.	10
III	**UNIT-III** **Operating System and Services in O.S.** History, Files and Directories, DOS (Internal and External Commands), Batch Files, Types of Operating System, File Management System. Introduction to Linux – Features of Linux , Components of Linux	8
IV	**UNIT-IV** **Problem solving techniques** Understanding the problem, Analyzing the problem, Developing the solution, **Algorithm and Flowcharts -**Definition, Characteristics, Expressing Algorithms, Analysis of Algorithms, Advantages and disadvantages, Examples Flowchart: Definition, Define symbols of flowchart, Limitations of Using Flowcharts, Advantages and disadvantages, Activities involved in Program Design, Coding and implementation.	8
V	**UNIT-V** **Windows Operating Environment& Office Automation** Windows, Control Panel, Taskbar, Desktop, Windows Application, Icons, Windows Accessories, Notepad, Paintbrush, MS-Word, Purpose, usage, command, MS-Excel, MS-Access, , MS-PowerPoint..	4

Referential Books:
1. Fundamental of Computers – By V.Rajaraman B.P.B.Publications
2. Fundamental of Computers – By P.K.Sinha
3. Computer Today- By Suresh Basandra
4. Unix Concepts and Application – By Sumitabha Das
5. MS-Office 2000(For Windows) – By Steve Sagman

Suggested Continuous Evaluation Methods:
In addition to the theoretical inputs the course will be delivered through Assignments, Presentation, Group Discussions. This will instill in student a sense of decision making and practical learning.

Program/Class: BCA	Year: First	Semester: I

Course/ paper-2		

Course Code: BCA-1002	Course Title:	C Programming

Course outcomes:

CO Number	CO Statement	Knowledge Level
CO1	Analyze a given problem and develop an algorithm to solve the problem.	K1
CO2	Use the 'C' language constructs in the right way	K1
CO3	Design, develop and test programs written in 'C'	K2
CO4	Design programs involving decision structures, loops and functions.	K1
CO5	Understand the dynamics of memory by the use of pointers and Structures	K2

Credits:		Compulsory	
Max. Marks:		Min. Passing Marks:	

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:

Unit	Topics	No. of Lectures Total=40
I	**UNIT-I** Fundamentals of C programming and Control Structures: History, Structure of a C program, C Conventions, Character Set, Identifiers, Keywords, Simple Data types, Modifiers, Variables, Constants, Operators, Operator precedence. Input and Output operation: Single character input and output, formatted input and output.Control Structures, Conditional statementand switch statement. Goto statement. Looping statement,break and continue, nested for statement.	8
II	**UNIT-II** Arrays and Functions: Introduction (One and multi-dimensional), Declaration of arrays, Initialization of arrays, processing with arrays. String manipulation, declaration of string arrays, string operations. Functions: Introduction, advantages of functions. Function definition, function call, Actual and formal arguments, local and global variables, function prototypes, types of functions, recursive functions, arrays and functions.	10
III	**UNIT-III** **Searching and Sorting:** selection sort, bubble sort, insertion sort, quick sort, merge sort Searching: linear and binary search methods, comparison of sorting and searching methods.	8
IV	**UNIT-IV** **Structures and Pointers:** Introduction to structures, Advantages of structures, accessing elements of a structure, nested structures, array of structures, functions and structures, Pointers: Introduction, pointer variable, pointer operator, pointer arithmetic, pointers and arrays, pointers and strings, array pointers, dynamic allocation.	10
V	**UNIT-V** **Files, Preprocessor, standard library and header files:** Files: Introduction, File data type, opening and closing a file, file functions (getc, putc, getw, putw, fscanf, fprintf, fread, fwrite, fgets, fputs, feof). Preprocessor: #define, #include, #undef, Conditional compilation directives, C standard library and header files:	4

	Header files, string functions, mathematical functions, Date and Time functions	

Referential Books :
1. Let us C-Yashwant Kanetkar.
2. Programming inC-Balguruswamy
3. The C programming Lang., Pearson Ecl - DennisRitchie
4. Structured programming approach using C- Forouzah & Ceilber Thomson learningpublication.
5. Pointers in C – YashwantKanetkar
6. How to solve it by Computer – R.G.Dromy

Suggested Continuous Evaluation Methods:
In addition to the theoretical inputs the course will be delivered through Assignments, Presentation, Group Discussions. This will instill in student a sense of decision making and practical learning.

Program /Class: BCA	Year: First	Semester: I

Course/ paper-3		
Course Code: BCA-1003	**Course Title: Principle of Management**	

Course outcomes:

CO Number	CO Statement	Knowledge Level
CO1	To Provide Fundamental knowledge and exposure to Theories and Concept in the Field of Management.	K1
CO2	To develop the knowledge of business and management principles.	K1
CO3	To learn decision thinking and problem skills	K2
CO4	To teach a sense of responsibility and a capacity for business management.	K1
CO5	To Explain the financial concepts used in making business decision.	K2

Credits:	Compulsory
Max. Marks:	Min. Passing Marks:

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:	

Unit	Topics	No. of Lectures Total=40
I	**UNIT-I** Nature of Management: Meaning, Defination, nature purpose, importance & Functions, Management as Art, Science & Profession- Management as social System Concepts of management-Administration-Organization, Management Skills, Levels of Management.	6
II	**UNIT-II** Evolution of Management Thought: Contribution of F.W.Taylor, Henri Fayol, Elton Mayo, Chester Bernard & Peter Drucker to the management thought. Business Ethics, Social Responsibility of business.	10
III	**UNIT-III** Functions of Management: Part-I Planning – Meaning- Need & Importance, types, Process of Planning, Barriers to Effective Planning, levels – advantages & limitations. Forecasting- Need & Techniques Decision making-Types - Process of rational decision making & techniques of decision making Organizing – Elements of organizing & processes: Types of organizations, Delegation of authority – Need, difficulties Delegation – Decentralization Staffing – Meaning & Importance Direction – Nature – Principles.	12
IV	**UNIT-IV** Functions of Management: Part-II Motivation – Importance – theories, Leadership – Meaning –styles, qualities & function of leader, Controlling - Need, Nature, importance, Process & Techniques, Total Quality Management Coordination – Need – Importance.	6

V	**UNIT – V** Management of Change: Meaning, Features of change, Force for Change, Models for Change, Resistance to change , overcoming resistance to change , New Trends in Organization Change, Stress Management.		6

Referential Books:
1. Essential of Management – Horold Koontz and Iteinz Weibrich- McGrawhillsInternational
2. Management Theory & Practice –J.N.Chandan
3. Essential of Business Administration – K.Aswathapa, Himalaya PublishingHouse
4. Principles & practice of management – Dr. L.M.Parasad, Sultan Chand & Sons – NewDelhi
5. Business Organization & Management – Dr.Y.K.Bhushan
6. Management: Concept and Strategies By J.S. Chandan, VikasPublishing
7. Principles of Management, By Tripathi, Reddy Tata McGrawHill

Suggested Continuous Evaluation Methods:
In addition to the theoretical inputs the course will be delivered through Assignments, Presentation, Group Discussions. This will instill in student a sense of decision making and practical learning.

Program/Class: BCA	Year: First	Semester: I

Course/ paper-4		
Course Code:BCA-1004	**Course Title: Business Communication**	

Course outcomes:

CO Number	CO Statement	Knowledge Level
CO1	To understand the basic concept of communication.	K1,K2
CO2	Learning the key types of communication and identifying key concepts Oral Communication in detail.	K2, K3
CO3	To have an in-depth knowledge about Written Communication.	K2
CO4	To get familiarize with Written communication and its aids	K3
CO5	To have a practical knowledge about the business correspondences like letters, reports etc	K4

Credits:	Compulsory
Max. Marks:	Min. Passing Marks:

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:

Unit	Topics	No. of Lectures Total=40
I	**UNIT-I** **Means of Communication:** Meaning and Definition – Process – Functions – Objectives – Importance – Essentials of good communication – Communication barriers, 7C's of Communication.	6
II	**UNIT-II** **Types of Communication**: Oral Communication: Meaning, nature and scope – Principle of effective oral communication – Techniques of effective speech – Media of oral communication (Face-to-face conversation – Teleconferences – Press Conference –Video Conferencing– Demonstration – Radio Recording – Meetings –Grapevine – Group Discussion – Mobile Phone Conversation– Oral report). The art of listening – Principles of good listening.	10
III	**UNIT-III** **Written Communication**: Purpose of writing, Clarity in Writing, Principles of Effective writing, Writing an e-mail, SMS.	8
IV	**UNIT-IV** **Business Letters & Reports:** Need and functions of business letters – Planning & layout of business letter – Kinds of business letters – Essentials of effective correspondence, Purpose, Kind and Objective of Reports, Writing Reports.	6
V	**UNIT-V** **Drafting of business letters :** Enquiries and replies – Placing and fulfilling orders – Complaints and follow-up Sales letters – Circular letters Application for employment and resume	10

Referential Books:

1. Business Communication – K.K.Sinha – Galgotia Publishing Company, New Delhi.
2. Media and Communication Management – C.S. Rayudu – Hikalaya Publishing House, Bombay.
3. Essentials of Business Communication – Rajendra Pal and J.S. Korlhalli- Sultan Chand & Sons, New Delhi.
4. Business Communication (Principles, Methods and Techniques) Nirmal Singh – Deep &Deep Publications Pvt. Ltd., New Delhi.

Suggested Continuous Evaluation Methods:
In addition to the theoretical inputs the course will be delivered through Assignments, Presentation,
Group Discussions. This will instill in student a sense of decision making and practical learning.

Program/Class: BCA	Year:Second	Semester: III
Course/ paper-5		
Course Code:BCA-1005	**Course Title: Mathematics –I**	

Course outcomes:

CO Number	CO Statement	Knowledge Level
CO1	To impart the required knowledge of Mathematics and statistics for managerial activities among students.	K1
CO2	To inculcate in students the fundamental mathematical background in computer science	K1
CO3	To gain knowledge about Sets, Relations Functions, Matrices, Mathematical logic, and Group theory.	K2
CO4	Understand the basic concepts of Sets, Relations Functions, Matrices, Mathematical logic, and Group theory.	K1
CO5	Develop analytical ability to solve real-world problems using these methodologies.	K2

Credits:	Compulsory
Max. Marks:	Min. Passing Marks:

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:

Unit	Topics	No. of Lectures Total=40
I	**UNIT-I** Matrices and Determinants: Matrix, Types of matrices, Addition, subtraction, scalar multiplication of a matrix, product of two matrices, Determinants of a square matrix, Co-factor of element of a square matrix, Adjoint, Inverse of a Square Matrix, Cayley Hamilton theorem (statement only) and problems	10
II	**UNIT-II** **Limits and Continuity:** Limit at a Point, Properties of Limit, Computation of Limits of Various Types of Functions, Indeterminate Forms, L' Hospitals Rule, Continuity at a Point, Continuity Over an Interval.	10
III	**UNIT-III** **Differentiation:** Derivatives of Sum, Differences, Product & Quotients, Chain Rule, Derivatives of Composite Functions, Logarithmic Differentiation, Rolle's Theorem, Mean Value Theorem), Maxima & Minima. Taylor's and Maclaurin's Theorem	10
IV	**UNIT-IV** **Integration:** Fundamental Theorem of Calculus (without proof.), Indefinite Integrals, Methods of Integration Substitution, By Parts, Partial Fractions	6
V	**UNIT-V** *Vector Algebra: Definition of a vector in 2 and 3 Dimensions; Double and Triple Scalar and Vector Product.*	4

Referential Books:

1. B.S. Grewal, "Elementary Engineering Mathematics", 34th Ed., 1998.

2. "Advanced Engineering Mathematics", S. Chand & Company, 9th Revised Edition, 2001.

3. Shanti Narayan, "Integral Calculus", S. Chand & Company, 1999.

4. Shanti Narayan, "Differential Caluculs", S.Chand & Company, 1998.

Suggested Continuous Evaluation Methods:
In addition to the theoretical inputs the course will be delivered through Assignments, Presentation,
Group Discussions. This will instill in student a sense of decision making and practical learning.

Program/Class: BCA	Year: First	Semester: II

Course/ paper-1		
Course Code: BCA-2001	**Course Title: Object Oriented Programming Using C++**	

Course outcomes:

CO Number	CO Statement	Knowledge Level
CO1	Understand fundamental constructs of OOP.	K1
CO2	Get the knowledge of different forms of OOP Implementation	K1
CO3	To demonstrate the differences between traditional imperative design and object- oriented design.	K2
CO4	To understand the role of inheritance, polymorphism, dynamic binding and generic structures in building reusable code.	K1

Credits:	Compulsory	
Max. Marks:	Min. Passing Marks:	

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:

Unit	Topics	No. of Lectures Total=40
I	**UNIT-I** *Introduction Introducing Object – Oriented Approach, Relating to other paradigms {Functional, Data decomposition}. Basic terms and ideas Abstraction, Encapsulation, Inheritance, Polymorphism, Review of C, Difference between C and C++ - cin, cout, new, delete, operators.*	10
II	**UNIT-II** Classes and Objects Encapsulation, information hiding, abstract data types, Object & classes, attributes, methods, C++ class declaration, State idendity and behaviour of an object, Constructors and destructors, instantiation of objects, Default parameter value, object types, C++ garbage collection, dynamic memory allocation, abstract classes.	10
III	**UNIT-III** Inheritance and Polymorphism Inheritance, Class hierarchy, derivation – public, private & protected, Aggregation, composition vs classification hierarchies, Polymorphism, Categorization of polymorphism techniques, Method polymorphism, Operator overloading.	10
IV	**UNIT-IV** *Generic function Template function, function name overloading, Overriding inheritance methods, Run time polymorphism, Multiple Inheritance.*	6
V	*UNIT-V* Files and Exception Handling Streams and files, Exception handling	4

Referential Books:

1. A.R.Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997.

2. S.B.Lippman & J.Lajoie, " C++ Primer", 3rd Edition, Addison Wesley, 2000.

3. R.Lafore, "Object Oriented Programming using C++", Galgotia Publications, 2004

4. D.Parasons, "Object Oriented Programming using C++", BPB Publication.

Suggested Continuous Evaluation Methods:
In addition to the theoretical inputs the course will be delivered through Assignments, Presentation, Group Discussions. This will instill in student a sense of decision making and practical learning.

Program/Class: BCA	Year: First	Semester: IV

Course/ paper-2	
Course Code:BCA-2002	**Course Title: Internet Technology and Web Design**

Course outcomes:

CO Number	CO Statement	Knowledge Level
CO1	To highlight the features of different technologies involved in Web Development.	K1
CO2	Students should be able to design and implement a basic website.	K1
CO3	Students should be able to develop simple back-end database to support a website.	K2
CO4	Students should be able to recognize and evaluate website organizational structure and design elements.	K1

Credits:	Compulsory
Max. Marks:	Min. Passing Marks:

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:

Unit	Topics	No. of Lectures Total=40
I	**UNIT-I** **Introduction to Internet:** Internet, Growth of Internet, Owners of the Internet, Anatomy of Internet, ARPANET and Internet history of the World Wide Web, basic Internet Terminology, Net etiquette. Internet Applications – Commerce on the Internet, Governance on the Internet, Impact of Internet on Society – Crime on/through the Internet.	10
II	**UNIT-II** **Internet Connectivity & Network:** Connectivity types: level one, level two and level three connectivity, modem, dedicated connections through the telephone system, ISDN, Protocol options – Shell, SLIP, PPP, Service options – E-mail, WWW, News Firewall etc. Network definition, Common terminologies: LAN, WAN, Node, Host, Workstation, bandwidth, Interoperability, Network administrator, network security.	10
III	**UNIT-III** **Internet Security Management Concepts:** Overview of Internet Security, Firewalls, Internet Security, Management Concepts and Information Privacy.	4
IV	**UNIT-IV** **Introduction to Java:** The JDK Directory Structure, Java History; Java Features; Structure of Java Program; Compiling and Interpreting Applications; Java Tokens; Java Character set; Keywords and Identifiers, Primitive Data types Declarations, Non-Primitive data types; Operators and Expressions; Implicit and Explicit Type Conversions: The Cast Operator; Control Statements: If- else – if statement and Switch-case; Loops: While, Do While and For; Object Oriented Concepts: Abstraction and Encapsulation, Data Hiding; Introduction to Classes and Object; Access Controls; Implementation of Inheritance and Polymorphism; Methods in Java; Access Modifiers; Constructors and its types.HTML Programming Basics:HTML page structure, HTML Text, HTML links, HTML document tables, HTML Frames, HTML Images.	10

	UNIT-V	6
V	**Web Publishing and Browsing:** Overview, SGML, Web hosting, HTML. CGL, Documents Interchange Standards, Components of Web Publishing, Document management, Web Page Design Consideration and Principles, Search and Meta Search Engines, WWW, Browser, HTTP, Publishing Tools.	

Referential Books:

1. Greenlaw R and Hepp E "Fundamentals of Internet and www" 2nd EL, Tata McGrawHill,2007.
2. Godbole AS & Kahate A, "Web Technologies", Tata McGrawHill,2008.
3. B. Patel & Lal B. Barik, " Internet & Web Technology ", Acme Learning Publishers
4. Leon and Leon, "Internet for Everyone", Vikas Publishing House.

Suggested Continuous Evaluation Methods:
In addition to the theoretical inputs the course will be delivered through Assignments, Presentation, Group Discussions. This will instill in student a sense of decision making and practical learning.

Program/Class: BCA	Year: First	Semester: II
Course/ paper-3		
Course Code:BCA-2003	Course Title: Organization Behavior	

Course outcomes:

CO Number	CO Statement	Knowledge Level
CO1	Obtain the conceptual knowledge of organisational behaviour, and analyse the models and concepts	K1,K4
CO2	Have a inclusive knowledge about the behaviour of individuals in terms of personality, perception, attitude in organisations	K3
CO3	Assimilate and evaluate the importance of group roles and group tasks	K3,K5
CO4	Acquaint in various theories of leadership and motivation used in organizations	K2
CO5	Gain experience about organisational culture and implementation of commodious organisational climate	K3

Credits:	Compulsory	
Max. Marks:	Min. Passing Marks:	

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:

Unit	Topics	No. of Lectures Total=40
I	UNIT-I Fundamentals of Organizational Behaviour : Nature, Scope, Definition, Fundamental Concepts of Organizational Behaviour; Models of Organizational Behaviour; Emerging aspects of Organizational Behaviour: Meaning Cultural Diversity	4
II	UNIT-II Perception, Attitude, Values and Motivation: Concept, Nature, Process, Importance, Management, Behavioural aspect of Perception. Effects of employee attitudes; Job Satisfaction; Nature and Importance of Motivation; Achievement Motive; Theories of Work Motivation: Maslow's Need Hierarchy Theory, Mc Gregors's Theory 'X' and Theory 'Y	10
III	UNIT-III Personality : Definition of Personality, Determinants of Personality; Theories of Personality- Trait and Type Theories, The Big Five Trait Theory, Myres-Briggs Indicator; Locus of Control, Type A and Type B Theory of Personality	10
IV	UNIT-IV Work Stress : Meaning and definition of Stress, Symptoms of Stress; Sources of Stress: Individual Level, Group Level, Organizational Level; Stressors, Extra Organizational Stressors; Effect of Stress – Burnouts; Stress Management – Individual Strategies, Organizational Strategies	10
V	UNIT-V Group Behaviour and Leadership : Nature of Group, Types of Groups; Nature and Characteristics of team; Team Building, Effective Teamwork; Nature of Leadership, Leadership Styles; Traits of Effective Leaders	6

Referential Books:

1. Organizational Behavior Text, Cases and Games- By K.Aswathappa, Himalaya Publishing House, Mumbai, Sixth Edition (2005)

2. Organizational Behavior Human Behavior at Work By J.W. Newstrom, Tata McGraw Hill Publishing Company Limited, New Delhi, 12th Edition (2007)

3. Organizational Behavior – By Fred Luthans

4. Organizational Behavior – By Super Robbins

Suggested Continuous Evaluation Methods:

In addition to the theoretical inputs the course will be delivered through Assignments, Presentation, Group Discussions. This will instill in student a sense of decision making and practical learning.

Programme /Class: BCA	Year: First	Semester: II

Course/ paper-4		
Course Code:BCA-2004	**Course Title: Financial Accounting &Management**	

Course outcomes:

CO Number	CO Statement	Knowledge Level
CO1	To understand the basics of accounting and its application in general business environment	K1
CO2	To get the Knowledge about the important concepts and characteristics of accounting.	K1
CO3	To study the application of accounting in the general business environment.	K2

Credits:	Compulsory
Max. Marks:	Min. Passing Marks:

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:

Unit	Topics	No. of Lectures Total=40
I	**UNIT-I** Overview - Meaning and Nature of Financial Accounting, Scope of Financial Accounting, Financial Accounting & Management Accounting, Accounting concepts & convention, Accounting standards in India.	5
II	**UNIT-II** Basics of accounting – Capital & Revenue items, Application of Computer in Accounting Double Entry System, Introduction to Journal, Ledger and Procedure for Recording and Posting, Introduction to Trail Balance, Preparation of Final Account, Profit & Loss Account and related concepts, Balance Sheet and related concept. Ratio analysis.	10
III	**UNIT-III** Definition nature and Objective of Financial Management, Long Term Sources of Finance, Introductory idea about capitalization, Capital Structure, Concept of Cost of Capital, introduction, importance, explicit & implicit cost, Measurement of cost of capital, cost of debt.	10
IV	**UNIT-IV** Concept & Components of working Capital. Factors Influencing the Composition of working Capital, Objectives of working Capital Management – Liquidity Vs. Profitability and working capital policies. Theory of working capital: Nature and concepts	10
V	**UNIT-V** Cash Management, Inventory Management and Receivables Management.	5

Suggested Readings:
1. Gillet B.E. "Introduction to Operation Research"
2. Taha, H.A. "Operation Research – An Introduction"
3. Kanti Swarup "Operation Research"
4. S.D. Sharma "Operation Research"
5. Hira & Gupta "Operation Research"

Suggested Continuous Evaluation Methods:
In addition to the theoretical inputs the course will be delivered through Assignments, Presentation, Group Discussions. This will instill in student a sense of decision making and practical learning.

Program/Class: BCA	Year: First	Semester: II

Course/ paper-5		
Course Code: BCA-2005	**Course Title: Mathematics II**	

Course outcomes:

CO Number	CO Statement	Knowledge Level
CO1	To Understand the use of the basic data structures along with their applications.	K1
CO2	To get the knowledge about the important mathematical concepts their application.	K1
CO3	Evaluate the probabilities and conditional probabilities.	K2
CO4	Construct point estimators using the method of maximum likelihood	K1

Credits:	Compulsory	
Max. Marks:	Min. Passing Marks:	

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:		

Unit	Topics	No. of Lectures Total=40
I	**UNIT-I SETS:** *Sets, Subsets, Equal Sets Universal Sets, Finite and Infinite Sets, Operation on Sets, Union, Intersection and Complements of Sets, Cartesian Product, Cardinality of Set, Simple Applications.*	10
II	**UNIT-II** **RELATIONS AND FUNCTIONS** *Properties of Relations, Equivalence Relation, Partial Order Relation Function: Domain and Range, Onto, Into and One to One Functions, Composite and Inverse Functions.*	10
III	**UNIT-III** **PARTIAL ORDER RELATIONS AND LATTICES** *Partial Order Sets, Representation of POSETS using Hasse diagram, Chains, Maximal and Minimal Point, Glb, lub, Lattices & Algebric Systems, Principle of Duality, Basic Properties, Sublattices, Distributed & Complemented Lattics.*	10
IV	**UNIT-IV** **FUNCTIONS OF SEVERAL VARIABLES** *Partial Differentiation, Chain Rule, Extrema of Functions of 2 Variables, Euler's Theorem.*	5
V	*UNIT-V* **MULTIPLE INTEGRATION** *Double Integral in Cartesian and Polar Coordinates to find Area, Change of Order of Integration, Triple Integral to Find Volume of Simple Shapes in Cartesian Coordinates.*	5

Referential Books:
1. Kolman, Busby and Ross, "Discrete Mathematical Structure", PHI,1996.
2. S.K. Sarkar, "Discrete Maths"; S. Chand & Co.,2000
3. "Discrete Mathematics", Schaum's Outlines

Suggested Continuous Evaluation Methods:
In addition to the theoretical inputs the course will be delivered through Assignments, Presentation, Group Discussions. This will instill in student a sense of decision making and practical learning.

Program/Class: BCA	Year: Second	Semester: III

Course/ paper-1

Course Code:BCA-3001	Course Title: Python Programming

Course outcomes:

CO Number	CO Statement	Knowledge Level
CO1	Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.	K1
CO2	Express proficiency in the handling of strings and functions.	K1
CO3	Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets.	K2
CO4	Identify the commonly used operations involving file systems and regular expressions.	K1
CO5	Articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python.	K2

Credits:	Compulsory
Max. Marks:	Min. Passing Marks:

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:

Unit	Topics	No. of Lectures Total=40
I	UNIT-I Python: Features of Python, Environmental setup, Installation and tools required for running, Basic Types Variable types and operators : Assigning values to variables Multiple Assignments Standard Data Types Set Map Single line comments using Multi-line comments using triple quote, Data Type Conversion Operators, Types of Operator, Conditional statement, Looping statements with else-Pass-Break continue.	10
II	UNIT-II Number and List: Accessing values in List-Delete, update List element-Basic List operations-Indexing, Slicing and Matrices Built in methods and Functions for List-Accessing values in Tuple-Delete, List element-Basic Tuple operations Indexing, Slicing and Matrices Built in methods and Functions for Tuple.	10
III	UNIT-III Dictionary and Function: Accessing values in Dictionary-Updating Dictionary-Deleting Dictionary –elements-Properties of Dictionary keys-Built in Dictionary Functions and Methods Defining Function-Calling function- Pass by reference vs value Function Arguments-Required arguments-Keyword arguments-Default arguments-Variable-length arguments Recursion.	10
IV	UNIT-IV Modules and Packages: The Time Module and its functions-Calendar modules and its functions-Other modules and Functions Sum and Difference f time and date Import From import statement From import statement Executing modules, Local functions-Reload function Packages in Python.	5
V	UNIT-V Exception handling: Exception handling and assertions-Standard Exceptions-Assertions in Python-Handling an exception-Except clause with no exception-Except Clause with multiple exception-Try-Finally Clause-Argument of an Exception Raising an Exception.	5

Suggested Readings:

1. Tony Gaddis, Starting Out with Python, 3rd edition, Pearson
2. Y. Daniel Liang, Introduction to Programming Using Python, Pearson
3. Budd T A, Exploring Python , 2011, Tata McGraw Hill Education
4. Learning Python, Fourth Edition, Mark Lutz, O'Reilly publication

Suggested Continuous Evaluation Methods:
In addition to the theoretical inputs the course will be delivered through Assignments, Presentation, Group Discussions. This will instill in student a sense of decision making and practical learning.

Program/Class: BCA	Year:Second	Semester: III

Course/ paper-2		
Course Code:BCA-3002	**Course Title:** Data Structure Using C & C++	

Course outcomes:

CO Number	CO Statement	Knowledge Level
CO1	Understand the structure, syntax, and semantics of the Python language.	K1
CO2	Solve real world problems by applying the Python Data Structures, Objects, Functions and Modules.	K1,K2
CO3	Apply the fundamental principles of Object Oriented Programming.	K2
CO4	Apply the basics of data science using advanced Python libraries.	K1
CO5	Build practical applications in Python.	K1,K2

Credits:		Compulsory	
Max. Marks:		Min. Passing Marks:	
Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:			

Unit	Topics	No. of Lectures Total=40
I	**UNIT-I Introduction to Data Structure and its Characteristics** Array Representation of single and multidimensional arrays; Sparse arrays – lower and upper triangular matrices and Tri-diagonal matrices with Vector Representation also.	5
II	**UNIT-II Stacks and Queues** Introduction and primitive operations on stack; Stack application: Infix, postfix, prefix expressions; Evaluation of postfix expression; Conversion between prefix, infix and postfix, introduction and primitive operation on queues, D- queues and priority queues.	10
III	**UNIT-III Lists** Introduction to linked lists; Sequential and linked lists, operations such as traversal, insertion, deletion searching, two way lists and Use of headers	5
IV	**UNIT-IV Trees** Introduction and terminology; Traversal of binary trees; Recursive algorithms for tree operations such as traversal, insertion, deletion; Binary Search Tree	10
V	**UNIT-V Graphs:** Graph terminology, Representation of graphs, path matrix, BFS (breadth first search), DFS (depth first search), topological sorting, Warshall's algorithm (shortest path algorithm.)	10

Suggested Readings:
1. E. Horowiz and S. Sahani, " Fundamentals of Data structures", Galgotia Book source Pvt. Ltd., 2003
2. R.S. Salaria, " Data Structures & Algorithms" , Khanna Book Publishing Co. (P)Ltd..,2002 3. Y. Langsam et. Al., " Data Structures using C and C++" , PHI,1999

Suggested Continuous Evaluation Methods:
In addition to the theoretical inputs the course will be delivered through Assignments, Presentation, Group Discussions. This will instill in student a sense of decision making and practical learning.

Program /Class: BCA	Year: Second	Semester: III

Course/ paper-3		

Course Code:BCA-3003	Course Title: Operating System

Course outcomes:

CO Number	CO Statement	Knowledge Level
CO1	Understand the basics of operating systems like kernel, shell, types and views of operating systems.	
CO2	Describe the various CPU scheduling algorithms and remove deadlocks.	
CO3	Explain various memory management techniques and concept of thrashing	
CO4	Use disk management and disk scheduling algorithms for better utilization of external memory.	
CO5	Recognize file system interface, protection and security mechanisms. Explain the various features of distributed OS like Unix, Linux, windows etc	

Credits:	Compulsory
Max. Marks:	Min. Passing Marks:

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:

Unit	Topics	No. of Lectures Total=40
I	UNIT-I Introduction, What is an operating system, Simple Batch Systems, Multi-programmed Batch systems, Time- Sharing Systems, Personal – Computer Systems, Parallel systems, Distributed systems, Real- Time Systems Memory Management: Background, Logical versus physical Address space, swapping, Contiguous allocation, Paging, Segmentation Virtual Memory: Demand Paging, Page Replacement, Page- replacement Algorithms, Performance of Demand Paging, Allocation of Frames, Thrashing, Other Considerations	12
II	UNIT-II Processes: Process Concept, Process Scheduling, Operation on Processes CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple – Processor Scheduling.	8
III	UNIT-III Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock	8
IV	UNIT-IV Device Management: Techniques for Device Management, Dedicated Devices, Shared Devices, Virtual Devices; Input or Output Devices, Storage Devices, Buffering.	4
V	UNIT-V Information Management: Introduction, A Simple File system, General Model of a File System, Symbolic File System, Basic File System, Access Control Verification, Logical File System, Physical File system File – System Interface; File Concept, Access Methods, Directory Structure, Protection.	8

Suggested Readings:

1. Silbersachatz and Galvin, " Operating System Concepts", Person, 5th Ed.2001
2. Madnick E., Donovan J., " Operating Systems, Tata McGrawHill,2001 3. Tannenbaum, "Operating Systems", PHI, 4th Edition,2000

Suggested Continuous Evaluation Methods:
In addition to the theoretical inputs the course will be delivered through Assignments, Presentation, Group Discussions. This will instill in student a sense of decision making and practical learning.

Program/Class: BCA	Year: Second	Semester: III

Course/ paper-4		
Course Code:BCA-3004	**Course Title: Digital Electronics & Computer Organization**	

Course outcomes:

To enable the students to learn principles and concepts of Business Economics

CO Number	CO Statement	Knowledge Level
CO1	An ability to understand theory of Digital Design and Computer Organization to provide an insight of how basic computer components are specified.	K1
CO2	An ability to understand the functions of various hardware components and their building blocks	K1,K2
CO3	An ability to understand and appreciate Boolean algebraic expressions to digital design	K3
CO4	An in depth understanding of sequential! Combinational circuits	K3,K4
CO5	An in depth understanding of realization of different combinational/sequential circuits	K4

Credits:		Compulsory	
Max. Marks:		Min. Passing Marks:	

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:			

Unit	Topics	No. of Lectures Total=40
I	**UNIT-I Number System & Boolean Algebra Number System**: Binary, Octal, Decimal, Hexadecimal; Conversion of Number System; Binary Arithmetic & Complement, Binary Codes: Weighted & Non Weighted, Gray Code, Excess-3 Code. Boolean Function; Boolean Postulates; De-Morgan's Theorem; Boolean Expressions: Sum of Product, Product of Sum, Minimization of Boolean Expressions using K-Map; Logic Gates: AND, OR, NOT, NAND, NOR, XOR, XNOR; Implementations of Logic Functions using Gates; NAND- NOR Implementations; Multilevel gate Implementations.	10
II	**UNIT-II Combinational Circuits Adders & Subtractors:** Half Adder, Full Adder, Binary Adder, Half Subtractor, Full Subtractor, Adder Subtractor; Magnitude Comparator: Two Bit Magnitude Comparator, Three Bit Magnitude Comparator; Multiplexer & De-Multiplexer: 4*1 Multiplexer, 8*1 Multiplexer; Decoder & Encoder; Parity Checker & Generator; Code Converter.	10
III	**UNIT-III Sequential Circuit: Introduction to Flip Flops:** SR, JK, T, D, Master Slave Flip Flops; Conversion of Flip Flops; Characteristic Table & Equation; Edge Triggering & Level Triggering; Excitation Table; State Diagram; State Table; State Reduction; Design of Sequential Circuits.	10
IV	**UNIT-IV Registers Introduction of Registers** Classification of Registers; Register with Parallel Load; Shift Registers; Bidirectional Shift Register with Parallel Load. Counters Introduction of Counter; Asynchronous/Ripple Counters; Synchronous Counters; BCD Counter; 4-bit Binary Counter with Parallel Load; Design of Synchronous Counters; Ring Counter; Johnson Counter.	5
V	**UNIT-V Memory Organization:** Basic cell of static and dynamic RAM; Building large memories using chips; Associative memory; Cache memory organization and Virtual memory organization.	5

Suggested Readings:

1. Digital Logic and Computer design (PHI) 1998 : M.M. Mano
2. Computer Architecture (PHI) 1998 : M.M. Mano
3. Digital Electronics (TMH) 1998 : Malvino and Leach
4. Computer Organization and Architecture : William Stallings
5. Digital fundamentals (Universal Book Stall) 1998 : Floyd, L.Thomas
6. Computer Organization (MC Graw-Hill, Signapore) : Hamcher, Vranesic and Zaky

Suggested Continuous Evaluation Methods:
In addition to the theoretical inputs the course will be delivered through Assignments, Presentation,
Group Discussions. This will instill in student a sense of decision making and practical learning.

Program/Class: BCA	Year: Second	Semester: III

Course/ paper-5	
Course Code:BCA-3005	**Course Title: Elements of Statistics**

Course outcomes:

To enable the students to learn principles and concepts of Business Economics

CO Number	CO Statement	Knowledge Level
CO1	Organize, manage and present data.	K1
CO2	Analyze statistical data graphically using frequency distributions and cumulative frequency distributions.	K1,K2
CO3	Analyze statistical data using measures of central tendency, dispersion and location.	K1,K2
CO4	Use the basic probability rules, including additive and multiplicative laws, using the terms, independent and mutually exclusive events.	K2
CO5	Translate real-world problems into probability models.	K1

Credits:	Compulsory
Max. Marks:	Min. Passing Marks:

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:		

Unit	Topics	No. of Lectures Total=40
I	**UNIT-I Population, Sample and Data Condensation** Definition and scope of statistics, concept of population and simple with Illustration, Raw data, attributes and variables, classification, frequency distribution, Cumulative frequency distribution.	5
II	**UNIT-II Measures of Central Tendency** Concept of central Tendency, requirements of a good measures of central tendency, Arithmetic mean, Median, Mode, Harmonic Mean, Geometric mean for grouped and ungrouped data.	8
III	**UNIT-III Measures of Dispersion**: Concept of dispersion, Absolute and relative measure of dispersion, range variance, Standard deviation, Coefficient of variation	6
IV	**UNIT-IV Permutations and Combinations** Permutations of 'n' dissimilar objects taken 'r' at a time (with or without repetitions). nPr = n!/(n-r) !(without proof). Combinations of 'r' objects taken from 'n' objects. nCr = n!/(r!(n-r)!) (without proof) . Simple examples, Applications.	6
V	**UNIT-V Sample space, Events and Probability** Experiments and random experiments, Ideas of deterministic and non-deterministic experiments; Definition of sample space, discrete sample space, events; Types of events, Union and intersections of two or more events, mutually exclusive events, Complementary event, Exhaustive event; Simple examples. Classical definition of probability, Addition theorem of probability without Proof (upto three events are expected). Definition of conditional probability Definition of independence of two events, simple numerical problems.	10
VI	UNIT-VI Statistical Quality Control Introduction, control limits, specification limits, tolerance limits, process and product control; Control charts for X and R; Control charts for number of defective {n-p chart} ,control charts for number of defects {c - chart}	5

Suggested Readings:
1. Gupta S.P. – Statistical Methods , Pub – Sultan Chand and sons New Delhi
2. S.C. Gupta - Fundamentals of statistics - Sultan Chand & sons ,Delhi.
3. D.N. Elhance - Fundamentals of statistics - Kitab Mahal, Allahabad.
4. Montogomery D.C. – Statistical Quality Control - John Welly andSons
5. Hogg R.V. and Craig R.G. – Introduction to mathematical statistics Ed 4 {1989} – Macmillan Pub. Co. New York.

Suggested Continuous Evaluation Methods:
In addition to the theoretical inputs the course will be delivered through Assignments, Presentation, Group Discussions. This will instill in student a sense of decision making and practical learning.

Program/Class: BCA	Year: Second	Semester: IV

Course/ paper-1	
Course Code:BCA-4001	**Course Title: Computer Graphics and Animation**

Course outcomes:

CO Number	CO Statement	Knowledge Level
CO1	Understand the basics of computer graphics, different graphics systems and applications of computer graphics.	K1
CO2	Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.	K1,K2
CO3	Use of geometric transformations on graphics objects and their application in composite form.	K1,K2
CO4	Extract scene with different clipping methods and its transformation to graphics display device.	K1
CO5	Explore projections and visible surface detection techniques for display of 3D scene on 2D screen.	K2
CO6	Render projected objects to naturalize the scene in 2D view and use of illumination models for this.	K1,K2

Credits:	Compulsory
Max. Marks:	Min. Passing Marks:

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:

Unit	Topics	No. of Lectures Total=40
I	**UNIT-I Introduction:** Interactive Computer Graphics, Advantages of Interactive Graphics, Representative Uses of Computer Graphics, Conceptual Framework for Interactive Graphics, Classification of Application Development of Hardware and software for computer Graphics.	10
II	**UNIT-II Scan Conversion:** Scan Converting Lines, Scan Converting Circles, Scan Converting Ellipses. Clipping: point clipping, Cohen-Sutherland line clipping Algorithm, Midpoint Subdivision Algorithm, polygon clipping (Sutherland-Hodgeman)	5
III	**UNIT-III Geometrical Transformation:** 2D Transformation (translation, rotation, scaling, reflection and shearing), Homogeneous Coordinates and Matrix Representation of 2D Transformations, Successive and composite 2D Transformations, the Window-to-Viewport Transformations, Introduction to 3D Transformations Matrix.	10
IV	**UNIT-IV Curves & Surfaces:** Polygon Surfaces and polygon meshes, Quadratic and super quadrics surfaces, Spline curve and representation.	5
V	**UNIT-V Computer Animation:** Introduction, Application of animation, Morphing, Keyframe system, Motion specifications in Animation, Types of animation, Sequencing of Animation Design and Fundamental principles of animation.	10

Suggested Readings:
1. Foley, Van Dam, Feiner, Hughes, Computer Graphics Principles& practice,2000.
2. D.J. Gibbs & D.C. Tsichritzs: Multimedia programming Object Environment& Frame work, 2000
3. Ralf Skinmeiz and Klana Naharstedt, Multimedia: computing, Communication and Applications, Pearson, 2001
4. D. Haran & Baker. Computer Graphics Prentice Hall of India,1986.

Suggested Continuous Evaluation Methods:
In addition to the theoretical inputs the course will be delivered through Assignments, Presentation, Group Discussions. This will instill in student a sense of decision making and practical learning.

Program/Class: BCA	Year: Second	Semester: IV

Course/ paper-2		

Course Code:BCA-4002	Course Title: Database Management System

Course outcomes:

CO Number	CO Statement	Knowledge Level
CO1	Describe DBMS architecture, physical and logical database designs, database modeling, relational, hierarchical and network models.	K1
CO2	Identify basic database storage structures and access techniques such as file organizations, indexing methods including B-tree, and hashing.	K1,K2
CO3	Learn and apply Structured query language (SQL) for database definition and database manipulation.	K1,K2
CO4	Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.	K2
CO5	Understand various transaction processing, concurrency control mechanisms and database protection mechanisms.	K1,K2

Credits:	Compulsory	
Max. Marks:	Min. Passing Marks:	

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:

Unit	Topics	No. of Lectures Total=40
I	**UNIT-I Introduction:** Characteristics of database approach, data models, DBMS architecture and data independence	6
II	**UNIT-II E-R Modeling:** Entity types, Entity set, attribute and key, relationships, relation types, roles and structural constraints, weak entities, enhanced E-R and object modeling, Sub classes; Super classes, inheritance, specialization and generalization.	8
III	**UNIT-III Data Normalization:** Functional Dependencies, Normal form up to 5th normal form, Data base design using EER to relational language.	8
IV	**UNIT-IV Relational Data Model:** Relational model concepts, relational constraints, relational algebra SQL: SQL queries, programming using SQL.	8
V	**UNIT-V Concurrency Control:** Transaction processing, locking techniques and associated, database recovery, security and authorization. Recovery Techniques, Database Security	10

Suggested Readings:
1. Abraham Silberschatz, Henry Korth, S.Sudarshan, "Database Systems Concepts", 4th Edition, McGraw Hill,1997.
2. Jim Melton, Alan Simon, "Understanding the new SQL: A complete Guide", Morgan Kaufmann Publishers, 1993.
3. A.K. Majumdar, P. Bhattacharya, "Database Management Systems", TMH, 1996.
4. 4. Bipin Desai, "An Introduction to database systems", Galgotia Publications, 1991.

Suggested Continuous Evaluation Methods:
In addition to the theoretical inputs the course will be delivered through Assignments, Presentation, Group Discussions. This will instill in student a sense of decision making and practical learning.

Program/Class: BCA	Year: Second	Semester: IV

Course/ paper-3	
Course Code:BCA-4003	**Course Title: Software Engineering**

Course outcomes:

CO Number	CO Statement	Knowledge Level
CO1	How to apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment.	K1
CO2	An ability to work in one or more significant application domains	K1,K2
CO3	Work as an individual and as part of a multidisciplinary team to develop and deliver quality software	K1,K2
CO4	Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle.	K1
CO5	Demonstrate an ability to use the techniques and tools necessary for engineering practice	K2

Credits:	Compulsory
Max. Marks:	Min. Passing Marks:

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:

Unit	Topics	No. of Lectures Total=40
I	Demonstrate an ability to use the techniques and tools necessary for engineering practice	5
II	Requirements Analysis: Statement of system scope, isolation of top level processes and entitles and their allocation to physical elements, refinement and review.	5
III	Designing Software Solutions: Refining the software Specification; Application of fundamental design concept for data, architectural and procedural designs using software blue print methodology and object oriented design paradigm; Creating design document.	10
IV	Software Implementation: Relationship between design and implementation, Implementation issues and programming support environment, Coding the procedural design, Good coding style.	10
V	Software Maintenance: Maintenance as part of software evaluation, reasons for maintenance, types of maintenance (Perceptive, adoptive, corrective), designing for maintainability, techniques for maintenance	5
VI	Comprehensive examples using available software platforms/case tools, Configuration Management.	5

Suggested Readings:
1. K.K. Aggarwal & Yogesh Singh "Software engineering", 2nd Ed., New Age International 2005.
2. I. Sommerville, "Software Engineering", Addison Wesley,2002.
3. James Peter, W. Pedrycz, "Software Engineering: An Engineering Approach" John Wiley & Sons

Suggested Continuous Evaluation Methods:
In addition to the theoretical inputs the course will be delivered through Assignments, Presentation, Group Discussions. This will instill in student a sense of decision making and practical learning.

Programme/Class: BCA	Year: Second	Semester: IV

Course/ paper-4		
Course Code:BCA-4004	**Course Title: Optimization Techniques**	

Course outcomes:

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concepts of linear programming, duality and methods for solving linear programming problem	K1
CO2	Understand the mathematical formulation of transportation and assignment problems and solution	K1,K2
CO3	Understand the mathematical formulation of transportation and assignment problems and solution	K1
CO4	Solve nonlinear unconstrained optimization problems.	K2

Credits:	Compulsory
Max. Marks:	Min. Passing Marks:

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:	

Unit	Topics	No. of Lectures Total=40
I	**UNIT-I Linear programming** Central Problem of linear Programming various definitions included Statements of basic theorem and also their properties, simplex methods, primal and dual simplex method, transport problem. Assignment problem and its solution. Graphical Method Formulation, Linear Programming Problem.	10
II	**UNIT-II Game theory Introduction** Two-person zero-sum game, pure strategies (Minmax and Maxmin principles),Mixed strategies, The rules principles of Dominance, Algebraic method to solve games without saddle point, Graphical method to solve the games.	10
III	**UNIT-III Replacement Theory** Replacement of item that deteriorates replacement of items that fail. Group replacement and individual replacement.	5
IV	**UNIT-IV PERT and CPM** Project management origin and use of PERT, origin and use of CPM, Applications of PERT and CPM, Project Network, Diagram representation, Critical path calculation by network analysis and critical path method (CPM)	10
V	**UNIT-V Job Sequencing** Introduction, solution of sequencing problem Johnson s algorithm for n jobs through 2 machines	5

Suggested Readings:
   1. Gillet B.E. "Introduction to Operation Research"
   2. Taha, H.A. "Operation Research – An Introduction"
   3. Kanti Swarup "Operation Research"
   4. S.D. Sharma "Operation Research"
   5. Hira & Gupta "Operation Research"

Suggested Continuous Evaluation Methods:
In addition to the theoretical inputs the course will be delivered through Assignments, Presentation, Group Discussions. This will instill in student a sense of decision making and practical learning.

Program/Class: BCA	Year: Second	Semester: IV

Course/ paper-5		
Course Code: BCA-4005	**Course Title: Mathematics-III**	

Course outcomes:

CO Number	CO Statement	Knowledge Level
CO1	Find out nth roots of complex numbers	K1
CO2	Apply the concepts of vector calculus	K1,K2
CO3	Find out Directional Derivatives, Divergence and Curl	K2
CO4	Find out Fourier series of periodic functions	K1,K2
CO5	To solve various differential equations and to apply these analytical methods in different engineering applications	K2

Credits:	Compulsory	
Max. Marks:	Min. Passing Marks:	

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:

Unit	Topics	No. of Lectures Total=40
I	**UNIT-I COMPLEX VARIABLES:** Complex Number System, Algebra of Complex Numbers, Polar Form, Powers and Roots, Functions of Complex Variables, Elementary Functions.	10
II	**UNIT-II VECTOR CALCULUS:** Differentiation of Vectors, Scalar and Vector Fields, Gradient, Directional Derivatives, Divergence and Curl and their Physical Meaning.	5
III	**UNIT-III FOURIER SERIES:** Periodic Functions, Fourier series, Fourier Series of Even and Odd Functions, Half Range Series.	5
IV	**UNIT-IV ORDINARY DIFFERENTIAL EQUATIONS OF FIRST ORDER:** Variable- Separable Method, Homogeneous Differential Equations, Exact Differential Equations, Linear Differential Equations, Bernoulli's Differential Equations, Differential Equations of First Order and First Degree by Integrating Factor.	10
V	**UNIT-V ORDINARY DIFFERENTIAL EQUATIONS OF SECOND ORDER**: Homogenous Differential Equations with Constant Coefficients, Cases of Complex Roots and Repeated Roots, Differential Operator, Solutions by Methods of Direct Formulae for Particular Integrals, Operator Method for Finding Particular Integrals, (Direct Formulae).	10

Suggested Readings:
1. A.B. Mathur and V.P. Jaggi, "Advanced Engineering Mathematics", Khanna Publishers, 1999.
2. H.K. Dass, "Advanced Engineering Mathematics", S. Chand & Co., 9th Revised Ed.

Suggested Continuous Evaluation Methods:
In addition to the theoretical inputs the course will be delivered through Assignments, Presentation, Group Discussions. This will instill in student a sense of decision making and practical learning.

Programme/Class:	Year:	Semester: FIFTH

Course/ paper-1 (A)		
Course Code: BCA-5001	**Course Title: Knowledge Management**	

Course outcomes:

CO Number	CO Statement	Knowledge Level
CO1	Here we learn that how to use knowledge for effective result to yourself or to any organization.	K1
CO2	A good knowledge management strategy will diagnose the existing status of the organisation, compare this with what stakeholders want to achieve in the future.	K1,K2
CO3	And come to an assessment of how far apart the two or a gap analysis.	K1,K2
CO4	Knowledge management auditing is often the first step in any knowledge management initiative as it serves to inventory what knowledge-intensive resources exist within a company	K2,K3

Credits:	Compulsory
Max. Marks:	Min. Passing Marks:

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:

Unit	Topics	No. of Lectures Total=40
I	**UNIT-I** **Business Intelligence and Business Decisions:** Modeling Decision Process; Decision support systems; Group decision support and Groupware Technologies.	10
II	**UNIT-II** **Executive Information and support Systems:** Business Expert System and AI, OLTO & OLAP; Data Warehousing; Data Marts, Data Warehouse architecture; Tools for data warehousing.	10
III	**UNIT-III** **Multi- Dimensional analysis:** Data mining and knowledge discovery; Data mining and Techniques; Data mining of Advance Databases.	10
IV	**UNIT-IV** **Knowledge Management Systems:** Concept and Structure KM systems, techniques of knowledge management appreciation & limitation.	10

Suggested Readings:
1. Decision support system, EIS, 2000
2. W.H.Inmon, "Building Data Warehousing", Willey,1998.
3. Han, Jiawei, Kamber, Michelinal, " Data Mining Concepts & Techniques", Harcourt India, 2001

Suggested Continuous Evaluation Methods:
In addition to the theoretical inputs the course will be delivered through Assignments, Presentation, Group Discussions. This will instill in student a sense of decision making and practical learning.

Programme/Class:	Year:		Semester: FIFTH

Course/ paper-2

Course Code:BCA-5002	Course Title: **Java Programming and Dynamic Webpage Design**

Course outcomes:

CO Number	CO Statement	Knowledge Level
CO1	Able to understand the use of Class, Servlet, AWT and abstract classes.	K1
CO2	We learn that how to develop the Web Application using java programming	K1,K2
CO3	We learn how to establish the connection with database.	K3
CO4	Able to solve real world problems using OOP techniques.	K3
CO5	Able to solve problems using java collection framework and i/o classes.	K1,K2

Credits:	Compulsory
Max. Marks:	Min. Passing Marks:

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:

Unit	Topics	No. of Lectures Total=40
I	**UNIT-I** *Java Programming: Data types, control structured, arrays, strings, and vector, classes (inheritance, package, exception handling) multithreaded programming.*	5
II	**UNIT-II** *Java applets, AWT controls (Button, Labels, Combo box, list and other Listeners, menu bar) layout manager, string handling (only main functions)*	10
III	**UNIT-III** *JDBC: JDBC Fundamentals, Establishing Connectivity and Working with Connection Interface, Working with Statements, Creating and Executing SQL Statements, Working with Result Set Objects.*	10
IV	**UNIT-IV** *Java Servlets: Introduction, HTTP Servlet Basics, The Servlet Lifecycle, Retrieving Information, Sending HTML Information, Session Tracking.*	5
V	**UNIT-V** Java Server Pages: Introducing Java Server Pages, JSP Overview, Setting Up the JSP Environment, Generating Dynamic Content, Using Custom Tag Libraries and the JSP Standard Tag Library, Processing Input and Output	10

Suggested Readings:
1. Patrick Naughton and Herbertz Schildt, "Java-2 The Complete Reference" 199,TMH.
2. Shelley Powers, "Dynamic Web Publishing" 2nd Ed. Techmedia,1998.
3. Ivor Horton, "Beginning Java-2" SPDPublication
4. Jason Hunter, "Java Servlet Programming"O'Reilly
5. Shelley Powers, "Dynamic Web Publishing" 2nd Ed. Techmedia,1998
6. Hans Bergsten, "Java Server Pages", 3rd Ed.O'reilly

Suggested Continuous Evaluation Methods:
In addition to the theoretical inputs the course will be delivered through Assignments, Presentation,
Group Discussions. This will instill in student a sense of decision making and practical learning.

Programme/Class:	Year:		Semester: FIFTH
Course/ paper-3			
Course Code:BCA-5003	**Course Title: Computer Network**		

Course outcomes:

CO Number	CO Statement	Knowledge Level
CO1	Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.	K1
CO2	Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.	K1,K2
CO3	Communicate effectively in a variety of professional contexts.	K3
CO4	Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.	K3
CO5	Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.	K1,K2

Credits:	Compulsory
Max. Marks:	Min. Passing Marks:

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:

Unit	Topics	No. of Lectures Total=40
I	**UNIT-I** *Basic Concepts: Components of data communication, distributed processing, standards and organizations. Line configuration, topology, Transmission mode, and categories of networks.* **OSI and TCP/IP Models:** Layers and their functions, comparison of models. *Digital Transmission: Interfaces and Modems: DTE-DCE Interface, Modems, Cable modems.*	10
II	**UNIT-II** *Transmission Media: AttenuationGuided and unguided,, distortion, noise, throughput, propagation speed and time, wavelength, Shannon capacity, comparison of media.*	5
III	**UNIT-III** *Telephony: Multiplexing, error detection and correction: Many to one, One to many, WDM, TDM, FDM, Circuit switching, packet switching and message switching.* *Data link control protocols: Line discipline, flow control, error control, synchronous and asynchronous protocols, character and bit oriented protocols, Link access procedures.* **Point to point controls:** Transmission states, PPP layers, LCP, Authentication, NCP. **ISDN:** Services, Historical outline,	10

	subscriber's access, ISDN Layers and broadcast ISDN.	
IV	**UNIT-IV** ***Devices:*** *Repeaters, bridges, gateways, routers, The Network Layer; Design issues, Internetworking, Network-Layer in the internet.*	5
V	**UNIT-V** **Transport and upper layers in OSI Model:** Transport layer functions, connection management, functions of session layers, presentation layer and application layer.	10

Suggested Readings:
1. A.S.Tanenbaum, "Computer Networks"; Pearson Education Asia, 4th Ed.2003.
2. Behrouz A.Forouzan, "Data Communication and Networking", 3rd Ed. Tata MCGraw Hill, 2004

Suggested Continuous Evaluation Methods:
In addition to the theoretical inputs the course will be delivered through Assignments, Presentation, Group Discussions. This will instill in student a sense of decision making and practical learning.

Programme/Class:	Year:	Semester: FIFTH

Course/ paper-4

Course Code:BCA-5004	Course Title: Numerical Methods

Course outcomes:

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.	K1
CO2	Understand the problems quickly and easily compared to analytic solutions	K1,K2
CO3	We learn that how to solves continuous problems using numeric approximation.	K3
CO4	We understand to make informed decisions or draw conclusions about the efficiency of methods or systems using numerical data.	K3

Credits:	Compulsory
Max. Marks:	Min. Passing Marks:

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:

Unit	Topics	No. of Lectures Total=40
I	**UNIT-I** ***Roots of Equations:*** *Bisections Method, False Position Method, Newton's Raphson Method, Rate of convergence of Newton's method.*	8
II	**UNIT-II** ***Interpolation and Extrapolation :*** *Finite Differences, The operator E, Newton's Forward and Backward Differences, Newton's dividend differences formulae, Lagrange's Interpolation formula for unequal Intervals.*	10
III	**UNIT-III** **Numerical Differentiation Numerical Integration :** Introduction, direct methods, maxima and minima of a tabulated function, General Quadratic formula.	10
IV	**UNIT-IV** **Solution of Linear Equation:** Gauss's Elimination method and Gauss's Siedel iterative method.	6
V	**UNIT-V** Solution of Differential Equations: Euler's method, Picard's method, Fourth-order Ranga – Kutta method	6

Suggested Readings:
1. *Scarbourogh, "Numerical Analysis".*
2. *Gupta & Bose S.C. "Introduction to Numerical Analysis, "Academic Press, Kolkata,*
3. *S.S.Shashtri, " Numerical Analysis", PHI*

Suggested Continuous Evaluation Methods:
In addition to the theoretical inputs the course will be delivered through Assignments, Presentation, Group Discussions. This will instill in student a sense of decision making and practical learning.

Programme/Class:	Year:	Semester: SIXTH
Course/ paper-1	
Course Code:BCA-6001		**Course Title: Information & Cyber Security**

Course outcomes:

CO Number	CO Statement	Knowledge Level
CO1	Understand that Network security is an important field that is increasingly gaining attention as the internet expands.	K1
CO2	The security threats and internet protocol were analyzed to determine the necessary security technology.	K1,K2
CO3	The security technology is mostly software based, but many common hardware devices are used.	K3
CO4	Understand the topology and Wireless Network	K3
CO5	Understand Cyber Laws and Standards.	K1,K2

Credits:	Compulsory
Max. Marks:	Min. Passing Marks:

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:

Unit	Topics	No. of Lectures Total=40
I	**UNIT-I** *Concept of Cyberspace: Netizens Technology, Law and Society Object, Scope of the Information Technology Act, 2000, Electronic Records and Electronic Commerce., Intrusion Detection System, Intrusion Prevention System, Public Key Infrastructure.* *Digital Transmission: Interfaces and Modems: DTE-DCE Interface, Modems, Cable modems.*	10
II	**UNIT-II** *Internet Security: Computer Security and Threats, Hacking, Cracking, sneaking, Viruses, Trojan Horses, malicious code, Worms and Logic Bombs. Network attack and Defence Most Common Attacks, Scripts Kiddies and Packaged Defense.*	10
III	**UNIT-III** **Wireless Network Security :** Wireless Network Components, Security issues in Wireless Networks, Securing a Wireless Network, Mobile Security, The Smartphone Pentest Framework	10

IV	**UNIT-IV** **Cyber Laws and Standards:** ISO 27001, Cyber Law (Information Technology Act, 2000), International Standards maintained for Cyber Security, Security Audit ,Investigation by Investing Agency, Cyber Security Solutions.		5
V	**UNIT-V** ***Security Management:*** *Disaster Recovery, Digital Signature, Ethical Hacking, Penetration Testing, Computer Forensics*		5

Suggested Readings:
1. GautamKumawat, Ethical Hacking & Cyber Security Course : A Complete Package, Udemy Course, 2017
2. Georgia Weidman , Penetration testing A Hands-On In t r o d u c t i o n to Hacking, no starch press, 2014
3. Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, Security in Computing, 5th Edition , Pearson Education , 2015
4. William Stallings-Cryptography and Network Security: Principles and Practice Publication

Suggested Continuous Evaluation Methods:
In addition to the theoretical inputs the course will be delivered through Assignments, Presentation, Group Discussions. This will instill in student a sense of decision making and practical learning.

Programme/Class:	Year:	Semester: SIXTH
	Course/ paper-2	
Course Code:BCA-6002	**Course Title: Internet of Things**	

Course outcomes:

CO Number	CO Statement	Knowledge Level
CO1	We understand the Internet of Things is a messy idea that's captured the attention of the public, governments, academics, and industry.	K1
CO2	We understand that the attention it generates is valuable because it encourages reflection on the past and future of privacy protections.	K1,K2
CO3	Automatic processes are expected to be all around us to build the so-called "smart world", where the real and virtual worlds co-exist together	K3

Credits:	Compulsory	
Max. Marks:	Min. Passing Marks:	
Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:		

Unit	Topics	No. of Lectures Total=40
I	**UNIT-I** **Internet of Things (IoT):** Vision, Definition, Conceptual Framework, Architectural view, technology behind IoT, Sources of the IoT, M2M Communication, IoT Examples.	10

II	**UNIT-II** **M2M vs IoT An Architectural Overview:**Building architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. Reference Architecture and Reference Model of IoT.	10
III	**UNIT-III** **Hardware for IoT:** Sensors, Digital sensors, actuators, radio frequency identification (RFID) technology, wireless sensor networks, participatory sensing technology. Embedded Platforms for IoT: Embedded computing basics, Overview of IOT supported Hardware platforms.	10
IV	**UNIT-IV** **Network & Communication aspects in IoT:** Wireless Medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery.	5
V	**UNIT-V** **Domain specific applications of IoT:** Home automation, Industry applications, Surveillance applications, Other IoT application.	5

Suggested Readings:
1. ArshdeepBahga, Vijay Madisetti "Internet of Things (A hands on approach)" 1ST edition, VPI publications,2014
2. Jeeva Jose, Internet of Things, Khanna Publishing House
3. Michael Miller "The Internet of Things" by Pearson

Suggested Continuous Evaluation Methods:
In addition to the theoretical inputs the course will be delivered through Assignments, Presentation, Group Discussions. This will instill in student a sense of decision making and practical learning.

Programme/Class:	Year:	Semester: SIXTH
Course/ paper-3		
Course Code:BCA-6003	**Course Title: E-Commerce**	

Course outcomes:

CO Number	CO Statement	Knowledge Level
CO1	Understand E-Commerce has undeniably become an important part of our society.	K1
CO2	E-Commerce is not an IT issue but a whole business undertaking. Companies that use it as a reason for completely re-designing their business processes are likely to reap the greatest benefits.	K1,K2
CO3	E-Commerce is a helpful technology that gives the consumer access to business and companies all over the world.	K2
CO4	Understand the Electronic Payment Systems	K2
CO5	We understand the Public Policy: From Legal Issues to Privacy.	K2

Credits:		Compulsory	
Max. Marks:		Min. Passing Marks:	

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:

Unit	Topics	No. of Lectures Total=40
I	***Introduction to E-Commerce:*** *The Scope of Electronic Commerce, Definition of Electronic Commerce, Electronic E-commerce and the Trade Cycle, Electronic Markets, Electronic Data Interchange, Internet Commerce, E-Commerce in Perspective.*	8
II	**UNIT-II** ***Business-to-Business Electronic Commerce:*** *Characteristics of B2B EC, Models of B2B Ec, Procurement Management Using the Buyer's Internal Marketplace, Just in Time Delivery, Other B2B Models, Auctions and Services from Traditional to Internet Based EDI, Integration with Back-end Information System, The Role of Software Agents for B2B EC, Electronic marketing in B2B, Solutions of B2B EC, Managerial Issues, Electronic Data Interchange (EDI), EDI: The Nuts and Bolts, EDI & Business.*	10
III	**UNIT-III** ***Internet and Extranet :*** *Automotive Network Exchange, The Largest Extranet, Architecture of the Internet, Intranet and Extranet, Intranet software, Applications of Intranets, Intranet Application Case Studies, Considerations in Intranet Deployment, The Extranets, The structures of Extranets, Extranet products & services, Applications of Extranets, Business Models of Extranet Applications, Managerial Issues.* ***Electronic Payment Systems :*** *Is SET a failure, Electronic Payments & Protocols, Security Schemes in Electronic payment systems, Electronic Credit card system on the Internet, Electronic Fund transfer and Debit cards on the Internet, Stored – value Cards and E- Cash, Electronic Check Systems, Prospect of Electronic Payment Systems, Managerial Issues.*	10
IV	**UNIT-IV** ***Public Policy: From Legal Issues to Privacy :*** *EC- Related Legal Incidents, Legal Incidents, Ethical & Other Public Policy Issues, Protecting Privacy, Protecting Intellectual Property, Free speech, Internet Indecency & Censorship, Taxation & Encryption Policies, Other Legal Issues: Contracts, Gambling & More, Consumer & Seller Protection In EC.*	6
V	**UNIT-V** *Infrastructure For EC : It takes more than Technology, A Network Of Networks, Internet Protocols, Web- Based client/ Server, Internet Security, selling on the web, Chatting on the Web, Multimedia delivery, Analyzing Web Visits, Managerial Issues.*	6

Suggested Readings:
1. David Whiteley, " E-Commerce", Tata McGraw Hill,2000
2. Eframi Turban, Jae Lee, David King, K. Michale Chung, "Electronic Commerce", Pearson Education, 2000

Suggested Continuous Evaluation Methods:
In addition to the theoretical inputs the course will be delivered through Assignments, Presentation, Group Discussions. This will instill in student a sense of decision making and practical learning.

Programme/Class:		Year:		Semester: SIXTH
Course/ paper-4
Course Code:BCA-6004			**Course Title: Data Science and Machine Learning**

Course outcomes:

CO Number	CO Statement	Knowledge Level
CO1	Learning Goals for the Major and Minor in Data Science	K1
CO2	How we will develop relevant programming abilities.	K1,K2
CO3	Understand the demonstrate proficiency with statistical analysis of data.	K3
CO4	We learn that how we will develop the ability to build and assess data-based models.	K2,K3
CO5	Understand that how to execute statistical analyses with professional statistical software.	K1,K3
CO6	Understand that how we will apply data science concepts and methods to solve problems in real-world contexts and will communicate these solutions effectively	K1,K3

Credits:	Compulsory
Max. Marks:	Min. Passing Marks:

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:

Unit	Topics	No. of Lectures Total=40
I	**UNIT-I** **Introduction to Data Science:** Evolution of Data Science, Data Science Roles, Stages in a Data Science Project, Applications of Data Science in various fields, Data Security Issues.	10
II	**UNIT-II** **Data Collection and Data Pre-Processing:** Data Collection Strategies, Data Pre-Processing Overview, Data Cleaning, Data Integration and Transformation, Data Reduction.	10
III	**UNIT-III** **Exploratory Data Analytics:** Descriptive Statistics - Mean, Standard Deviation, Skewness and Kurtosis – Box Plots – Pivot Table – Correlation Statistics – ANOVA.	10

IV	**UNIT-IV** **Introduction:** Idea of Machines learning from data, Classification of problem – Regression and Classification, Supervised and Unsupervised learning.		5
V	**UNIT-V** **Neural Networks:** History, Artificial and biological neural networks, Artificial intelligence and neural networks, Biological neurons, Models of single neurons, Different neural network models		5

Suggested Readings:
1. 1. Cathy O'Neil and Rachel Schutt , "Doing Data Science", O'Reilly, 2015.
2. David Dietrich, Barry Heller, Beibei Yang, "Data Science and Big data Analytics", EMC 2013
3. Machine Learning, Tom M. Mitchell
4. Introduction to Machine learning, Nils J.Nilsson

Suggested Continuous Evaluation Methods:
In addition to the theoretical inputs the course will be delivered through Assignments, Presentation, Group Discussions. This will instill in student a sense of decision making and practical learning.