

BCA-MCA DUAL DEGREE (5 YRS.) SYLLABUS 2018 BATCH
(UPDATED ON 24.05.2019)

Course: BCA- MCA Dual Degree Programme

Duration: 5 Years

Eligibility: Passed 10+2 Examination from any Board recognized or established by Central/State Government through a legislation.

Mode of admission:

1. Online Counselling based on 10+2 examination marks.
2. Manual counselling for left over seats after Online Counselling.

MRSPTU

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Semester 1 st		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
HUM0-101	Communicative English	3	1	0	40	60	100	4
BCMC-101	Introduction to Information Technology	3	1	0	40	60	100	4
BCMC-102	Computer Organization	3	1	0	40	60	100	4
BCMC-103	Programming in C Language	3	1	0	40	60	100	4
HUM0-102	Human Value & Professional Ethics	3	1	0	40	60	100	4
BCMC-104	Software Lab.-I (Based on BCMC-101)	0	0	4	60	40	100	2
BCMC-105	Software Lab.-II (Based on BCMC-103)	0	0	4	60	40	100	2
Total		15	5	8	320	380	700	24

Semester 2 nd		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BCMC -206	Database Management System	3	1	0	40	60	100	4
BCMC -207	Computer Network	3	1	0	40	60	100	4
BCMC -208	Management Information System	3	1	0	40	60	100	4
BCMC -209	Object Oriented Programming Language in C++	3	1	0	40	60	100	4
BCMC -210	Operating System	3	0	0	40	60	100	3
BCMC -211	Software Lab.-III (Based on BCMC-206)	0	0	4	60	40	100	2
BCMC -212	Software Lab.-IV (Based on BCMC-209)	0	0	4	60	40	100	2
Total		15	4	8	320	380	700	23

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Semester 3 rd		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BCMC-313	Software Engineering	3	1	0	40	60	100	4
BCMC-314	Data Structure	3	1	0	40	60	100	4
BCMC -315	Latest Trends in Information Technology	3	1	0	40	60	100	4
BCMC -316	Programming in Java	3	1	0	40	60	100	4
BCMC -317	Environmental Studies and Disaster Management	3	1	0	60	40	100	4
BCMC -318	Software Lab.-V (Based on BCMC-314)	0	0	4	60	40	100	2
BCMC-319	Software Lab.-VI (Based on BCMC-316)	0	0	4	40	60	100	2
Total		15	5	8	320	380	700	24

Semester 4 th		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BCMC-420	Programming with Python	3	1	0	40	60	100	4
BCMC -421	Software Project Management	3	1	0	40	60	100	4
BCMC-422	Linux Operating System	3	1	0	40	60	100	4
BCMC -423	System Programming	3	1	0	40	60	100	4
BCMC-424	Software Lab.-VII (Based on BCMC-420)	0	0	4	60	40	100	2
BCMC-425	Software Lab.-VIII (Based on BCMC-422)	0	0	4	60	40	100	2
Total		12	4	8	280	320	600	20

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Semester 5 th		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BCMC-526	Data Analytics	3	1	0	40	60	100	4
BCMC-527	Artificial Intelligence	3	1	0	40	60	100	4
BCMC-528	Object Oriented Analysis and Design using UML	3	1	0	40	60	100	4
BCMC-529	Web Application Development	3	1	0	40	60	100	4
BCMC-530	Software Lab.-IX (Based on BCMC-528)	0	0	4	60	40	100	2
BCMC-531	Software Lab.-X (Based on BCMC-529)	0	0	4	60	40	100	2
Total		12	4	8	280	320	600	20

Semester 6 th		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BCMC-632	Computer Graphics and Multimedia Animation	3	1	0	40	60	100	4
BCMC-633	Network Security	3	1	0	40	60	100	4
BCMC-634	Mobile Applications	3	1	0	40	60	100	4
BCMC-635	Software Lab- XI (Based on BCMC-632)	0	0	4	60	40	100	2
BCMC-636	Software Lab-XII (Based on BCMC-634)	0	0	4	60	40	100	2
BCMC-637	Software Project Development	0	0	8	60	40	100	4
Total		9	3	16	300	300	600	20

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COMMUNICATIVE ENGLISH

SubjectCode:HUM0-101

L T PC
3 1 0 4

Durations: 45Hrs.

Objectives and Expected Outcomes: The objectives of this course are to make students understand that both oral & written communications are equally important. The students should be comfortable with both verbal & written communications.

UNIT-I (10 Hrs.)

English Language: Sentence, Parts of speech, Tenses, Active passive voice, Direct Indirect speech, Creative writing & vocabulary, Comprehension passage, reading of biographies of at least 10 IT business personalities (can be a home assignment or classroom reading).

UNIT-II (13 Hrs.)

Business Communications: Types, Medias, Objectives, Modals, Process, Importance Understanding Barriers to communication & ways to handle and improve barriers.

UNIT-III (12 Hrs.)

Presentation Skills: Its Purpose in business world, how to find material for presentation, how to sequence the speech with proper introduction and conclusion, how to Prepare PPT & Complete set of required body language while delivering presentation.

Reading & Writing Skills: Importance of reading and writing, improving writing skills through understanding and practicing Notice, E-mail, Tenders, Advertisement, formal letter.

UNIT-IV (10 Hrs.)

Listening Skills: Its importance as individual and as a leader or as a worker, its types, barriers to listening & remedies to improve listening barriers.

Non-verbal Communication: understanding what is called non-verbal communication, its importance as an individual, as a student, as a worker and as a leader, its types.

Recommended Books:

1. M.V. Rodriguez, 'Effective Business Communication', 2003.
2. Meenakshi Raman, Parkash Singh, 'Business Communication' Paperback Edition, Oxford University Press, 2012.

INTRODUCTION TO INFORMATION TECHNOLOGY

SubjectCode:BCMC-101

L T PC
3 1 0 4

Durations: 45 Hrs.

Objectives and Expected Outcomes: This course will enable the student to gain an understanding of the core concepts and technologies which constitute Information Technology. The intention is for the student to be able to articulate and demonstrate a basic understanding of the fundamental concepts of Information Technology.

UNIT- I (10 Hrs.)

Computer Fundamentals: Block structure of a computer, characteristics of computers, problem solving with computers, generations of computers, and classification of computers on the basis of capacity, purpose, and generation.

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Number System: Bit, byte, binary, decimal, hexadecimal, and octal systems, conversion from one system to the other, representation of characters, integers and fractions.

Binary Arithmetic: Addition, subtraction and multiplication.

UNIT-II (13 Hrs.)

Memory Types: Magnetic core, RAM, ROM, Secondary, Cache, Bubble Memory.

Input and Output Units: Keyboard, Mouse, Monitor (CRT and LCD): Light pen, joystick, Mouse, Touch screen; OCR, OMR, MICR

Overview of storage devices: Floppy disk, hard disk, compact disk, tape. Printers: Impact, non-impact, working mechanism of Drum printer, Dot Matrix printer, Inkjet printer and Laser printer.

Computer Languages: Machine language, assembly language, higher level language, 4GL. Introduction to Compiler, Interpreter, Assembler, Assembling, System Software, Application Software.

UNIT- III (12 Hrs.)

Operating System: Batch, multi-programming, time sharing, network operating system, on-line and real time operating system, Distributed operating system, multi-processor, Multi-tasking.

Graphical OS: Fundamentals of windows, types of windows, anatomy of windows, windows explorer, customizing windows, control panel, taskbar setting, Network Neighborhood.

Word processing: Editing features, formatting features, saving, printing, table handling, page settings, spell-checking, macros, mail-merge, equation editors.

Spreadsheet: Workbook, worksheets, data types, operators, cell formats, freeze panes, editing features, formatting features, creating formulas, using formulas, cell references, replication, sorting, filtering, functions, Charts & Graphs.

Presentation Graphics Software: Templates, views, formatting slide, slides with graphs, animation, using special features, presenting slide shows.

UNIT –IV (10 Hrs.)

Computer Network and Communication: Network types, network topologies, network communication devices, physical communication media.

Internet and its Applications: E-mail, TELNET, FTP, World Wide Web, Internet chatting; Intranet, Extranet, Gopher, Mosaic, WAIS.

Recommended Books:

1. D. H. Sanders, 'Computers Today', 4thEdn., McGraw Hill, 1988.
2. V. Rajaraman, 'Fundamentals of Computers', 2ndEdn., Prentice Hall of India, New Delhi, 1996.
3. Satish Jain, 'Information Technology', BPB, Paperback Edn., 1999.
4. David Cyganski, John A. Orr, 'Information Technology Inside and Outside', Pearson Education, Paperback Edn., 2002.
5. B. Ram, 'Computer Fundamentals', 3rdEdn., Wiley, 1997.
6. ChetanSrivastva, 'Fundamentals of Information Technology', 3rdEdn., KalayaniPublishers.
7. Larry long & Nancy long, 'Computers', 12thEdn., PrenticeHall, 1999.

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COMPUTER ORGANIZATION

Subject Code: BCMC-102

L T PC
3 1 0 4

Durations: 45Hrs.

UNIT-I (10 Hrs.)

Components of a Computer: Processor, Memory, Input-Output Unit, Historical Computer Architecture: First, Second, Third, Fourth Generation and Beyond, Difference between Organization and Architecture, Hardware Software Interaction.

UNIT-II (13 Hrs.)

Instruction Types: Three-address, Two-address, One-address, Zero-address; Addressing Modes, Interrupts. **Digital Logic Circuits:** Design of Combinational Circuits: Half Adder, Full Adder.

UNIT-III (12 Hrs.)

Sequential Circuits: SR, JK, D, T Flip-Flop, Excitation Tables, State Diagram, State Table, Binary Counter

Memory: Hierarchical Memory Structure, RAM, ROM, Cache, Auxiliary Memory

UNIT-IV (10 Hrs.)

CPU Architecture: Processor, Register Organization, ALU, CU, Memory, Input/Output; Instruction Implementation: Instruction Cycle, Fetch-Execute Cycle, Instruction codes, op-codes, Timing and Control, Memory reference instructions.

Recommended Books:

1. JyotsnaSengupta, 'Fundamentals of Computer Organization and Architecture', Nu TechBooks, Deep and Deep Publications, New Delhi, 2009,
2. M. Morris Mano, 'Digital Logic and Computer Design', Prentice Hall of India, 2006.
3. J.P. Hayes, 'Computer Organization and Architecture', Tata McGrawHill, 1999.
4. William Stallings, 'Computer System Architecture', PHI, 2010.

PROGRAMMING IN C LANGUAGE

Subject Code: BCMC-103

L T PC
3 1 0 4

Duration: 45 Hrs.

Objectives and Expected Outcomes: The objective of this course is to help the students in finding solutions to various real life problems and converting the solutions into computer program using C language (structured programming). Students will learn to write algorithm for solutions to various real-life problems. Converting the algorithms into computer programs using C language.

UNIT-I (10 Hrs.)

Algorithm and Programming Development: Steps in development of a program, Flow charts, Algorithm Development, Program Debugging, Compilation and Execution.

Fundamentals of 'C': I/O statements, Assignment Statements, Constants, Variables, Operators and Expressions, Standards and Formatted statements, Keywords, Data Types and Identifiers.

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UNIT-II (13 Hrs.)

Control Structures: Introduction, Decision making with if – statement, if-else and Nested if, while and do-while, for loop. Jump statements: break, continue, goto, switch Statement

Functions: Introduction to Functions, Function Declaration, Function Categories, Standard Functions, Parameters and Parameter Passing, Call – by value/reference, Recursion, Global and Local Variables, Storage classes.

UNIT- III (12 Hrs.)

Arrays: Introduction to Arrays, Array Declaration, Single and Multidimensional Array, Memory Representation, Matrices, Strings, String handling functions.

Structure and Union: Declaration of structure, Accessing structure members, Structure Initialization, Arrays of structure, nested structures, Unions.

UNIT-IV (10 Hrs.)

Pointers: Introduction to Pointers, Address operator and pointers, Declaring and Initializing pointers, Assignment through pointers, Pointers and Arrays

Files: Introduction, creating a data file, opening and closing a data file, processing a data file.

Preprocessor Directives: Introduction and Use, Macros, Conditional Preprocessors, Header Files.

Recommended Books:

1. Yashvant P. Kanetkar, 'Let us C', 7thEdn., BPB Publications, NewDelhi, 2010.
2. E. Balagurusami, 'Programming in ANSI C', 4thEdn., Tata McGrawHill, 2007.
3. Byron S. Gottfried, 'Programming in C', 2ndEdn., McGrawHills, 1998.
4. Kernighan & Richie, 'The C Programming Language', 2ndEdn., PHIPublication, 1988.
5. R. Lafore, 'Object Oriented Programming', 3rdEdn., GalgotiaPublications, 1999.
6. R.S. Salaria, 'Problem Solving and Programming in C', 2ndEdn, 2015.

HUMAN VALUES AND PROFESSIONALETHICS

Subject Code: HUM0-102

L T PC

Durations: 45Hrs.

3 1 0 4

Objectives and Expected Outcomes: To help the students to discriminate between valuable and superficial in the life. To help develop the critical ability to distinguish between essence and form, or between what is of value and what is superficial, in life – this ability is to be developed not for a narrow area or field of study, but for everyday situations in life, covering the widest possible canvas. To help students develop sensitivity and awareness; leading to commitment and courage to act on their own belief. It is not sufficient to develop the discrimination ability; it is important to act on such discrimination in a given situation. Knowingly or unknowingly, our education system has focused on the skill aspects (learning and doing)-it concentrates on providing “How to do” things. The aspects of understanding “What to do” or “Why something should be done” is assumed. No significant cogent material on understanding is included as a part of curriculum. A result of this is the production of graduates who tend to join into a blind race for wealth, position and jobs. Often it leads to misuse of the skills; and confusion and wealth that breeds chaos in family, problems in society, and imbalance in nature. This course encourages students to discover what they consider valuable. Accordingly, they should be able to discriminate between valuable and superficial in real situations in their life.

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It has been experimented at IIITH, IITK and UPTU on a large scale with significant results.

UNIT-I (10 Hrs.)

Course Introduction-Need, Basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and process for Value Education. Self-Exploration– what is it? - Its content and process; ‘Natural Acceptance’ and Experiential Validation- as the mechanism for self- exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

UNIT-II (13 Hrs.)

Understanding Harmony in the Human Being – Harmony in Myself! Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’. Understanding the needs of Self (‘I’) and ‘Body’ – *Sukhand 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: *Sanyamand Swasthya*; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure *Sanyamand Swasthya*.

Understanding Harmony in the Family and Society-Harmony in Human- Human Relationship: Understanding harmony in the Family- the basic unit of human interaction. Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*; Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship. Understanding the meaning of *Vishwas*; Difference between intention and competence. Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship. 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 (*AkhandSamaj*), Universal Order (*SarvabhaumVyawastha*)- from family to world family!

UNIT- III (12 Hrs.)

Understanding Harmony in the Nature and Existence – Whole existence as Co-existence: Understanding the harmony in the Nature. 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.

UNIT-IV (10 Hrs.)

Implications of the above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics. Ability to utilize the professional competence for augmenting universal human order. Ability to identify the scope and characteristics of people-friendly and eco- friendly production systems. Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order: At the level of individual: as socially and ecologically responsible engineers, technologists and managers at the level of society: as mutually enriching institutions and organizations.

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Recommended Books:

1. A. Nagraj, 'Jeevan Vidyaek Parichay', Divya Path Sansthan, Amarkantak, **1998**.
2. Susan George, 1976, 'How the Other Half Dies', Penguin Press, **1976**, Reprinted 1986, 1991.
3. P.L. Dhar, R.R. Gaur, 'Science and Humanism', Commonwealth Publishers, **1990**.
4. A.N. Tripathy, 'Human Values', New Age International Publishers, **2003**.
5. Subhas Palekar, 'How to Practice Natural Farming', Pracheen (Vaidik) Krishi Tantra Shodh, Amravati, **2000**.
6. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 'Limits to Growth – Club of Rome's Report', Universe Books, **1972**.
7. E.G. Seebauer & Robert L. Berry, 'Fundamentals of Ethics for Scientists & Engineers', Oxford University Press, **2000**.
8. M. Govindrajran, S. Natrajan & V.S. Senthil Kumar, 'Engineering Ethics (including Human Values)', Prentice Hall of India Ltd, Eastern Economy Edn.
9. B.P. Banerjee, 'Foundations of Ethics and Management', Excel Books, **2005**.
10. B.L. Bajpai, 'Indian Ethos and Modern Management', New Royal Book Co. Lucknow. Reprinted, **2004, 2008**.

SOFTWARE LAB-II (BASED ON BCMC-103)

Subject Code: BCMC-105

L T P C
0 0 4 2

Objectives and Expected Outcomes: The objective of this course is to help the students in finding solutions to various real life problems and converting the solutions into computer program using C language (structured programming). Students will learn to write programs for solving various real-life problems.

1. **Input-Output Statements:** formatted and non-formatted statements.
2. **Decision Making:** switch, if-else, nested if, else-if ladder, break, continue, goto.
3. **Loops:** while, do-while, for.
4. **Functions:** definition, declaration, variable scope, parameterized functions, return statement, call by value, call by reference, recursive functions.
5. **Arrays:** Array declarations, Single and multi-dimensional, memory limits, strings and string functions.
6. **Files:** Creation and editing of various types of files, closing a file (using functions and without functions).

DATABASE MANAGEMENT SYSTEM

Subject Code: BCMC-206

L T P C
3 1 0 4

Durations: 45 Hrs.

UNIT-I (10 Hrs.)

Introduction to Data, Field, Record, File, Database, Database management system. Structure of database system, Advantage and disadvantage, levels of database system, Relational model, hierarchical model, network model, comparison of these models, E-R diagram, different keys used in a relational system, SQL.

UNIT-II (13 Hrs.)

DBA, responsibilities of DBA, Relational form like 1NF, 2NF, 3NF, BCNF, 4NF, 5NF, DBTG, concurrency control and its management, protection, security, recovery of database.

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UNIT-III (12 Hrs.)

SQL: Introduction to SQL–DDL, DML, DCL, join methods & sub query, Union Intersection, Minus, Tree Walking, Built in Functions, views.

UNIT- IV (10 Hrs.)

Security amongst users, Sequences, Indexing Cursors– Implicit & Explicit, Procedures, Functions & Packages Database Triggers. Big Data: Introduction to Big Data and Analytics, Introduction to NoSQL.

Recommended Books:

1. C.J. Date, 'Introduction to DatabaseSystem', **2003**.
2. B.C. Desai, 'Database ManagementSystem'.
3. Korth, 'DatabaseConcept'.
4. Database System Concepts & Oracle (SQL/PLSQ) – AP Publishers, **2005**.

COMPUTER NETWORK

Subject Code: BCMC-207

L T PC
3 1 04

Durations: 45 Hrs.

UNIT-I (10 Hrs.)

Introduction to Computer networks: Applications, Network hardware and Software (protocol hierarchies, design issues for layers.

Interfaces and services: connection oriented and connection less), Network structure and architecture-point to point, multicast, broadcast, Classification of networks-LAN, MAN and WAN.

UNIT-II (13 Hrs.)

Reference models: The OSI reference model, TCP / IP reference model. Comparison between OSI and TCP / IP models.

Data Link Layer: Design issues, Services to network layer, Framing, Error control, Flow control.

UNIT-III (12 Hrs.)

Network layer: Design issues, Services to the transport layer, Routing algorithms- Static/ non-adaptive and dynamic/adaptive algorithms.

Transport layer: Design issues, connection management-addressing, establishing and releasing connection, transport layer protocols- TCP, UDP.

UNIT-IV (10 Hrs.)

Application layer: The DNS Name Space, Electronic Mail, The World Wide Web.

Network Security: Introduction to cryptography.

Recommended Books:

1. Computer Networks, Tanenbaum, Andrew, Fifth Edition, PHI, **2011**.
2. Data Communication and Networking, Behrouz A. Forouzan, Fourth Edition, **2007**.
3. Computer Today, S.K. Basandra, First Edition, Galgotia.
4. Data Communication System, Black, Ulysse, Third Edition, PHI.
5. Data and Computer Communications, Stalling, Ninth Edition, PHI, **2011**.

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MANAGEMENT INFORMATION SYSTEM

Subject Code: BCMC-208

L T PC
3 1 0 4

Durations: 45Hrs.

UNIT- I (10 Hrs.)

Management Information System: Meaning and definition, Role of information system, Nature and scope of MIS.

Information and System Concepts: Definition and types of information, Information quality, dimensions of information, value of information, general model of human as an information processor. System related concepts, elements of a system, and types of system.

UNIT- II (13 Hrs.)

Role and Importance of Management: Introduction, levels and functions of management. Structure and classification of MIS, Components of MIS, Framework for understanding MIS: Robert Anthony's hierarchy of management activity, Information requirements and levels of management.

UNIT- III (12 Hrs.)

Decision making concept, types of decisions, methods of choosing among alternatives, Role of MIS in decision making.

Simon's model of decision making, Structured and unstructured decisions.

UNIT- IV (10 Hrs.)

Development of MIS: Stages in the development of MIS, System development approaches: Waterfall model, Prototyping, Iterative enhancement model, Spiral model.

Applications of information systems in Functional areas: Marketing MIS, Financial MIS, Production MIS, Personnel MIS.

Decision Support Systems: Definition and characteristics, MIS versus DSS, Tools and Models for decision support.

Recommended Books:

1. D.P. Goyal, 'Management Information Systems: Managerial Perspectives', Macmillan India Ltd, 2006.
2. Robert G. Murdick, Joel E. Ross, James R. Claggett, 'Information Systems for Modern Management', Prentice Hall of India Pvt. Ltd, 1984.
3. Gordon B. Davis, M.H. Olson, 'Management Information Systems: Conceptual Foundations, Structure & Development', McGraw Hill Book Co, 1974.
4. W.S. Jawadekar, 'Management Information Systems', Tata McGraw Hill Publishing Co, **1998.**

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OBJECT ORIENTED PROGRAMMING USING C++

Subject Code:BCMC-209

L T P C
3 1 0 4

Duration: 45 Hrs.

UNIT- I (10 Hrs.)

Characteristics of Object Oriented Programming: Abstraction, Encapsulation, Data hiding, Inheritance, Polymorphism, Code Extensibility and Reusability, User defined Data Types.

Introduction to C++: Identifier, Keywords, Constants, And Operators: Arithmetic, relational, logical, And conditional and assignment. Size of operator, Operator precedence and associativity.

UNIT- II (13 Hrs.)

Classes and Objects: Class Declaration and Class Definition, defining member functions, making functions inline, nesting of member functions, Members access control. this pointer.

Objects: Object as function arguments, array of objects, functions returning objects, Const member functions.

Destructors: Properties, Virtual destructors. Destroying objects. Rules for constructors and destructors. Array of objects. Dynamic memory allocation using new and delete operators, Nested and container classes.

UNIT- III (12 Hrs.)

Static data members and Static member functions. Friend functions and Friend classes.

Constructors: properties, types of constructors (Default, parameterized and copy), Dynamic constructors, multiple constructors in classes.

Inheritance: Defining derived classes, inheriting private members, single inheritance, types of derivation, function redefining, constructors in derived class.

Types of Inheritance: Single, Multiple, Multilevel and Hybrid. Types of base classes: Direct, Indirect, Virtual, Abstract. Code Reusability.

UNIT- IV (10 Hrs.)

Polymorphism: Methods of achieving polymorphic behavior.

Operator overloading: overloading binary operator, overloading unary operators, rules for operator overloading, operator overloading using friend function.

Function overloading: Early binding, Polymorphism with pointers, virtual functions, late binding, pure virtual functions and abstract base class. Introduction to File Handling.

Recommended Books:

1. E. Balagurusamy, 'Object Oriented Programming with C++', Tata McGrawHill, 2008.
2. Deitel and Deitel, 'C++ How to Program', Pearson Education, 2012.
3. Herbert Schildt, 'The Complete Reference C++', Tata McGrawHill, 2003.
4. Robert Lafore, 'Object Oriented Programming in C++', Galgotia Publications, 2002.
5. Bjarne Strastrup, 'The C++ Programming Language', Addition-Wesley Publication Co, 1986.
6. Stanley B. Lippman, Josee Lajoie, 'C++ Primer', Pearson Education, 2002.

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OPERATING SYSTEM

Subject Code: BCMC-210

L T PC
3 1 0 4

Durations: 45Hrs.

UNIT- I (10 Hrs.)

Introduction: Definition, Early Systems, Simple Batch system, Multi programmed Batch. Time Sharing Systems, Personal Computer System, Parallel Systems, Distributed Systems, and Real-time Systems.

UNIT- II (13 Hrs.)

Processes: Process concepts, Process Scheduling, Threads.

CPU-Scheduling: Basic concepts, Scheduling Criteria, Scheduling Algorithms, Algorithm Evaluation.

Process Synchronization: Critical – section problem, semaphores, classical problem of synchronization.

UNIT- III (12 Hrs.)

Memory Management: Background, Logical v/s Physical address space, swapping, continuous allocation, paging, segmentation.

Virtual Memory: Background, demand paging, performance of demand paging, page replacement, page replacement algorithms, allocation of frames, thrashing.

UNIT- IV (10 Hrs.)

Secondary Storage Structures: Disk structures, Disk scheduling, Disk Reliability.

Deadlocks: System Model, Deadlock characterization, methods for handling deadlocks, Deadlocks Prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock, combined approach to deadlock handling.

Recommended Books:

1. Silberschatz Galvin, 'Operating System Concepts', 4thEdn., AddisonWesley, 1993.
2. Crowley, 'Operating Systems, A Design Oriented Approach', Tata McGrawHill, 2012.
3. Dietel, 'Operating Systems', 2ndEdn., AddisonWesley, 2003.

SOFTWARE LAB.-III (BASED ON BCMC-206)

Subject Code: BCMC-211

L T PC
0 0 4 2

Operational Knowledge and Implementation of Database using SQL.

SOFTWARE LAB-IV (BASED ON BCMC-209)

Subject Code: BCMC-212

L T PC
0 0 4 2

Operational Knowledge and Implementation of numerical methods & statistical Techniques using C++ Language.

SOFTWARE ENGINEERING

Subject Code: BCMC-313

L T P C
3 1 0 4

Duration: 60Hrs.

Course Objective: To apply principles of software development and evolution. To specify, abstract, verify, validate, plan, develop and manage large software and learn emerging trends in software engineering.

UNIT-I (14 Hrs.)

Introduction to Software: Definition, Software characteristics, Software components, Software Applications.

Introduction to Software Engineering: Definition, Software Engineering Paradigms, Waterfall Model, Prototyping Model, Interactive Enhancement Model, the Spiral Model.

UNIT- II (15Hrs.)

Software Metrics: Role of Metrics and Measurement, Metrics for software productivity and quality, Measurement software, size-oriented metrics, function oriented metrics, Metrics for software quality.

Software Requirement Specification (SRS): Problem analysis, structuring information, Data flow diagram and data dictionary, structured analysis, Characteristics and component of (SRS).

UNIT- III (17Hrs.)

Planning a Software Project: Cost estimation, uncertainties in cost estimation, Single variable model, COCOMO model, Project scheduling and milestones, Software & Personal Planning, Verification & Validation (V & V), inspection & review.

System Design: Design Objectives, Design Principles, problem, Partitioning, Abstraction, Top Down and Bottom-up techniques, Structure Design, Structure Charts, Design Methodology.

UNIT- IV (14Hrs.)

Coding: Coding by Top-down and Bottom-up, Structured Programming, Information Hiding, Programming style, Internal Documentation.

Testing: Level of testing, Test cases and test criteria, Functional Testing, Structural Testing.

Recommended Books:

1. Roger S. Pressman, "Software Engineering – A Practitioner's Approach ", Sixth Edition, McGraw Hill, **2010**.
2. R.E. Fairley, "Software Engineering Concepts", Paperback Edition, McGraw Hill, **2004**.
3. Pankaj Jalote, "An Integrated Approach to Software Engineering", Third Edition, Narosa Publishing House, **2016**.

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DATA STRUCTURES

Subject Code: BCMC-314

L T P C
3 1 0 4

Duration: 60 Hrs.

UNIT-I(14 Hrs.)

Basic Concepts: Introduction to Complexity, Data Structure and Data Structure operations. Applications of Data Structure, Basic data Structures.

Arrays: Introduction, Types of Array, Memory representation, Applications and operations.

Stacks: Introduction, memory representation, Applications and operations.

UNIT- II (15Hrs.)

Linked List: Operations like traversing, searching, inserting, deleting, operations on header-linked list, circular linked list, doubly linked list, memory representation.

Queue: Introduction, Operations on EnQueue and Dequeue, Memory Representation and Applications.

UNIT- III (17Hrs.)

Trees – Definition and Basic concepts, Representation in Contiguous Storage, Binary Tree, Binary Tree Traversal, Searching, Insertion and deletion in Binary trees, Binary Search tree.

UNIT- IV (14Hrs.)

Searching: Binary and Linear Search.

Sorting: Bubble sort, Insertion sort, Selection sort, Merge Sort, Quick sort.

Recommended Books:

1. Data Structures, Lipschutz Seymour, Second Edition, TMH, 2003.
2. Algorithm + Data Structures = Programs, Ni Claus Wirth, Prentice Hall.
3. Data Structures, Tanenbaum, Paperback Edition.
4. An Introduction to Data Structures Applications, Trembley&Soreson, Second Edition, 2001.

LATEST TRENDS IN INFORMATION TECHNOLOGY

Subject Code: BCMC-315

L T P C
3 1 0 4

Duration: 60 Hrs.

Course Objectives

After completion of this course, the students would be able to

- 1 Recognise the concepts of emerging technologies.
- 2 Analyse the components of cloud computing.
- 3 Critically analyse case studies to derive the best practice model to apply when developing and deploying parallel, distributed, cloud and IoT based applications.

UNIT-I (14 Hrs.)

Introduction to Computing-Emerging Trends in Computing like Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Utility Computing, Cloud Computing, High Performance Computing, Autonomic Computing.

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UNIT-II (15 Hrs.)

Cloud Computing-Introduction, Cloud Types, Uses of Cloud, Components of Cloud Computing - Software as a Service, Platform as a Service, Infrastructure as a Service, Virtualization in Cloud Computing, Concept of Green Clouds.

UNIT-III (17 Hrs.)

Soft Computing-Soft Computing VS Hard Computing; Introduction to Neural Networks – Intelligence, Neurons, Artificial Neural Networks, Application Scope of Neural Network, Brain VS Computer.

UNIT-IV (14 Hrs.)

IoT and Fog Computing-Topologies, Edge Routers, Client-Server Architecture, P2P, M2M, Introduction to Fog Computing, Benefits of Fog Computing.

Recommended Books:

- 1 Joshy Joseph, Craig Fellenstein, 'Grid Computing', 1st Edn. Prentice Hall Professional, **2004**.
- 2 RajkumarBuyaa, James Broberg, Andrzej Goscinski, 'Cloud Computing Principles and Paradigms', 1st Edn., Wiley, **2011**.
- 3 Tettamanzi, Andrea, Tomassini and Macro, 'Soft Computing', Springer, **2001**.
- 4 RajkumarBuyaa, Vecchiola, Selvi, 'Mastering Cloud Computing', first Edn. McGraw Hill, **2013**.
- 5 ArshdeepBahga, Vijay Madiseti, 'Internet of Things (A Hands -on- Approach)', first Edn. VPT, **2014**.

PROGRAMMING IN JAVA

Subject Code: BCMC-316

L T P C
3 1 0 4

Duration: 60 Hrs.

UNIT- I (14 Hrs.)

Introduction to Java: evolution, features, comparison with C and C++; Java program structure; tokens, keywords, constants, variables, data types, type casting, statements.

Operators and expressions: arithmetic, relational, logical, assignment, increment, decrement, conditional, bitwise and special operators. Operator precedence & associativity rules.

UNIT- II (15Hrs.)

Control statements: if else, switch case, for, while, do while, break, continue, labeled loops.

Class: syntax, instance variable, class variables, methods, constructors, overloading of constructors and methods.

UNIT- III (17Hrs.)

Inheritance: types of inheritance, use of super, method overriding, final class, abstract class, wrapper classes. Arrays, Strings and Vectors, Packages and Interfaces, visibility controls.

UNIT- IV (14Hrs.)

Errors and Exceptions: Types of errors, Exception classes, Exception handling in java, use of try, catch, finally, throw and throws. Taking user input, Command line arguments.

Multithreaded Programming: Creating Threads, Life cycle of thread, Thread priority, Thread synchronization, Inter-thread communication.

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Recommended Books:

1. Programming in Java, E-Balagurusami, Fourth Edition, Tata McGraw Hill, 2013.
2. Mastering Java, Second Edition, BPB Publications, 1998.
3. Advance Java, Ivan Bayross, BPB Publications, 2000.

ENVIRONMENTAL STUDIES AND DISASTER MANAGEMENT

Subject Code: BCMC-317

L T P C
3 1 0 4

Duration: 60 Hrs.

UNIT-I (14 Hrs)

The Multidisciplinary nature of environmental studies Natural Resources Renewable and non-renewable resources: Natural resources and associated problems a) Forest resources; b) Water resources; c) Mineral resources; d) Food resources; e) Energy resources; f) Land resources: Role of an individual in conservation of natural resources.

UNIT-II(15 Hrs)

Introduction, types, characteristic features, Structure and function of an ecosystem., Concept of an ecosystem. Ecosystems the ecosystems: Forest ecosystem; Grassland ecosystem; Desert ecosystem; Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

UNIT- III (17 Hrs)

Environmental Pollution: Air pollution; Water pollution; Soil pollution.

Natural Resources: Natural Resources and associated problems, use and over exploitation, case studies of forest resources and water resources.

UNIT- IV (14 Hrs)

Social Issues: Environment From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns. Case studies. Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.

Recommended Books (Latest edition):

1. Y.K. Sing, Environmental Science, New Age International Pvt, Publishers, Bangalore
2. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
3. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, India,
4. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
5. Clark R.S., Marine Pollution, Clarendon Press Oxford
6. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
7. De A.K., Environmental Chemistry, Wiley Eastern Ltd. 8. Down of Earth, Centre for Science and Environment.
- 8.

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SOFTWARE LAB V (BASED ON BCMC -314 DATA STRUCTURES)

Subject Code: BCMC-318

L T P C
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper BCMC: 314 Data Structures. Students are required to develop programs in C/C++ language. Few programs are listed below:

1. Program to insert an element from an array.
2. Program to delete an element from an array.
3. Program to apply various operations on stack.
4. Program for parenthesis matching using stack
5. Program for String reversal using stack.
6. Program to insert and delete nodes in a queue.
7. Program to traverse 2-way linked list.
8. Program to insert and delete nodes in a linked list.
9. Program to search a node in a linked list.
10. Program to insert or delete node in a binary tree.
11. Program to traverse binary tree
12. Program for implementing linear search.
13. Program for implementing binary search.
14. Program for implementing Bubble sort.
15. Program for implementing Selection sort.

SOFTWARE LAB VI (BASED ON BCMC-316 JAVA PROGRAMMING)

Subject Code: BCMC-319

L T P C
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper BCMC: -316 Java Programming. Students are required to develop programs in JAVA programming language. Few programs are listed below:

1. Write a ***Class Date*** that takes day, month, and year while creating an object of this class. Find a new date when the number of days is given.
2. Write a program to Add, Subtract, multiply two matrices using switch statement. The program must also validate the sizes of two matrices before performing any operation and should raise exception in case the operation cannot be performed.
3. Write a program to find the ***area of all types of triangles*** using the principle of ***constructor overloading and Inheritance*** depending on the number of dimensions given in the input parameter list using ***super*** to call the super class constructor.
4. Write a program to find the ***area of rectangle*** using an ***abstract super*** class figure and also ***override*** method use to compute the area of the rectangle.
5. Write a program to implement grow able and shrinkable ***Stack*** that can support operations like- push, pop, and view the top item with concept of dynamic allocation using ***finalize ()*** method. The program should also incorporate the concepts of ***private and public*** access methods to avoid accidental manipulations of stack.
6. Write a program to demonstrate ***static variables, methods and blocks.***

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7. Write a program to swap two items belonging to an object using *returning of object* by a function.
8. Write a program to count the frequency of each vowel in a given string.
9. Demonstrate the use of *static and non static nested* classes.
10. Create a package containing a class to print your (name, roll no, marks) and use this package in another program using *import* statement.

PROGRAMMING WITH PYTHON

Subject Code: BCMC-420

L T P C
3 1 0 4

Duration: 60 Hrs.

UNIT-I (14 Hrs.)

Introduction to Python: Python Installation and Working with Python Understanding Python Variables Python Basic Operators, Understanding python blocks.

Data Types: Declaring and using Numeric data types: int, float, complex using string data type and string operations, Use of Tuple data type.

UNIT- II (15Hrs.)

Program Flow Control: Conditional blocks using if, else and elif, loops in python programming, continue, break statements in python.

UNIT- III (17Hrs.)

Functions Modules and Packages: Organizing python codes using functions, organizing python projects into modules, Importing own module as well as external modules.

String List and Dictionary Manipulations: Building blocks of python programs, understanding string in build methods, List manipulation using in build methods, Dictionary manipulation Programming using string, list and dictionary in build functions.

UNIT- IV (14Hrs.)

File Operation: Reading config files in python Writing log files in python Understanding read functions, read (), read line () and read lines () Understanding write functions, write () and writelines () Manipulating file pointer using seek Programming using file operations.

Recommended Books:

1. Downey, Allen B. Think Python: How to Think Like a Computer Scientist (Version 1.6.6 Ed.), **2012**.
2. Hamilton, Naomi. "The A-Z of Programming Languages: Python", **2008**.
3. Lutz, Mark Learning Python (5th ed.). O'Reilly Media, **2013**.
4. Pilgrim, Mark Dive into Python 3. Apress, **2009**.

SOFTWARE PROJECT MANAGEMENT

Subject Code: BCMC-421

L T P C
3 1 0 4

Duration: 60 Hrs.

UNIT- I (14 Hrs.)

Introduction to Software Project Management: Project and characteristic of project, Project Management, Software Project Management, Activities of software project management, Plans, methods and methodologies, stakeholders, objectives and sub-objectives, Project success and failure.

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UNIT- II (15 Hrs.)

Selection of Project approach and effort estimation Project: Build or buy. Choosing Methodologies and technologies, Project Development Models: Waterfall Model, Spiral Model and Software prototyping,

UNIT- III (17 Hrs.)

Dynamic System Development Model: Effort estimation: Introduction, stages of estimation, over and under estimation, basis for software estimating, software effort estimation techniques.

Activity Planning: Overview and objective of activity planning, when to plan, Project schedules, Project and activities,

UNIT- IV (14 Hrs.)

Risk Management: WBS, Adding the time dimension using forward pass and backward pass, Risk identification, risk assessment, risk planning, risk management.

Monitoring, Control and contracts: Creating the framework, collecting the data, visualizing progress, cost monitoring, prioritizing monitoring.

Recommended Books:

1. Robert K. Wysocki “Effective Software Project Management” – Wiley Publication, **2011**.
2. Walker Royce: “Software Project Management”- Addison-Wesley, **1998**.
3. Gopalaswamy Ramesh, “Managing Global Software Projects” – McGraw Hill Education (India), Fourteenth Reprint **2013**.

LINUX OPERATING SYSTEM

Subject Code: BCMC-422

L T P C
3 1 0 4

Duration: 60 Hrs.

UNIT- I (14 Hrs.)

Introduction to Operating Systems: its needs and services, Simple batch Systems, Multi- programmed batched systems, Time sharing systems, Parallel systems, Distributed systems and Real-time systems. Introduction to process, Process States.

Structure of LINUX: Kernel, Shell. LINUX Directory system.

UNIT- II (15 Hrs.)

LINUX Commands:User Access and UserID Commands, Directory commands, Editors Commands, File Manipulation Commands, Security and Protection Commands, Inter-User and Inter-Machine Communication, Process Management Commands, I/O Redirection and Piping Commands, Vi editor, File Handling commands, and Introduction to Regular Expressions and Grep.

UNIT- III (17 Hrs.)

Administering LINUX System: Introduction to System Administration, Functional activities of System Administration - Starting up the system, Maintaining the Super User Login, shutting down the system, recovering from system crash, taking backups, managing disk space, Mounting and Un-mounting file system, Adding and removing users, Changing groups and password.

UNIT- IV (14 Hrs.)

Shell Programming: Executing a shell program, Study of shell programming as a Language; Wild card

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characters, Type of statements and Reserved Words, Special Shell parameters. The AWK pattern scanning and processing language: Operators, Control Statements and arrays.

Recommended Books:

1. J. Goerzen- Linux Programming Bible, IDG Books, New Delhi- **2001**.
2. N. Mathew&R. Stones- Beginning Linux Programming Wiley Publishing India, **2004**.

SYSTEM PROGRAMMING

Subject Code: BCMC-423

L T P C
3 1 0 4

Duration: 60 Hrs.

UNIT-I (14 Hrs.)

Introduction: Definition of system software, types of system software, features of system programming, system programming vs. application programming.

Language Processors: Introduction, Language processing activates, Fundamentals of Language Processing.

UNIT- II (15Hrs.)

Assembler: Elements of Assembly Language Processing, a simple Assembly scheme, pass structure of Assemblers, Design of a two-pass assembler. A brief overview of single pass assembly and problem of forward references.

UNIT- III (17Hrs.)

Linkers and Loaders: Definition of linker and loader, Design of Absolute Loader, Re-locatable Loader, Direct-linking loader.

UNIT- IV (14Hrs.)

Compilers: - Overview of compilation process, Lexical analysis, Syntax analysis, Semantic analysis, Intermediate code generation and Code optimization techniques, Compiler vs. Interpreter.

Recommended Books:

1. Donovan J.J., "Systems Programming", New York, Mc-Graw Hill, **1972**.
2. Dhamdhare, D.M., "Introduction to Systems Software", Tata Mc-Graw Hill, **1996**.
3. Aho A.V. and J.D. Ullman, "Principles of compiler Design" Addison Wesley/ Narosa **1985**.
4. Kenneth C. Louden, "Compiler Construction", Cengage Learning, **1997**.

SOFTWARE LAB VII (BASED ON BCMC-420 PROGRAMMING WITH PYTHON)

Subject Code: BCMC-424

L T P C
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper BCMC: 420 Programming with Python. Students are required to develop programs in python language. Few programs are listed below:

- 1 To Exchange the Values of Two Numbers Without Using a Temporary Variable.
- 2 To Check if a Number is a Palindrome.
- 3 To Print all Integers that Aren't Divisible by Either 2 or 3 and Lie between 1 and 50.
- 4 To Print Table of a Given Number.

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- 5 To Print Sum of Negative Numbers, Positive Even Numbers and Positive Odd numbers in a List.
- 6 To Print Numbers in a Range (1, upper) Without Using any Loops.
- 7 To Find the Sum of Sine Series.
- 8 To Find the Sum of First N Natural Numbers.
- 9 To Search the Number of Times a Particular Number Occurs in a List.
- 10 To Find the Largest Number in a List.
- 11 To Find the Second Largest Number in a List.
- 12 To Find the Second Largest Number in a List Using Bubble Sort.
- 13 To Sort a List According to the Length of the Elements.
- 14 To Sort a List of Tuples in Increasing Order by the Last Element in Each Tuple.
- 15 To Swap the First and Last Value of a List.
- 16 To remove the ith Occurrence of the Given Word in a List where Words can repeat.

SOFTWARE LAB VIII (BASED ON BCMC-422 LINUX OPERATING SYSTEM)

Subject Code: BCMC-425

L T P C
0 0 42

This laboratory course will comprise as exercises to supplement what is learnt under paper BCMC: 422 Linux Operating System. Students are required to develop programs in Linux.

DATA ANALYTICS

Subject Code: BCMC-526

L T P C
3 10 4

Duration: 60 Hrs.

UNIT-I (14 Hrs.)

Introduction: Collection of data- Secondary data, primary data, Internal data, presentation of data, Classification of data: Mean, Median Mode, Harmonic Mean, Deometric mean.

UNIT- II (15 Hrs.)

Measures of Variations: Significance of measuring variation, good properties of measuring variations, average deviation and standard deviation.

Regression & ANOVA: Regression ANOVA(Analysis of Variance).

UNIT- III (17 Hrs.)

Machine Learning: Introduction and Concepts Differentiating algorithmic and model based frameworks
Regression : Ordinary Least Squares, Ridge Regression, Lasso Regression, K Nearest Neighbours Regression & Classification.

UNIT- IV (14 Hrs.)

Supervised Learning with Regression and Classification techniques -1 Bias-Variance Dichotomy Model ,Validation Approaches Logistic Regression, Linear Discriminant Analysis, Quadratic Discriminant Analysis, Regression and Classification Trees Support, Vector Machines.

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Recommended Books:

1. Hastie, Trevor, et al. The elements of statistical learning. Vol. 2. No. 1. New York: springer, 2009.
2. Montgomery, Douglas C., and George C. Runger. Applied statistics and probability for engineers. John Wiley & Sons, 2010.

ARTIFICIAL INTELLEGEENCE

Subject Code: BCMC-527

L T P C
3 10 4

Duration: 60 Hrs.

Course Objectives After completion of this course the student will be able to understand the:

1. Different types of AI agents.
2. Various AI search algorithms.
3. The fundamentals of knowledge representation.

UNIT-I (14 Hrs.)

Basics of AI - What is Artificial Intelligence, what is an AI technique, Criteria for success, Problems, Problem spaces and search, Production system, Problem characteristics, Hillclimbing, Best-First search, AO algorithm, Constraint satisfaction.

UNIT-II (15 Hrs.)

Natural Language Processing - Introduction, Overview of linguistics, Grammars and language, Basic Parsing techniques, Semantic analysis and representation, Structure, Natural Language generation, Natural Language systems.

UNIT-III (17 Hrs.)

Knowledge Representation - Issues, Approaches to knowledge Representation, Representing simple facts in logic, Computable functions and predicates, Procedural vs declarative knowledge, Forward vs Backward Reasoning matching, Control knowledge.

UNIT-IV (14 Hrs.)

Expert Systems - Rule-Based system architecture, Non-production system Architecture, dealing with uncertainty, Knowledge acquisition and validation, Knowledge system Building tools.

Recommended Books

1. Elaine Rich and Kevin Knight, 'Artificial Intelligence', 5 th Edn., Tata McGraw Hill, **2014**.
2. Dan. W. Patterson, 'Introduction to Artificial Intelligence and Expert Systems', 1 st Edn., Prentice Hall India, **2015**.
3. Eugene Charniak and Drew McDermott, 'Introduction to Artificial Intelligence', 1 st Edn., Pearson Education, **2002**.

OBJECT ORIENTED ANALYSIS AND DESIGN USING UML

Subject Code: BCMC-528

L T P C
3 10 4

Duration: 60 Hrs.

Course Objectives: The student is made to learn:

1. Learn the basis of OO analysis and design skills.

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2. Learn the UML design diagrams.
3. Learn to map design to code.
4. Be exposed to various design techniques.

UNIT-I (14 Hrs.)

UML Diagrams: Introduction to OOAD- Unified Process, UML diagrams, Use Case, Class Diagrams, Interaction Diagrams, State Diagrams, Activity Diagrams, Package, Component and Deployment Diagrams.

UNIT-II (15 Hrs.)

GRASP: Designing objects with responsibilities, Creator, Information Expert, Low Coupling, High Cohesion, Controller, Design Patterns, Creational, Factory method, structural, bridge, adapter, behavioural, strategy, observer.

UNIT-III (17 Hrs.)

Applying design patterns: System sequence diagrams, Relationship between sequence diagrams and use cases logical architecture and UML package diagrams, logical architecture refinement, UML class diagrams, UML interaction diagrams, applying GoF design patterns.

UNIT-IV (14 Hrs.)

Coding and Testing: Mapping design to code, testing issues in OO testing, class testing, OO integration testing, GUI testing, OO system testing.

Recommended Books:

1. Simon Bennett, Steve Mc Robb and Ray Farmar, "Object Oriented System Analysis and Design using UML", Forth Edition, Mc- Graw Hill Education, **2010**.
2. Erich Gamma, and Richard Helm, Ralph Johnson, John Vlissides, " Design Patterns: Elements of Reusable Object Oriented Software", Addison Wesley, **1995**.
3. Martin Fowler, " UML Distilled: A Brief Guide to the standard Object Modeling Language", Third Edition, Addison Wesley, **2003**.
4. Paul C. Jorgensen, " Software Testing:- A Craftsman Approach," Third Edition, Auerbach Publications, Taylor and Francis Group, **2008**.

WEB APPLICATION AND DEVELOPMENT

Subject Code: BCMC-529

L T P C
3 10 4

Duration: 60 Hrs.

UNIT-I (14 Hrs.)

Web programming and HTML5: Introduction to web programming, client server architecture, DNS, latest trends, static and dynamic content, WWW3C standards, difference between HTML & HTML5. Basics of HTML5, understanding document tags.

HTML5 formatting: Formatting tags e.g. font, Bold, italic, super script, subscript, delete, mark etc.

UNIT-II (15 Hrs.)

HTML5 Quotations: q tag, blockquote, Code, abbreviation, address, cite, bi-directional override tag, header, footer and output Tag, meta data and meta tag.

Lists: Ordered, Unordered, Definition List.

Introduction to LINK: anchor element, internal linking and external linking, attribute of anchor tag.

Images: image basics, image tag, Image alignment, image map and all the attributes of image and map.

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UNIT-III (17 Hrs.)

Table: Table tag with attributes like width, alignment, cell spacing, cell padding, cell alignment, borders rules, rows, cells, rowspan, colspan, header, footer, body sections, captions and background images.

HTML Frames: Introduction to frameset tag, frame tag, iframes and respective attributes.

Form: Creating form, add labels, text box, check box, radio buttons, password, pull down menus and button to a form ,Use of clickable image as a submit button, pass information between forms (action ,method).

UNIT-IV (14 Hrs.)

DHTML and CSS: Introduction to DHTML, introduction to CSS3, ways to Insert CSS in HTML document (External Style Sheet, Internal Style Sheet, Inline Styles), CSS id and class, div and span tag.

CSS background: background color, background image (repeat horizontally or vertically, set position and no-repeat), **CSS Text:** text color, text alignment, text decoration, **CSS Font:** style, family, SizeCSS lists, CSS Links **CSS Tables:** Table borders, collapse borders, table width and height ,table text alignment, table padding, table color, **CSS border:** style, width, color, **CSS margin:** margin, padding.

Recommended Books:

1. Kogent Learning Solutions Inc., " HTML 5 in simple steps",Dreamtech Press.
2. Murray,Tom/Lynchburg," Creating a Web Page and Web Site",College,2002.
3. Steven M. Schafer," HTML, XHTML, and CSS Bible, 5ed",Wiley India.

SOFTWARE LAB IX(BASED ON BCMC 528)

Subject Code: BCMC-530

L T P C
0 0 4 2

This laboratory course will comprise an exercises to supplement what is learnt under paper BCMC: 528 Object oriented analysis and design using UML.

SOFTWARE LAB X(BASED ON BCMC 529)

Subject Code: BCMC-531

L T P C
0 0 4 2

This laboratory course will comprise an exercises to supplement what is learnt under paper BCMC: 529 Web application and development.

COMPUTER GRAPHICS & MULTIMEDIA ANIMATION

Subject Code: BCMC-632

L T P C
3 1 0 4

Duration: 60 Hrs.

UNIT-I (14 Hrs.)

Introduction to computer graphics & graphics systems: Overview of computer graphics, representing pictures, preparing, presenting & interacting with pictures for presentations; Visualization & image processing; RGB color model, direct coding, lookup table.

Devices: storage tube graphics display, Raster scan display, 3D viewing devices, Plotters, printers, digitizers, Light pens etc.; Active & Passive graphics devices; Computer graphics software.

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UNIT-II (15 Hrs.)

Scan conversion Points & lines: Line drawing algorithms; DDA algorithm, Bresenham's line algorithm,.

Scan conversion -2: Circle generation algorithm; Ellipse generating algorithm; scan line polygon, fill algorithm, boundary fill algorithm, flood fill algorithm.

2D transformation Basic transformations: translation , rotation, scaling ; Matrix representations & homogeneous coordinates, transformations between coordinate systems; reflection shear; Transformation of points, lines , parallel lines, intersecting lines.

UNIT-III (17 Hrs.)

2D Viewing: Viewing pipeline, Window to viewport Co-ordinate transformation, clipping operations, point clipping, line clipping, clipping circles , polygons & ellipse.

Introduction - Overview of multimedia computing, Definitions, terms, terminologies, characteristics and requirements of different media, Components of multimedia systems.

UNIT-IV (14 Hrs.)

Human's Visual and Audio System - Characteristics of human visual system, Light and visible light, Human retina structure and functions, Non-perceptual uniform color models and perceptual uniform color models, Characteristics of human's audio system, Frequency response and Magnitude range.

Multimedia Coding and Compression - Coding requirements, Compression principles, Entropy and hybrid coding, Compression standards: JPEG and MPEG.

Recommended Books:

1. D. Hearn and M.P. Baker, 'Computer Graphics', 2nd Edn., Pearson, **2002**.
2. Andries van Dam, F. Hughes John, James D. Foley; Steven K. Feiner, 'Computer Graphics Principles and Practice in C', 2nd Edn., Pearson, **2002**.
3. Roy A. Plastock, 'Computer Graphics', 2nd Edn., McGraw Hill, **2000**.
4. F.S. Hill, 'Computer Graphics using OpenGL', 3rd Edn., PHI, **2009**.
5. Jeffrey McConnell, 'Computer Graphics: Theory into Practice', 1st Edn., Jones and Bartlett Publishers, **2005**.
6. William M. Newman, 'Principles of Interactive Computer Graphics', 2nd Edn., McGraw Hill, **2001**.
7. John F. Koegel Buford, 'Multimedia Systems', 1st Edn., Pearson, **2002**.
8. Ralf Steinmetz and Klara Nahrstedt, 'Multimedia: Computing, Communications and Applications', 1st Edn., Pearson, **2002**.

NETWORK SECURITY

Subject Code: BCMC-633

L T P C
3 10 4

Duration: 60 Hrs.

UNIT-I (14 Hrs.)

Introduction: Attack, Services and Mechanism, Model for Internetwork Security. Cryptography: Notion of Plain Text, Encryption, Key, Cipher Text, Decryption and cryptanalysis; Public Key Encryption, digital Signatures and Authentication.

UNIT-II (15 Hrs.)

Network Security: Authentication Application: Kerberos, X.509, Directory Authentication Service, Pretty Good Privacy, S/Mime.

IP security Architecture: Overview, Authentication header, Encapsulating Security Pay Load combining

BCA-MCA DUAL DEGREE (5 YRS.) SYLLABUS 2018 BATCH
(UPDATED ON 24.05.2019)

Security Associations, Key Management.

UNIT-III (17 Hrs.)

Web Security: Requirement, Secure Socket Layer, Transport Layer Security, and Secure Electronic Transactions.

Network Management Security: Overview of SNMP Architecture-SMMPV11 Communication Facility, SNMPV3.

UNIT-IV (14 Hrs.)

System Security: Intruders, Viruses and Related Threats, Firewall Design Principles. Comprehensive examples using available software platforms/case tools, Configuration Management.

Recommended Books:

1. W Stallings, "Networks Security Essentials: Application & Standards", Pearson Education, 2000.
2. W.Stallings, "Cryptography and Network Security, Principles and Practice", Pearson Education, 2000.

MOBILE APPLICATIONS

Subject Code: BCMC-634

L T P C
3 10 4

Duration: 60 Hrs.

UNIT-I (14 Hrs.)

Introduction: Android versions and its feature set The various Android devices on the market , The Android Market application store ,Android Development Environment - System Requirements, Android SDK, Installing Java, and ADT bundle - Eclipse Integrated Development Environment (IDE), Creating Android Virtual Devices (AVDs), Understanding Java SE and the Dalvik Virtual Machine , The Directory Structure of an Android Project , Common Default Resources Folders , The Values Folder , Leveraging Android XML, Screen Sizes , Launching Your Application: The AndroidManifest.xml File, Creating Your First Android Application.

UNIT-II (15 Hrs.)

Android Architecture Overview and Creating an Example Android Application: The Android Software Stack, The Linux Kernel, Android Runtime - Dalvik Virtual Machine, Android Runtime – Core Libraries, Dalvik VM Specific Libraries, Java Interoperability Libraries, Android Libraries, Application Framework, Creating a New Android Project ,Defining the Project Name and SDK Settings, Project Configuration Settings, Configuring the Launcher Icon, Creating an Activity, Running the Application in the AVD, Stopping a Running Application, Modifying the Example Application, Reviewing the Layout and Resource Files

UNIT-III (17 Hrs.)

Android Framework Overview: Android Application Components, Android Activities: Defining the UI, Android Services: Processing in the Background, Broadcast Receivers: Announcements and Notifications Content Providers: Data Management, Android Intent Objects: Messaging for Components,Android Manifest XML: Declaring Your Components

UNIT-IV (14 Hrs.)

Understanding Android Views, View Groups, Layouts and Intents:Designing for Different Android Devices, Views and View Groups, Android Layout Managers, The View Hierarchy, Designing an Android

BCA-MCA DUAL DEGREE (5 YRS.) SYLLABUS 2018 BATCH
(UPDATED ON 24.05.2019)

User Interface using the Graphical Layout Tool, Intent Overview, Implicit Intents, Creating the Implicit Intent

Example Project, Explicit Intents, Creating the Explicit Intent Example Application, Intents with Activities, Intents with Broadcast Receivers

Recommended Books:

1. Jonathan Mccalister, "Mobile Apps Made Simple", 2nd Edition, **2017**.
2. Scott Gowell, "Professional Mobile Application Development", 3rd Edition, **2012**.

SOFTWARE LAB XI (BASED ON BCMC 632)

Subject Code: BCMC-635

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This laboratory course will comprise an exercises to supplement what is learnt under paper BCMC: 632 Computer Graphics and Multimedia.

SOFTWARE LAB XII (BASED ON BCMC 634)

Subject Code: BCMC-636

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This laboratory course will comprise an exercises to supplement what is learnt under paper BCMC: 634 Mobile Applications.