KANNUR UNIVERSITY
(Abstract)

Bachelor of Computer Application (BCA) Programme- Scheme, Syllabus and Pattern of Question Papers of Core and Generic Elective Course under Choice Based Credit and Semester System (Outcome Based Education System-OBE) in Affiliated colleges with effect from 2019 Admission-Implemented-Orders issued.

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Academic Branch

No.Acad.C2/12371/2019/i   Civil Station P.O, Dated 21/06/2019

Read:- 1.   U.O.No.Acad.C2/429/2017 dated 10-10-2017
2.   The Minutes of the Meeting of the Curriculum Restructuring Committee held on 28-12-2018.
3.   U.O No.Acad.C2/429/2017 Vol.II dated 03-06-2019
4.   The Minutes of the meeting of the Board of Studies in Computer Science (UG) held on 07-06-2019
5.   Syllabus of Bachelor of Computer Application (BCA) submitted by the Chairperson, Board of Studies in Computer Science (UG) dated 13/06/2019

ORDER

1.   A Curriculum Restructuring Committee was constituted in the University vide the paper read (1) above to co-ordinate the activities of the Syllabus Revision of UG programmes in Affiliated colleges of the University.

2.   The meeting of the Members of the Curriculum Restructuring Committee and the Chairpersons of different Boards of Studies held, vide the paper read (2) above, proposed the different phases of Syllabus Revision processes such as conducting the meeting of various Boards of Studies , Workshops, discussions etc.

3.   The Revised Regulation for UG programmes in Affiliated colleges under Choice Based Credit and Semester System (in OBE-Outcome Based Education System) was implemented with effect from 2019 Admission as per paper read (3) above.

4.   Subsequently, as per paper read (4) above, the Board of Studies in Computer Science (UG) finalized the Scheme, Syllabus & Pattern of Question Paper for Core & Generic Elective of Bachelor of Computer Application (BCA) Programme to be implemented with effect from 2019 Admission.

5. As per paper read (5) above, the Chairperson, Board of Studies in Computer Science (UG) has submitted the finalized copy of the Scheme, Syllabus & Pattern of Question Papers of Bachelor of Computer Application (BCA) Programme for implementation with effect from 2019 Admission.

6. The Vice Chancellor after considering the matter in detail and in exercise of the powers of the Academic Council conferred under Section 11(1) of Kannur University Act 1996 and all other enabling provisions read together with accorded sanction to implement the Scheme, Syllabus & Pattern of Question Paper(Core /Generic Elective Course) of Bachelor of Computer Application (BCA)programme under Choice Based Credit and Semester System(in OBE-Outcome Based Education System) in the Affiliated colleges under the University with effect from 2019 Admission, subject to report before the Academic Council.

7. The Scheme, Syllabus & Pattern of Question Paper of Bachelor of Computer Application (BCA) Programme are uploaded in the University website (www.kannuruniversity.ac.in)

Orders are issued accordingly.

Sd/-
DEPUTY REGISTRAR (ACADEMIC)
For REGISTRAR

To
The Principals of Colleges offering BCA
(Bachelor of Computer Application programme)

Copy to:-
1. The Examination Branch (through PA to CE)
2. The Chairperson, Board of Studies in Computer Science (UG)
3. PS to VC/PA to PVC/PA to Registrar
4. DR/AR-I, Academic
5. The Computer Programmer (for uploading in the website)
6. SF/DF/FC

Forwarded/By Order

SECTION OFFICER

KANNUR UNIVERSITY

BOARD OF STUDIES-COMPUTER SCIENCE (UG)

SYLLABUS FOR
BACHELOR OF COMPUTER APPLICATIONS(B C A)
CORE AND GENERIC ELECTIVE COURSES

CHOICE BASED CREDIT AND SEMESTERSYSTEM
(OBE-Outcome Based Education System)

(2019 ADMISSION ONWARDS)

Kannur University
Vision and Mission Statement

Vision: To establish a teaching, residential and affiliating University and to provide equitable and just access to quality higher education involving the generation, dissemination and application of knowledge with special focus on the development of higher education in Kasargode and Kannur Revenue Districts and the Manantavadytaluk of Wayanad Revenue District"

Mission:

➢ To produce anddisseminate new knowledge and to find novel avenues for application of such knowledge.

➢ To adopt critical pedagogic practices which uphold scientific temper, the uncompromised spirit of enquiry and the right to dissent.

➢ To uphold democratic, multicultural, secular, environmental and gender sensitive values as the foundational principles of higher educationand to cater to the modern notions of equity, social justice and merit in all educational endeavors.

➢ To affiliate colleges and other institutions of higher learning and to monitor academic, ethical, administrative and infrastructural standards in such institutions.

➢ To build stronger community networks based on the values and principles of higher education and to ensure the region's intellectual integration with national vision and international standards.

➢ To associate with the local self-governing bodies and other statutory as well as non-governmental organizations for continuing education and also for building public awareness on important social, cultural and other policy issues.

KANNUR UNIVERSITY

ProgrammeOutcomes (PO)

PO 1.Critical Thinking:

1. Acquire the ability to apply the basic tenets of logic and science to thoughts, actions and interventions.
2. Develop the ability to chart out a progressive direction for actions and interventions by learning to recognize the presence of hegemonic ideology within certain dominant notions.
3. Develop self-critical abilities and also the ability to view positions, problems and social issues from plural perspectives.

PO 2.Effective Citizenship:

1. Learn to participate in nation building by adhering to the principles of sovereignty of the nation, socialism, secularism, democracy and the values that guide a republic.
2. Develop and practice gender sensitive attitudes, environmental awareness, the ability to understand and resist various kinds of discriminationsand empathetic social awareness about various kinds of marginalization.
3. Internalize certain highlights of the nation's and region's history. Especially of the freedom movement, the renaissance within native societies and the project of modernization of the post-colonial society.

PO 3.Effective Communication:

1. Acquire the ability to speak, write, read and listen clearly in person and through electronic media in both English and in one Modern Indian Language
2. Learn to articulate analysis, synthesis, and evaluation of situations and themes in a well-informed manner.
3. Generate hypothesis and articulate assent or dissent by employing both reason and creative thinking.

PO 4.Interdisciplinarity:

1. Perceive knowledge as an organic comprehensive, interrelated and integrated faculty of the human mind
2. Understand the issues of environmental contexts and sustainable development as a basic interdisciplinary concern of all disciplines.
3. Develop aesthetic, social, humanistic and artistic sensibilities for problem solving and evolving a comprehensive perspective.

PREFACE

The Board of Studies in Computer Science bears deep academic venture and curriculum vision in forming the syllabus for undergraduateprogramme of Kannur University. The curriculum and syllabus pinpoint the creation of technical caliber of students through class room learning, workshops, seminars, presentations and summative and formative assessments.

As the present era moves with advancements in Science and Technology, the Board of Studies in computer Science of Kannur University predominantly emphasize employment-based curriculum formation to make the students extremely competent in global scenario.

Recent algorithms, Networks, Operating Systems etc. are the crux of vast developing technical dimensions of the computer science and Engineering. This curriculum and syllabus clearly states the graduate attributes/Outcomes and is developed after numerous workshops and discussions with different stakeholders.The Board of Studies in Computer Science has resolved to introduce the syllabus in the affiliated colleges for UG programme from 2019 admission onwards.I place records of gratitude to the members of board of studies,Faculties and stake holders to help me in the formation of syllabus.

Lt.ThomasScaria

Chairperson

Board of Studies, Computer Science (UG)
Kannur University

KANNUR UNIVERSITY

ProgrammeSpecific Outcome of B.Sc. Computer Science Programme

PSO1	Understand the concepts of Computer Science and Applications.
PSO2	Understand the concepts of System Software and Application Software.
PSO3	Understand the concepts of Algorithms and Programming.
PSO4	Understand the concepts of Computer Networks.
PSO5	Design, develop, implement and test software systems to meet the given specifications, following the principles of Software Engineering.

KANNUR UNIVERSITY

BCA PROGRAMME

WORK AND CREDIT DISTRIBUTION STATEMENT

Semester	Course Title*	Credits	Hours per week	Total Credits	Total Hours
I	Common Course – English I	4	5	19	25
	Common Course – English II	3	4		
	Common Course – Additional Language I	4	5		
	General Awareness Course I – 1A11BCA Informatics for Computer Applications	2	3		
	Core Course I – 1B01BCA Programming In C	2	2		
	Core Course IV – 2B04BCA Lab I: Programming In C*	0	2		
	Complementary Elective (Mathematics I)	4	4		
II	Common Course – English III	4	5	22	25
	Common Course – English IV	3	4		
	Common Course – Additional Language II	4	5		
	Core Course II – 2B02BCA Digital Systems	3	3		
	Core Course III – 2B03BCAObject Oriented Programming Using C++	2	2		
	Core Course IV – 2B04BCA Lab I: Programming In C*	1	0		
	Core Course V – 2B05BCA Lab II: Programming In C++*	1	2		
	Complementary Elective (Mathematics II)	4	4		
III	General Awareness Course II – 3A12BCA Data Structures	4	4	18	25
	General Awareness Course III – 3A13BCA Database Management System	4	4		
	Core Course VI – 3B06BCAIntroduction to Microprocessors	3	4		
	Core Course VII – 3B07BCAJava Programming	3	4		
	General Awareness Course V – 4A15BCA Lab III: Data Structure and DBMS**	0	3		
	Core Course XI – 4B11BCA Lab IV: Java Programming, Shell Programming & Linux Administration**	0	2		
	Complementary Elective (Mathematics III)	4	4		

IV	General Awareness Course IV – 4A14BCA Discrete Mathematical Structures	4	4		
	Core Course VIII – 4B08BCA Operating Systems	3	4		
	Core Course IX – 4B09BCAComputer Organization	3	4		
	Core Course X – 4B10BCA Linux Administration	3	4	21	25
	General Awareness Course V – 4A15BCA Lab III: Data Structure and DBMS**	2	2		
	Core Course XI – 4B11BCA Lab IV: Java Programming, Shell Programming & Linux Administration **	2	3		
	Complementary Elective (Mathematics IV)	4	4		
V	Core Course XII – 5B12BCASoftware Engineering	3	3		
	Core Course XIII – 5B13BCAEnterprise Java Programming	4	4		
	Core Course XIV – 5B14BCA- Python Programming	2	2		
	Core Course XV – 5B15BCAWeb Technology	2	2		
	Core Course XVI – 5B16BCA Discipline Specific Elective I	3	4	16	25
	Core Course XXI– 6B21BCA Lab V: Enterprise Java Programming***	0	3		
	Core Course XXII– 6B22BCA Lab VI: Python Programming***	0	3		
	Core Course XXIII– 6B23BCA Lab VII: Web Technology***	0	2		
	General Elective Course	2	2		
VI	Core Course XVII – 6B17BCA Design and Analysis of Algorithm	4	4		
	Core Course XVIII – 6B18BCA Introduction to Compiler	3	4		
	Core Course XIX – 6B19BCA Data Communication & Networks	3	3		
	Core Course XX – 6B20BCA Discipline Specific Elective II	3	3	24	25
	Core Course XXI– 6B21BCA Lab V: Enterprise Java Programming***	2	2		
	Core Course XXII– 6B22BCA Lab VI: Python Programming***	3	2		
	Core Course XXIII– 6B23BCA Lab VII: Web Technology***	2	2		
	Core Course XXIV – 6B24BCA Project	4	5		
Total				120	150

*External examination will be conducted at the end of second semester

**External examination will be conducted at the end of fourth semester

***External examination will be conducted at the end of sixth semester

Complementary Elective: Mathematics

Total Marks of the Programme- 1850 Marks (Eng 200 Marks, Additional Common Course 100 Marks, Core 1350, Complementary Elective 200 Marks)

PART A

BCACORE COURSES
WORK AND CREDIT DISTRIBUTION

(2019 ADMISSION ONWARDS)

COURSE CODE	COURSE TITLE	SEMESTER	HOURS PER WEEK	CREDIT	EXAM HRS	MARKS (INTERNAL + EXTERNAL)
1A11BCA	INFORMATICS FOR COMPUTER APPLICATIONS	1	3	2	3	10+40
1B01BCA	PROGRAMMING IN C	1	2	2	3	10+40
2B02BCA	DIGITAL SYSTEMS	2	3	3	3	10+40
2B03BCA	OBJECT ORIENTED PROGRAMMING USING C++	2	2	2	3	10+40
2B04BCA	LAB I: PROGRAMMING IN C	2	I SEM 2 II SEM 0	1	3	5+20
2B05BCA	LAB II: PROGRAMMING IN C++	2	2	1	3	5+20
3A12BCA	DATA STRUCTURES	3	4	4	3	10+40
3A13BCA	DATABASE MANAGEMENT SYSTEM	3	4	4	3	10+40
3B06BCA	INTRODUCTION TO MICROPROCESSORS	3	4	3	3	10+40
3B07BCA	JAVA PROGRAMMING	3	4	3	3	10+40
4A14BCA	DISCRETE MATHEMATICAL STRUCTURES	4	4	4	3	10+40
4B08BCA	OPERATING SYSTEMS	4	4	3	3	10+40
4B09BCA	COMPUTER ORGANIZATION	4	4	3	3	10+40
4B10BCA	LINUX ADMINISTRATION	4	4	3	3	10+40
4A15BCA	LAB III: DATA STRUCTURES AND DBMS	4	III SEM 3 IV SEM 2	2	3	5+20
4B11BCA	LAB IV: JAVA PROGRAMMING, SHELL PROGRAMMING & LINUX ADMINISTRATION	4	III SEM 2 IV SEM 3	2	3	5+20
5B12BCA	SOFTWARE ENGINEERING	5	3	3	3	10+40
5B13BCA	ENTERPRISE JAVA PROGRAMMING	5	4	4	3	10+40
5B14BCA	PYTHON PROGRAMMING	5	2	2	3	10+40
5B15BCA	WEB TECHNOLOGY	5	2	2	3	10+40
5B16BCA	DISCIPLINE SPECIFIC ELECTIVE I	5	4	3	3	10+40
5D--BCA	GENERIC ELECTIVE COURSE	5	2	2	2	5+20

6B17BCA	DESIGN AND ANALYSIS OF ALGORITHM	6	4	4	3	10+40
6B18BCA	INTRODUCTION TO COMPILER	6	4	3	3	10+40
6B19BCA	DATA COMMUNICATION & NETWORKS	6	3	3	3	10+40
6B20BCA	DISCIPLINE SPECIFIC ELECTIVE II	6	3	3	3	10+40
6B21BCA	LAB V: ENTERPRISE JAVA PROGRAMMING	6	V SEM 3 VI SEM 2	2	3	5+20
6B22BCA	LAB VI: PYTHON PROGRAMMING	6	V SEM 3 VI SEM 2	3	3	5+20
6B23BCA	LAB VII: WEB TECHNOLOGY	6	V SEM 2 VI SEM 2	2	3	5+20
6B24BCA	PROJECT	6	5	4	-	20+80
*AN INDUSTRIAL VISIT (STUDY TOUR) IS RECOMMENDED FOR THE PROJECT WORK						

LIST OF DISCIPLINE SPECIFIC ELECTIVE COURSES

COURSE CODE	COURSE TITLE	SEMESTER	HOURS PER WEEK	CREDIT	EXAM HRS
5B16BCA-E01	INFORMATION SECURITY	5	4	3	3
5B16BCA-E02	MOBILE COMMUNICATIONS	5	4	3	3
5B16BCA-E03	C# AND .NET PROGRAMMING	5	4	3	3
5B16BCA-E04	BIO-INFORMATICS	5	4	3	3
6B20BCA-E01	DATA MINING AND DATA WAREHOUSING	6	3	3	3
6B20BCA-E02	NETWORK PROGRAMMING	6	3	3	3
6B20BCA-E03	DIGITAL IMAGE PROCESSING	6	3	3	3
6B20BCA-E04	CLOUD COMPUTING	6	3	3	3

EVALUATION

ASSESSMENT	WEIGHTAGE
EXTERNAL	80%
INTERNAL	20%

CONTINUOUS INTERNAL ASSESSMENT FOR THEORY

COMPONENT	WEIGHTAGE	REMARKS
COMPONENT1: TEST	80%	MINIMUM OF 2 TESTS SHOULD BE CONDUCTED. MARKS FOR THE TEST COMPONENT SHOULD BE CALCULATED AS THE AVERAGE OF THE MARKS OBTAINED IN THE TESTS CONDUCTED.
COMPONENT 2: ASSIGNMENT/ SEMINAR/VIVA	20%	ANY ONE COMPONENT

PATTERN OF QUESTION PAPER FOR END SEMESTER EVALUATION

Part A	**Short Answer**	**6 Questions x 1 Mark = 6 Marks**
	Answer all questions	6 Questions x 1 Mark = 6 Marks
Part B	**Short Essay**	**8 Questions x 2 Marks = 16 Marks**
	Answer any 6 questions	6 Questions x 2 Marks = 12 Marks
Part C	**Essay**	**6 Questions x 3 Marks = 18 Marks**
	Answer any 4 questions	4 Questions x 3 Marks = 12 Marks
Part D	**Long Essay**	**4 Questions x 5 Marks = 20 Marks**
	Answer any 2 questions	2 Questions x 5 Marks = 10 Marks
Total Marks Including Choice: 60		
Maximum Marks for the Course: 40		

CONTINUOUS EVALUATION FOR PRACTICAL

COMPONENT	WEIGHTAGE	REMARKS
COMPONENT 1: LAB SKILLS, OBSERVATION NOTE AND PUNCTUALITY	20% FOR LAB SKILL 20% FOR OBSERVATION NOTE AND PUNCTUALITY	OBSERVATION NOTE IS MANDATORY. MARKS SHOULD BE GIVEN CONSIDERING OBSERVATION NOTE LAB SKILLS AND PUNCTUALITY.
COMPONENT1: TEST	60%	MODEL EXAMINATION SHOULD BE CONDUCTED BEFORE EXTERNAL EXAM AND CONSIDERED FOR INTERNAL MARK

END SEMESTER EVALUATION FOR PRACTICAL

*EXCEPT : 2B04BCA PROGRAMMING IN C- LAB

COMPONENT	PART A	PART B
Code Writing	3	3
Output	3	3
Modification for Part A or Part B	3	
Record	2	
Viva	3	
Total Marks	**20**	

PATTERN OF QUESTION PAPER FOR END SEMESTER EVALUATION

Part A	**2 Questions x 10 Mark = 20 Marks**	
	Answer any 1 question	1 Questions x 10 Mark = 10 Marks
Part B	**2 Questions x 10 Mark = 20 Marks**	
	Answer any 1 question	1 Questions x 10 Mark = 10 Marks
Total Marks Including Choice: 40		
Maximum Marks for the Course: 20		

SEMINARS/ASSIGNMENTS/VIVA

These are part of the curriculum and are to be critically assessed for Internal Assessment. Marks should be awarded based on the content, presentation and the effort put in by the student. The course teacher may give the topics for seminars / assignments. The topics shall be related to the syllabus of the course and is not meant for evaluation in the End Semester Examination.

RECORDS

One rough record (Observation Note) and one fair record are compulsory for each practical course. The student will not be permitted to appear for practical examinations without certified practical records. The records are intended as observation records of the practical works done in the lab. The valuation of records, to be done internally, should be based on the effort and promptness of the student in practical works. Record mark is calculated at the time of End Semester Evaluation. Observation notes are compulsory in Lab hours.Students should get signature for each program done in the lab from the faculties and those programs are recommended for fair record.

PROJECT WORK

Every student of B.Sc. Computer Science Programme shall have to work on a project of FIVE credits under the supervision of a faculty member as per the curriculum. The duration of the project is one year, starting in the fifth semester and submission of the dissertation at the end of sixth semester. Individual projects are recommended but, in an instance, where the number of supervising teachers is less, the project may be done as group. The maximum number of students in a group shall be limited to THREE.

PROJECT EVALUATION

Evaluation of the Project Work shall be done under Mark System at two stages:

1. Internal Assessment (supervising teachers will assess the project and award internal Marks)
2. External evaluation (external examiner appointed by the University)

Marks secured for the project will be awarded to candidates, combining the internal and external Marks. Assessment of different components may be taken as below.

CONTINUOUS EVALUATION FOR PROJECT

COMPONENT	WEIGHTAGE
Punctuality	20%
Relevance of topic System study / Design of tables	20%
Project Report	30%
Presentation & Viva-voce	30%
Total	**100%**

END SEMESTEREVALUATION FOR PROJECT

COMPONENT	WEIGHTAGE
Written Synopsis/Abstract	12.5%
Content of the Project	12.5%
Quality of project work/Useof software/ tools	12.5%
Perfection of the work (Designs of tables/ Input & Output forms)	25%
Live demo	12.5%
Viva-voce	25%
Total	**100%**

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
I	1A11BCA	3	2	3

COURSE OUTCOME

CO1: Understand the basic concepts and functional knowledge in the field of Informatics.
CO2: Equip the students with fundamentals of Computer.
CO3: Awareness about social issues and concerns in the use of digital technology
CO4: Skills to enable students to use free software.

Unit I:

Concept of Hardware and Software: Computer Languages – Machine Language, Assembly Language, High-level Language, Language translators: Compiler, Interpreter, Assembler, Features of good language.

(12Hrs)

Unit II:

Basic Computer Organization: Von Neumann model, Input Unit, Output Unit, Storage Unit, Control Unit, Memory hierarchy, RAM, ROM, PROM and EPROM, cache memory and registers. Secondary storage devices. Storage capacity: bit, byte, nibble.

(10Hrs)

Unit III:

Introducing Input output devices with examples. Introduction to operating System: need of OS, Types of OS, Functions of OS (introduction only). Introduction to Computer Networks: definition and applications.

(12Hrs)

Unit IV:

Introduction to Linux: Basic commands in Linux such as listing files, viewing contents in files, creating and deleting directories, moving and copying files and/or directories, man pages, setting permissions on files/directories and vi editor. Steps to install Linux OS.

(10Hrs)

Unit V:

IT & Society- issues and concerns- digital divide, IT & development, free software movement, cyber ethics, cybercrime, cyber threats, cyber security, privacy issues, cyber laws, cyber addictions, guide lines for proper usage of computers, internet and mobile phones.

(10Hrs)

Books for Study:

1. V. Rajaraman and T. Radhakrishnan, An Introduction to Digital Computer Design, 5th Ed, PHI.
2. B.Ram, Computer Fundamentals, Architecture & Organization, 4th Ed, New Age International Publishers
3. Pradeep K. Sinha and PritiSinha, Computer Fundamentals, 6th Ed, BPB Publications
4. Ellen Siever, Stephen Figgins, Robert Love and Arnold Robbins, Linux in a Nutshell: A Desktop Quick Reference, 6thEdition, O′Reilly

Books for Reference:

1. George Beekman and Eugene J. Rathswohl, Computer Confluence, Pearson
2. Alexis Leon and Mathews Leon, Fundamentals of Information Technology, Vikas Publishing
3. Barbara Wilson, Information Technology: The Basics, Macmillan International Higher Education
4. John Ray, Sams Teach Yourself Linux in 10 Minutes, Sams
5. Ramesh Bangia, Learning Computer Fundamentals, Khanna Publishers

Marks including choice:

Unit	Marks
1	12
2	12
3	12
4	12
5	12

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
I	1B01BCA	2	2	3

COURSE OUTCOME

CO1: Understanding the basic concepts inprogramming.
CO2: Familiarize the basic syntax and semantics of C language.
CO3: Familiarize with advanced features ofc.
CO4: Develop skill inprogramming

Unit I:

Algorithms and Flow charts: Definitions, Symbols, Program:structure, top-down design, source code, object code, executable file, file extensions. Importance of C; Basic structure of C, programming style, executing a C program. Character set, C tokens, Keywords, identifiers, Constants, data types, declaration of variables, arithmetic operators , logical operators, Relational operators, Assignment operators, Increment and decrement operators, conditional operators, Bitwise operators. Precedence and order of evaluation.type conversion in expression. common programming errors, program testing and debugging, programefficiency.

(9 Hrs)

Unit II:

Managing Input output operation: reading a character, writing a character, formatted input output. Branching statements-if, if..else, nested if...else, else...if ladder, switch statement, go to statement. Looping statements- while, do...while, for loop. Break and continue statements.

(7 Hrs)

Unit III:

Arrays: One dimensional arrays, two dimensional arrays, Initializing array elements, Multidimensional arrays. Strings: declaration and initializing, reading and writing. Arithmetic operations on character. String handling functions, Functions: Library and user defined, defining a function, calling a function. Parameter passing techniques, Scope and life time of variables in function, recursive functions, arrays andfunctions.

(**7 Hrs**)

Unit IV:

Structure and union: definition, giving values to members, initialization. Array of structures, array within structure, structure within structure, union. Pointers: accessing the address of a variable, declaration and initializing pointers, accessing a variable through its pointers, pointer arithmetic, pointers and arrays (pointer to array and array of pointers), pointers and character string, pointer and functions. Dynamic memory allocation: malloc(), calloc(), free(),realloc().

(6 Hrs)

Unit V:

File Management: Text and binary files, Defining and opening a file, closing a file, input and output operations on file, error handling, random access file. Command line arguments.

(7 Hrs)

Books for Study:

   1. E. Balaguruswamy, Programming in ANSI C, 7th Ed, TMH

Books for Reference:

   1. V. Rajaraman, Computer Basics and C Programming, PHI

   2. Ashok N. Kamthane, Programming with ANSI and Turbo C, Pearson

   3. YeshavantKanetkar, Let Us C, 16thEd, BPB

   4. Noel Kalicharan, C by Example, Cambridge University Pres

Marks including choice:

Unit	Marks
1	12
2	12
3	12
4	12
5	12

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
II	2B02BCA	3	3	3

COURSE OUTCOME

CO1: Introduce the basic and important concepts of Digital Principles and applications

CO2: Familiarize with basic building blocks of Digital systems, Digital Logic and Digital Circuits

CO3: Design simple combinational digital systems.

CO4: Familiarize different number systems, codes and data representation in digital systems

Unit I:

Introductory Digital Concepts: Digital and Analog Quantities – Binary Digits, Logic Levels and Digital Waveforms - Basic Logic - Digital IC. Number Systems: Decimal, Binary, Hexa-decimal and Octal – Conversions -CODES: BCD,ASCII, Excess-3, GRAY and UNICODE. BINARY ARITHMETIC: Addition, Subtraction. Data Representation(textbook 2): Data types - Complements (1's and 2's)– FixedPoint representation – Floating Point representation.

(10 Hrs)

Unit II:

Logic Gates: Inverter-AND-OR-NAND-NOR-XOR-XNOR-positive and Negative logic-Examples of IC gates. Boolean Algebra and Logic simplification: Boolean operations and Expressions – Laws and Rules of Boolean Algebra – DeMorgan's Theorem – Boolean analysis of Logic Circuits – Simplification, Standard forms and Truth tables of Boolean Expressions – K-Map , SOP, POS Minimization.

(12 Hrs)

Unit III:

Combinational Logic Circuits: Basic Combinational Logic Circuits – Implementing Combinational Logic – Universal Property of NAND and NOR gates. Functions of Combinational Logic: Basic overview – Basic Adders-Parallel Binary Adders-

Comparators-Decoders-Encoders-Code Converters – Multiplexers – Demultiplexers-Parity generators/checkers.

(12 Hrs)

Unit IV:

Flip Flops: Latches – Edge triggered Flip flops – Master Slave Flip flops-operating characteristics. Counters: Asynchronous counters - Synchronous counters – UP/Down synchronous counters – Design of Synchronous counters

(10Hrs)

Unit V:

Shift Registers: Basic Shift Registers Functions - Serial in/Serial Out Shift Registers - Parallel In/Parallel out Shift Registers Bidirectional Shift Registers – Shift Register Counters. Memory: Basics of Semiconductor memories – RAM – ROM – PROM – EPROM – Flash Memories

(10 Hrs)

Books for Study:
1. Thomas L. Floyd, Digital Fundamentals, 11th Ed, Pearson
2. M. Morris Mano, Computer System Architecture, 3rd Ed, Pearson

Books for Reference:
1. Donald P. Leach, Albert Paul Malvino and GautamSaha, Digital Principles and Applications, 8th Ed, TMH

Marks including choice:

Unit	Marks
1	12
2	12
3	12
4	12
5	12

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
II	2B03BCA	2	2	3

COURSE OUTCOME

CO1: Understanding OOPsconcepts such as inheritance and polymorphism and their implementation usingC++.

CO2: Ability to develop programs in C++

Unit I:

Principles of object-oriented programming; OOP paradigm; Basic concepts of OOP; Benefits; applications. Introduction to C++, Structure of C++ program; Tokens, Keywords, identifiers and constants; Data types, symbolic constants; type compatibility; declaration and dynamic initialization of variables; reference variables. Operators, manipulators; type cast operators; Expressions, implicit conversions; operator overloading; operator precedence; Control structures.

(9Hrs)

UnitII:

Functions; function overloading; friend and virtual functions; Math library functions. Structures; Specifying a class; Defining member functions; making an outside function inline; nesting of member functions; private member functions; arrays within a class; memory allocation for objects; static data members; static member functions; arrays of objects; objects as function arguments; friendly functions; returning objects; const member functions; pointer to members; Localclasses.

(7 Hrs)

Unit III:

Constructors and destructors; dynamic initialization of objects; copy constructor; Dynamic constructors; const objects; Destructors. Operator overloading – definition; overloading unary operators; overloading binary operators; overloading binary operators using friends; manipulation of strings using operators; rules for overloading operators. Type conversions.

(7 Hrs)

Unit IV:

Inheritance – defining derived classes; making a private member inheritance; Types of inheritance; virtual base classes; abstract classes; constructors in derived classes; Nesting of classes. Pointers; Pointers to objects; Pointers to derived classes; virtual functions; pure virtualfunctions.

(6 Hrs)

Unit V:

C++ streams; stream classes; unformatted I/O operations; Formatted console I/O operations; Managing output with manipulators. Files – classes for file stream operations; Opening and closing a file; file modes; file pointers and their manipulations; Sequential input and output operation.

(7 Hrs)

Books for Study:

1. E. Balagurusamy, Object Oriented Programming with C++, 7th Ed, TMH

Books for Reference:

1. K R. Venugopal and Raj Kumar Buyya, Mastering C++, 2ndEd, TMH.
2. Ashok N. Kamthane, Object-Oriented Programming with ANSI and Turbo C++, Pearson
3. M. T. Somashekara, Programming in C++, 2009, PHI
4. YeshavantKanetkar , Let us C++, 2nd Ed, BPB

Marks including choice:

Unit	Marks
1	12
2	12
3	12
4	12
5	12

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
II	2B04BCA	I SEM 2 Hrs II SEM 0 Hrs	1	3

Sample Program List

Students have to practice all programs

1. Write a program to print the size of any five data types in C and its range.
2. Write a program to convert Fahrenheit to Celsius.
3. Write a program to accept three numbers and find the largest and second largest (if stmt)
4. Write a program to to find the roots of a quadratic equation (if stmt)
5. Write a program to print all prime numbers between any 2 given limits. (while/for stmt)
6. Write a program to check whether a given matrix is an Identity matrix or not. (2D array)
7. Write a program matrix multiplication. (2D array)
8. Write a program to accept two numbers and perform various arithmetic operations (+,-,*,/) based on the symbol entered. (switch stmt)
9. Write a recursive program to find the factorial of a number.(recursive function)
10. Write a program to check whether the string is a Palindrome. (string, 1D array)
11. Write a program to count and display the different vowels in a line of text. (string)
12. Create an employee structure and display the same. (structure)
13. Write a function to swap two numbers using pointers (pointers, call by value, call by ref)
14. Write a program to access an array of integers using pointers (pointers to arrays)
15. Create a file and store some records in it. Display the contents of the same.(file)

DISTRIBUTION OF MARKS FOR END SEMESTER EVALUATION

COMPONENT	PART A	PART B
Code Writing	3	3
Output	3	3
Modification for Part A or Part B	2	
Algorithm/Flowchart for part A or Part B	2	
Record	1	
Viva	3	
Total Marks	20	

PATTERN OF QUESTION PAPER FOR END SEMESTER EVALUATION

Part A	**2 Questions x 10 Mark = 20 Marks**	
	Answer any 1 question	1 Questions x 10 Mark = 10 Marks
Part B	**2 Questions x 10 Mark = 20 Marks**	
	Answer any 1 question	1 Questions x 10 Mark = 10 Marks
Total Marks Including Choice: 40		
Maximum Marks for the Course: 20		

CORE COURSE V: 2B05BCA LAB II - PROGRAMMING IN C++

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
II	2B05BCA	2	1	3

Sample Program List

Students have to practice all programs . All programs must be based on OOP concepts.

1. Program to find whether the given number belongs to fibonacci series. (class basics)

2. Program to find whether the string is palindrome or not. Use pointers. (class basics)

3. Write a program to sort n numbers. (class basics)

4. Program to add one day to a given date. (class basics)

5. Program to find the trace and transpose of a matrix. (class basics)

6. Create a class time comprises hr,min and sec.as member data and add() and display() as member functions. Use constructor to initialise the object. write a main function to add two time objects, store it in another time object and display the resultant time (constructors)

7. Program to find biggest, smallest, sum and difference of two numbers using inline function. (inline)

8. Program to find the area and volume of respective figures using function overloading. (function overloading)

9. Program to negate the elements of an array. Use operator overloading function with the operator -. (operator overloading - unary)

10. Program to compare two strings. Use operator overloading (==). Do not use any built in functions. (operator overloading - binary)

11. Addition / Subtraction / Multiplication of complex numbers using classes. (operator overloading)

12. Define a class student with name, reg.no, date of birth and name of college as member data and functions to get and display these details. Design another class Test with subjects of study and grade for each subject as member data and

corresponding input and output functions. Derive a class Result from both Student and Test classes and Print the Result of each student with relevant information. (inheritence)

13. Start with an array of pointers to strings representing the days of the week. Provide functions to sort the strings into alphabetical order. Use pointers (array of pointers)

14. Design two classes A and B with member data n1 and n2 respectively. Set values for each one. Write a program to interchange the values of both A and B. Use friend function. (friend functions)

15. Design a class employee with relevant emp details. Read the details of n emp from the keyboard and write it into a File named empdetails. At the end of writing every n emp details read them back from the same file and display into the screen. Use seperate functions to write and read into and out of the file. (file, can use object pointers) 16. Define a class to represent a bank account. Include the following members :

     1. Data Members:

     2. Name of the depositor.

     3. Account number.

     4. Type of account.

     5. Balance amount in the account.

   ⬜ Member Functions

     1. To assign initial values.

     2. To deposit an amount.

     3. To withdraw an amount after checking the balance.

     4. To display name and balance.

   ⬜ Use appropriate main program. (application level calsspgm)

17. . Create a base class called shape. Use this class to store two double type values that could be used to compute the area of figures. Derive two specific classes called TRIANGLE and RECTANGLE from the base SHAPE. Add to the base class, a member function get_data() to initialize base class data members and

another member function display_area() to compute and display the area of figures. Make display_area() as a virtual function and redefine this function in the derived class to suite the requirements (virtual functions)

GENERAL AWARENESS COURSE II: 3A12BCA DATA STRUCTURES

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
III	3A12BCA	4	4	3

COURSE OUTCOME

CO1: Understand theconceptofdatastructuresanditsrelevanceincomputer science.

CO2: Familiarize with selected linear and nonlinear datastructures.

CO3: Enhance skill inprogramming.

Unit I:

Data structures: Definition and Classification. Array: - Operations; Number of elements; Array representation in memory. Polynomial representation with arrays; Polynomial addition. Sparse matrix: Addition of sparse matrices. The concept of recursion.examples – factorial and Tower of Hanoiproblem.

(12 Hrs)

Unit II:

Sorting algorithms: Insertion, bubble, selection, quick and merge sort; Comparison of Sort algorithms. Searching techniques: Linear and Binary search.

(15 Hrs)

Unit III

Stack: Operations on stack; array representation. Application of stack- i. Postfix expression evaluation. ii. Conversion of infix to postfix expression. Queues: Operation on queue. Circular queue; Dequeue, and priority queue. Application of queue: Job scheduling.

(15 Hrs)

Unit IV:

Linked list – Comparison with arrays; representation of linked list in memory. Singly linked list- structure and implementation; Operations – traversing/printing; Add new node; Delete node; Reverse a list; Search and merge two singly linked lists. Stack with singly linked list. Circular linked list – advantage. Queue as Circular linked list. Head nodes in Linked list – Singly linked list with head node – Add / delete nodes; Traversal /

print. Doubly linked list – structure; Operations – Add/delete nodes; Print/traverse.Advantages.

(15 Hrs)

Unit V:

Tree and Binary tree: Basic terminologies and properties; Linked representation of Binary tree; Complete and full binary trees; Binary tree representation with array. Tree traversal: Recursive inorder, preorder and postorder traversals. Binary search tree - Definition and operations (Create a BST, Search, Time complexity of search). Application of binary tree: Huffmanalgorithm.

(15 Hrs)

Books for Study:

1. DebasisSamanta, Classic Data Structures, 2nd Ed, PHI

Books for Reference:

2. G. A. V. Pai, Data Structures and Algorithms: Concepts, Techniques and Applications, 1st Ed, TMH

3. Ellis Horowitz, SartajSahni and Dinesh Mehta, Fundamentals of Data Structures in C++, 2nd Ed, Universities Press

Marks including choice:

Unit	Marks
1	12
2	12
3	12
4	12
5	12

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
III	3A13BCA	4	4	3

COURSE OUTCOME

CO1: Understand the basic concepts inDBMS.
CO2: Skill in designingdatabase.
CO3: Familiarization of different DBMSmodels.
CO4: Skill in writing queries usingMySQL.

Unit I:

Introduction – purpose of Database systems. View of Data, data Models, transaction
management, database structure, DBA, Data Base Users.

(12 Hrs)

Unit II:

E-R model, Basic concepts; design issues; Mapping Constraints; Keys; Primary, Foreign,
candidate, E-R diagram; Weak entity set; Extended E-R features. Normal forms – 1NF,
2NF, 3NF and BCNF; functional dependency, Normalization.

(15 Hrs)

Unit III:

Relational model – Structure of Relational database.Relational Algebra; Fundamental
operations; Relational calculus; Tuple and domaincalculus.

(15 Hrs)

Unit IV:

SQL: database languages; DDL; create, alter, Drop, DML, Insert into, Select, update,
Delete, DCL commands, Data types in SQL; Creation of database and user.Case study:
MySQL.

(15 Hrs)

Unit V:

Developing queries and subqueries; Join operations; Set operations; Integrity constraints,
views, Triggers, functions and Sequences. Case study: MySQL

(15 Hrs)

Books for Study:

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan, Database System Concepts, 6th Ed, TMH

2. NarainGehani, The Database Book Principles and Practice Using MySQL, University Press

Books for Reference:

1. ElmasriRamez and NavatheShamkant, Fundamentals of Database System, 7th Ed, Pearson

Marks including choice:

Unit	Marks
1	12
2	12
3	12
4	12
5	12

CORE COURSE VI:3B06BCA INTRODUCTION TO MICROPROCESSORS

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
III	3B06BCA	4	3	3

COURSE OUTCOME

CO1: Familiarize with 8085 architecture.
CO2: Familiarize with 8086 architecture.
CO3: Skill in writing assembly language programs.
CO4: Understand Interrupts and DMA techniques.

Unit I

Introduction: History of Microprocessors, Introduction to 8-bit microprocessor - 8085,Architecture of 8085, Bus organization of 8085, Internal Data Operations and 8085registers.

(15Hrs)

Unit II

Introduction to 16-bit microprocessor – 8086, Architecture of 8086, Functional BlockDiagram, Register Organization of 8086, Signal Description of 8086, Physical MemoryOrganization, Memory Mapped and I/O Mapped Organization, General Bus Operation, I/OAddressing Capability.

(15 Hrs)

Unit III

Addressing Modes of 8086, Machine Language Instruction Format, AssemblyLanguage Programming of 8086, Instruction Set of 8086-Data transfer instructions,Arithmetic and Logic instructions, Branch instructions, Loop instructions, Processor Controlinstructions, Flag Manipulation instructions, Shift and Rotate instructions, Stringinstructions, Assembler Directives and operators.

(15 Hrs)

Unit IV

Introduction to Stack, STACK Structure of 8086, Interrupts and Interrupt ServiceRoutines, Interrupt Cycle of 8086, Non-Maskable and Maskable Interrupts.

(12 Hrs)

Unit V

Data transfer schemes – Programmed IO, Interrupt driven IO and DMA.Programmable Peripheral Interface 8255-features, architecture, DMA Controller 8257-features, architecture, Programmable Interrupt Controller 8259A -features,architecture

(15Hrs)

Books for study
1. K. M. Bhurchandi and A. K. Ray, Advanced Microprocessor and Peripherals, 3rd Ed, TMH
2. Ramesh Gaonkar, Microprocessor Architecture, Programming, and Applications with the 8085, 6th Ed, Penram International Publishing

Books for Reference
1. Douglas V. Hall, Microprocessors and Interfacing: Programming and Hardware, 2nd Ed, McGraw Hill

Marks including choice:

Unit	Marks
1	12
2	12
3	12
4	12
5	12

CORE COURSE VII:3B07BCA JAVA PROGRAMMING

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
III	3B07BCA	4	3	3

COURSE OUTCOME

CO1: Learn the features of java
CO2: Understand the concept of error handling
CO3: Learn about multi - threading
CO4: Experience the GUI Programming.

Unit I

Introduction to Java programming : Java technology; history; java as a new paradigm; features of java; Java Development Kit; Java Language fundamentals; wrapper classes; arrays; strings; StringBuffer classes.

(12 Hrs)

Unit II

Java classes, variables, methods and constructors; Overloading and overriding; Modifiers; Packages; Interfaces.

(15 Hrs)

Unit III

Exception handling: Basics; handling exceptions in java; (Try, catch, finally, multiple catch, nested try, throw); Exception and inheritance; Throwing user defined exceptions; Advantages of exception handling.Multithreading: Overview; Creating threads; thread life cycle; Priorities and scheduling; synchronization; Thread groups; communication of threads; Sample programs.

(15 hrs)

Unit IV

Files and I/O streams: Overview; Java I/O; file streams; FileInputStreamand FileOutputStream; Filter Streams; RandomAccessFile; Serialization; Applets : Introduction; Application vs. applets; Applet lifecycle; Working with Applets; The HTML APPLET tag; the java.applet Package; Sample programs.

(15 Hrs)

Unit V

The Abstract Window Toolkit: - Basic classes in AWT; Drawing with Graphics class; Class hierarchy; Event handling;AWT controls (Labels, Buttons, checkbox, radio buttons; choice control; list, textbox, scroll bars); Layout Managers. The menu component hierarchy; Creatingmenus; Handling events from menu items.

(15 Hrs)

Books for Study:

1. P. RadhaKrishna, Object Oriented Programming Through Java, University Press

Books for Reference:

1. E. Balagurusamy, Programming With JAVA, 5th Ed, TMH
2. Herbert Schildt, Java 2: The Complete Reference, 5th Ed, TMH

Marks including choice:

Unit	Marks
1	14
2	11
3	13
4	11
5	11

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
IV	4A14BCA	4	4	3

COURSE OUTCOME

CO1: Fundamental mathematical concepts and terminology for Computer Science
CO2: Acquire knowledge in Mathematical Logic
CO3: Gain knowledge in Boolean Algebra and Group Theory
CO4: Awareness about the importance of Graph Theory in Computer Science

Unit I

Sets and Mathematical Logic: Set Theory - Types of sets, Set operations, Principles of Inclusion and Exclusion. Mathematical Logic - Propositional Calculus - Statement, Connectives, Conditional and Biconditional, Equivalence of Formula, Well Formed Formula, Tautologies, Normal Forms, Theory of Inference for the Statement Calculus, Predicate Calculus, Theory of Inference for the Predicate Calculus.

(12 Hrs)

Unit II

Functions and Relations: Functions – Types of Functions, Composition of Functions and Inverse Functions. Relations - Relations and Their Properties, Functions as relations, Closure of Relations, Composition of relations, Equivalence Relations and Partitions. Partial Ordering, Hasse Diagram.The Pigeonhole Principle.

(15 Hrs)

Unit III

Lattices and Boolean Algebra - Lattices and Algebraic Systems, Principles of Duality, Basic Properties of Algebraic Systems Defined by Lattices, Distributive Lattices and Complemented Lattices. Boolean Lattices and Boolean Algebras.Boolean Functions and Boolean Expressions.

(15 Hrs)

Unit IV

Group Theory – Definition and Elementary Properties - Permutation Groups, Cyclic Groups – Subgroups - Cosets,Semigroup and Monoid.Homomorphism and Isomorphism.Rings, Integral Domains and Fields.

(15 Hrs)

Unit V

Graph Theory- Basic concepts- Introduction, Directed Graph, Undirected Graph, Connected and Disconnected Graphs, Bipartite Graph, Complete Bipartite Graph, Isomorphic Graphs, Subgraph. Paths and Circuits.Shortest Paths in Weighted Graphs-Dijkstra's Algorithm.Eulerian Paths and Circuits, Hamiltonian Paths and Circuits.Storage representation and manipulation ofgraphs.Minimum Spanning Trees.

(15 Hrs)

Books for Study:

1. Kenneth H. Rosen and Kamala Krithivasan, Discrete Mathematics And Its Applications with Combinatorics and Graph Theory, 7th Ed, TMH

Books for Reference:

1. J. K. Sharma, Discrete Mathematics, 2004, Macmillan Publishers India Limited
2. Alan Doerr, Kenneth Levasseur, Applied Discrete Structures for Computer Science, Galgotia Publications Pvt Ltd
3. N Ch S N Iyengar, V. M. Chandrasekaran, K. A. Venkatesh and P. S. Arunachalam, Discrete Mathematics, Vikas Publishing
4. C. L. Liu and D. P. Mohapatra, Elements Of Discrete Mathematics (SIE), 4thEd, TMH

Marks including choice:

Unit	Marks
1	12
2	12
3	12
4	12
5	12

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
IV	4B08BCA	4	3	3

COURSE OUTCOME

CO1: Understand the basic concepts, structure and functions of operating systems.
CO2: Understand the principles behind the techniques in resource management
CO3: Knowledge about the basic design of the OS

Unit I

OPERATING SYSTEMS OVERVIEW: Operating System Definition, Functions, OS as a resource manager, Types of OS, Evolution of OS, OS Structure, Operating system operations, Process Management, Memory Management, Storage Management, Protection and Security, Operating System Services, User Operating System Interface, System Calls, OS design and implementation, Operating System Structure. (Text 1)

(14 Hrs)

Unit II

PROCESS MANAGEMENT:Processes: Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication. CPU Scheduling: Basic concepts, scheduling criteria, Scheduling algorithms. Deadlocks: System Model,Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock. (Text 1)

(18Hrs)

Unit III

MEMORY MANAGEMENT:Memory management: Single contiguous allocation,Partitioned allocation, Relocatable partitioned, Paging, Demand paging, Segmentation, Segmentation and demand paging, Otherschemes. (Text 2)

(14 Hrs)

Unit IV

STORAGE MANAGEMENT: Mass Storage Structure: Overview, Disk Scheduling: (FCFS, SSTF, SCAN, C-SCAN , Look) , Disk Management. RAID Structure. (Text 1)

Unit V:

File System interface: File Concepts, Directory and Disk Structure.

Protection: Protection: Goals of protection, principles of protection, domain of protection, access matrix. (Text 1)

(12 Hrs)

Books for Study:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 9th Edition, John Wiley and Sons Inc., 2012
2. Stuart E.Madnick and John J Donovan, "Operating Systems", Tata McGraw-Hill, 2005

Books for Reference:

1. Andrew S.Tanenbaum, Herbert Bos, Modern Operating Systems, 4th Ed, Pearson
2. Dhananjay M.Dhamdhere, Operating Systems A Concept Based Approach, 3rd Ed, TMH

Marks including choice:

Unit	Marks
1	13
2	14
3	11
4	11
5	11

CORE COURSE IX: 4B09BCA COMPUTER ORGANIZATION

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
IV	4B09BCA	4	3	3

COURSE OUTCOME

CO1: Understand the basic operation of a computer system.
CO2: Understand the organization and design of basic digital computer
CO3: Introduce the concepts of microprogramming and design simple combinational digital systems.
CO4: Understand the organization of memory and techniques that computers use to communicate with I/O devices

Unit I

Functional Units and Basic operational Concepts of a digital computer (Textbook 2). Register Transfer and Micro operations: Register Transfer Language-Register Transfer-Bus and memory Transfer. Basic Computer Organization and Design: Instruction Codes – Computer Registers-Computer Instructions-Timing and Control-Instruction cycle-Memory Reference Instructions-I/O and Interrupt-Complete Computer Description-Design of Basic Computer.

(18Hrs)

Unit II

Micro Programmed Control: Control Memory – Address sequencing – Microprogram Example -Design of Control Unit. Central Processing Unit – General Register Organization – Stack Organization - Instruction Formats – Addressing modes – Data Transfer and Manipulations- Program Control – Reduced Instruction set computer(RISC).

(18Hrs)

Unit III

Input Output Organization: Peripheral Devices – Input/output Interfaces – Asynchronous Data Transfer – Modes of transfer –Priority Interrupt – Direct Memory Access (DMA) - Input Output Processor - Serial Communications.

(12Hrs)

Unit IV

Memory Organization: Memory Hierarchy – Main memory – Auxiliary Memory – Associative Memory – Cache memory – Virtual Memory.

(**12Hrs**)

Unit V

Pipelining: Parallel processing – Pipelining – Instruction pipeline. Multiprocessors: Characteristics of multiprocessors – Inter connection structures – Inter Processor Arbitration.

(**12 Hrs**)

Books for Study:
1. M. Morris Mano, Computer System Architecture, 3rd Ed, Pearson
2. Carl Hamacher,ZvonkoVranesic and SafwatZaky, Computer Organization,5th Ed, TMH

Books for Reference:
1. William Stallings, Computer Organization and Architecture. 10th Ed, Pearson
2. John P. Hayes, Computer Architecture And Organization, 3rd Ed, TMH

Marks including choice:

Unit	Marks
1	12
2	12
3	12
4	12
5	12

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
IV	4B10BCA	4	3	3

COURSE OUTCOME

CO1: To learn basic Linux commands and understand the file system structure
CO2: To understand the Boot loaders and the configuration files
CO3: To learn different system services, maintenance and configuring these
CO4: To experience Shell Scripting

Unit I

Linux OS: History, Features and benefits of Linux, basic concepts of multi user system, open source, free Software concepts, Types of users in Linux, Types of files. **BASICS** : login, password, creating an account, shell and commands, logout, changing password, files and directories, relative and absolute pathnames, directory tree, current working directory, referring home directory, creating new directories, copying files, moving files, deleting files and directories , wild cards, hidden files, cat command

(18Hrs)

Unit II

Vi editor: different modes-command mode, insert mode, last line mode, vi Editing commands – moving within a file, deleting, editing,Copy and Paste Commands, Saving and Closing the file, redirecting input/output-filter, pipes. **File permissions:** user, group, ls command (long listing),changing file permission.

(15Hrs)

Unit III

Shell Scripting: Types of shell, Basic shell configuration for bourne and bash shell: /etc/profile,   /etc/bashrc,   ~/.bash_profile,   ~/.bash_login,   ~/.profile,   ~/.bashrc, ~/.bash_logout, ~/.bash_history. Bourne shell scripts, script execution, variables and parameters, Control structures - Shell if then else, Shell if then elif, Shell for loop, Shell while loop, Shell until loop , Shell case, Shell function.

(15Hrs)

Unit IV

Linux Boot process: LILO - boot process, /edc/lilo.conf file, GRUB - /etc/grub.conf file runlevels, rc files, startup scripts. **Mounting: mounting** file systems, structure of /etc/fstab. **Linux Administration** : Major services in Linux system - init, /etc/inittab file, login from terminal, syslog and its configuration file /etc/syslog.conf, periodic command execution: at and cron, crontab file , GUI, X windows. Starting and stopping different services – service command.

(12Hrs)

Unit V:

System Maintenance: tmpwatch command, logrotate utility. **Backup and Restore**: types of backup - full, differential, incremental, cp, tar commands. **Linux Installation: Partitioning**, MBR, SWAP, file system mount points, rpm utility - installation of packages

(12Hrs)

Books for Study:

1. YashavantKanetkar, UNIX Shell Programming, BPB
2. Æleen Frisch, Essential System Administration, 3rd Edition, O'Reilly Media

Books for Reference:

1. Arnold Robbins, Unix in a Nutshell, 4th Edition, O'Reilly Media
2. Evi Nemeth, Garth Snyder and Trent R. Hein, Linux Administration Handbook, 2nd Ed, Prentice Hall
3. Christopher Negus, Red Hat Linux Bible, John Wiley & Sons
4. Rebecca Thomas,Jean Yates, A User Guide to the Unix System, McGraw Hill

Marks including choice:

Unit	Marks
1	12
2	12
3	12
4	12
5	12

GENERAL AWARENESS COURSE V: 4A15BCA LAB III: DATA STRUCTURES & DBMS

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
IV	4A15BCA	III SEM 3 HRS IV SEM 2 HRS	2	3

Sample Program List

Section A: DATA STRUCTURE

1. Add two polynomials.
2. Sequential and binary search : Print number of comparison in each case for given datasets.
3. Insertion sort: number of comparisons and exchanges for given data sets.
4. Bubble sort: Print number of comparisons and exchanges for given data sets.
5. Selection sort: Print number of comparisons and exchanges for given data sets .
6. Quick sort.
7. Stack operation: addition and deletion of elements
8. Queue operation: addition and deletion of elements
9. Conversion of infix expression to postfix.
10. Menu driven program: to add / delete elements to a circular queue. Include necessary error messages.
11. Singly linked list operations : add a new node at the beginning, at the end, after ith node, delete from beginning, end, print the list.
12. Circular linked list : add a new node at the beginning, at the end, after ith node, delete from beginning, end, print the list.
13. Doubly linked list : add a new node at the beginning, at the end, after ith node, delete from beginning, end, print the list.
14. Implement tree traversal.
15. Merge two sorted linked list.

Section B: DBMS

Minimum 10 exercises covering SQL related topics. Sample exercises are given below:

SQL -1
Create table students with fieldssno, sname, sex, mark with sno as primary keyand assign suitable constraints for each attribute.Insert five records into the table.
1. Alter the table by adding one more field rank.
2. Display all boy students with their name.

3. Find the Average mark
4. Create a query to display the sno and sname for all students who got More than the
5. average mark. Sorts the results in descending order of mark.
6. Display all girl student names for those who have marks greater than 20 and less than 40.

SQL -2
Create a table department with fieldsename, salary, dno, dname, place with dno asprimary key.Insert five records into the table.
1. Rename the field 'place' with 'city'
2. Display the employees who got salary more than Rs.6000 and less than10000 /-
3. Display total salary of the organization
4. Display ename for those who are getting salary in between 5000 and 10000.
5. Create a view named 'Star' with field ename, salary & place
6. Display ename and salary with salary rounded with 10 digits'*'

SQL -3
Create a table department with fieldsdno, dname, dmanager and place with dno asprimary key.
Create a table emp with fields eno, ename, job, dno, salary, with eno as primary key.Set dno as foreign key.
Insert five records into each table.
1. Display the ename and salary, salary with ascending order
2. Display ename and salary for eno=20,
3. Display the manager for the accounting Department
4. Display the name,salary and manager of all employees who are getting salary > 5000
5. Write the queries using various group functions.
6. Write the queries using various Number functions.

SQL -4
Create a table emp with fields eno,ename, job, manager and salary, with eno as primary key. Insert values into the table.
1. Display ename, salary from emp who are getting salary more than average salary of
2. the organization.
3. ADD 20% DA as extra salary to all employees. Label the coloumn as 'New Salary'
4. Create a query to display the eno and ename for all employees who earn more thanthe average salary. Sort the results in descending order of salary.
5. Create a view called emp_view based on the eno, ename from emp table change theheading for the ename to 'EMPLOY'.

6. Write a query that will display the eno and ename for all employees whose namecontains a 'T'.

SQL -5
Create a table department with fieldsdno, ename, salary, Designation, dname and place with dno as primary key. Insert values into the table.
1. Write the queries using various Character functions in ename field.
2. Create a query to display the employee number and name for all employees who earnmore than the average salary. Sort the results in descending order of salary.
3. Display all employees who got salary between 5000 &10000
4. Display ename, salary, Designation for those who got salary more than 5000 or hisDesignation is 'clerk'.
5. Display ename and designation those who are not a clerk or manager.
6. Display the names of all employees where the third letter of their name is an 'A'

SQL -6
Create a table Customer with fieldscid, cname, date_of_birth and place
Create table loan with fieldsloanno, cid and bname assigning suitable constraints.
Create table depositor with fields accno, cid, balance and bname assigning suitable constraints.
Insert 5 Records into each table.
1. Add one more field amount to loan table. Update each record. Display cname forcid=2.
2. Calculate Rs 150 extra for all customers having loan.The added loan amount will
3. display in a new coloumn.
4. Display loanno, cname and place of a customer who is residing in Kannur city.
5. Display all information from loan table for loanno 2,8,10.
6. Display all customers who have both loan and deposit.

CORE COURSE XI: 4B11BCA LAB IV: JAVA PROGRAMMING, SHELL PROGRAMMING & LINUX ADMINISTRATION

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
IV	4B11BCA	III SEM 2 HRS IV SEM 3 HRS	2	3

Sample Program List
SECTION A: JAVA PROGRAMMING

1. Write a java program to perform various string operations using java class.

2. Write java program to implement interface.

3. Write java program that handles various exceptions. Use try –catch statement.

4. Write java program to implement file I/O operation using java iostreams.

5. Write java program to implement Applet life cycle.

6. Write java program to implement a calculator using suitable AWT controls.

7. Write java program to implement packages.

8. With API suport write demo programs for menu display

9. Write a java program to demonstrate threads.

10. Demonstration of FileInput Stream and FileOutputStream Classes

SECTION B: SHELL PROGRAMS

1. Get a name and number from the user, create a file with that name and number. Also display the contents of the file.

    ◦ If the name is XXX and number is 2 the filename must be XXX_2

    ◦ use cat command to create a file

    ◦ Create the file with 10 different lines, then display the first 5 lines of file using head command.

2. Write a program to greet a user by 'Good Morning', Good Afternoon' or 'Good Evening' based on time

    ◦ get the system time using 'date' command

- Read the name from the user

- if the name is 'XXX' then greet with 'Hello XXX, Good Morning! '

3. Write a shell program to check whether a number is positive,negative or zero

4. Shell Script To Print A Number In Reverse Order

5. Write a program to check whether a user has logged in or not. The username is passed as command line argument

6. Write a demo program for the number and string comparison operators

- verfiy whether the entered username and password is of admin user's if so display a warning message 'Permission denied'

- read a number from the user. Check whether number of files in a folder is greater than the read number

7. Write a demo program using basic calculator

- find the average size of the files available in a folder

8. A program to create 10 users

- use loop structure

- get the usernames from the user

- assign same password to all the users

9. A demo program to test different file operators

- read filename from the user

  - Check if the file exists, if exists then display the contents, otherwise create the file

  - Check whether the size of the file is zero

  - check whether the file is having read, write and execute permission

10. Write a program with 3 different functions. Use Menu driven program and invoke the function accrodingly

- Function for listing the contents of a folder

- Function for checking whether a file is available in a folder or not if so display the contents

- Function to check whether an user is already a member of a group

LINUX ADMINISTRATION

1. Linux installation, upgradation and rescue.

2. Boot loader configuration using GRUB

3. Managing the run level.

4. Starting and stopping services in runlevel.

5. The service command

6. Managing process- viewing status, killing, restarting etc using ps.

7. Adding and deleting user accounts, changing passwords.

8. Changing the environment variables like PATH

9. Scheduling jobs using cron

10. Managing kernel modules

11. Mounting and unmounting external file systems

12. Setting the value of umask, changing the permissions, changing owner and groups

13. Installation and removal of packages

14. Installation of a peripheral devices (eg printer)

15. Archiving and Backup using tar. Restoring backup

16. Compressing and uncompressing files using any one tool

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
V	5B12BCA	3	3	3

COURSE OUTCOME

CO1: Understand the basic processes in software Development lifecycle.
CO2: Familiarize with different models and theirsignificance.
CO3: Familiarize with requirement engineering and classical software designtechniques.
CO4: Familiarize with various software testing techniques andtools.

Unit I

Introduction to software engineering-Definition, program versus software, software process, software characteristics, brief introduction about product and process, software process and product matrices; Software life cycle models – Definition, waterfall model, increment process model, evolutionary process model, selection of the life cycle model.

(10Hrs)

Unit II

Software Requirement Analysis and Specification – Requirements engineering, types of requirements, feasibility studies, requirement elicitation, various steps of requirement analysis, requirement documentation, requirementvalidation.

(10Hrs)

Unit III

Software design – definition, various types, objectives and importance of design phase, modularity, strategy of design, function-oriented design, IEEE recommended practice for software designdescriptions.

(12Hrs)

Unit IV

Objected Oriented Design – Analysis, design concept, design notations and specifications, design methodology.

(8Hrs)

Unit V

Software Testing – What is testing, Why should we test, who should do testing? Test case and Test suit, verification and validation, alpha beta and acceptance testing, functional testing , techniques to design test cases , Boundary value analysis, equivalence class testing, decision table based testing; structural testing , path testing , Graph matrices , Data flow testing , levels of testing ,unit testing , integration testing, system testing , validationtesting

(14Hrs)

Books for Study:

1. K. K. Aggarwal, Yogesh Singh, Software Engineering, 3rd Ed, New Age International Publication (For unit 1,2,3,5 and case study of unit4)

2. PankajJalote, An Integrated Approach toSoftwareEngineering, 2nd Ed, Narosa Publishing House (For Unit 4)

Books for Reference:

1. Ian Sommerville, Software Engineering, 10th Ed, Pearson

2. Roger S Pressman, Software Engineering: A Practitioner's Approach, 6th Ed, TMH

3. Carlo Ghezzi, Mehdi Jazayeri and Dino Mandrioli, Fundamentals of Software Engineering, 2nd Ed, Pearson

Marks including choice:

Unit	Marks
1	12
2	12
3	12
4	12
5	12

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
V	5B13BCA	4	4	3

COURSE OUTCOME

CO1: Understand the Enterprise Java platform

CO2: Learn APIs and runtime environment for developing and running large scale Projects.

CO3: Develops programming skills in multi – tiered, scalable, reliable and secure Network application.

CO4: Understand the structure of a web application.

Unit I

Java Database Connectivity: JDBC architecture; Drivers, JDBC-ODBC bridge, native API partly java driver, Net Protocol all Java driver, Native protocol all Java driver; Connecting to Database; statements; Large data types; Dates and Times; Handling Errors; SQL warning; Metadata, database meta data, result set meta data

(15 Hrs)

Unit II

Remote Method Invocation: RMI architecture; RMI Object services; Naming/registry service, object activation service, distributed garbage collection; Defining Remote objects; Key RMI classes for remote object implementations; Stubs and skeletons; Accessing remote object as a client; Remote method arguments and return values; Dynamically loaded classes; Configuring clients and servers for remote class loading;

(15 Hrs)

Unit III

Java Servlets: Life cycle; HTTP Servlets, forms **and** interaction; **POST,** HEAD and other requests; Servlet requests; Servlet responses; Error handling, status codes; Custom Servlet Initialization; Thread safety; Cookies; Session tracking

(15 Hrs)

Unit IV

Common Object Request Broker Architecture: Introduction to CORBA, CORBA

architecture, CORBA versus Java RMI, IDL Compiler, Interface definition language, IDL stub, IDL Skelton interface, Object Request Broker; Naming service; Inter-ORB communication.

(12 Hrs)

Unit V

Creating CORBA objects; Creating IDL modules, interfaces, data members and methods; IDL and Java; Simple server class, helper class, holder class, client stubs and server skeltons; Writing the implementation class; Initializing ORB, Registering with a naming service; Adding objects to a naming context; Finding remote objects; Initial ORB references; Getting objects from other Remote objects.

(15 Hrs)

Books for Study:

1. Java Enterprise in a Nutshell by David Flanagan and Jim Parley, O'Reilly Associates Inc.

Books for Reference:

1. David Flanagan, Jim Farley and and William Crawford, Java Enterprise in a Nutshell, 2nd Edition, O'Reilly Media

2. Jim Keogh, J2EE: The Complete Reference, 1st Ed, TMH

3. C. NellaiKannan, Java & J2EE, Nels Publication

4. Thomas J. Mowbray and William A. Ruh, Inside CORBA: Distributed Object Standards and Applications, Addison Wesley

Marks including choice:

Unit	Marks
1	14
2	13
3	13
4	10
5	10

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
V	5B14BCA	2	2	3

COURSE OUTCOME

CO1: Learn Python for expressing computation
CO2: Familiarize with functions and modules in python
CO3: Understand object-oriented programming concepts in Python
CO4: Learn the techniques for database connectivity and GUI programming in Python

Unit I

Basic Elements and Control Statements: Features of Python, Different Methods to Run Python, Basic Elements (Objects, Expressions, Numerical Types, Strings, Variables), Comments, Indentation in Python, Input and Output in Python, import function, Operators in Python, Branching (if, else, elif), Iteration (while, for), range and enumerate functions, Tuples, Lists, Sets, Dictionaries, Built-in methods of lists, sets and dictionaries, Mutable and Immutable Objects.

(8 Hrs)

Unit II

Functions, Modules and Exception Handling: Functions Definition, Function Calling, Function Arguments (Required, Keyword, Default), Recursion, Modules, Built-in Modules, Creating Modules, File Handling (Opening, Closing, Writing, Reading), Exceptions, Built-in Exceptions (IndexError, OverflowError, ZeroDivisionError, RuntimeError), Exception Handling.

(8 Hrs)

Unit III

Object Oriented Programming, Arrays and Data Visualization: Class Definition, Object Creation, Built-in Attribute Methods, Object Oriented Programming Features of Python. Arrays in Python, Numpy Module, ndarray, Creating Arrays (array, zeros, ones, empty, linspace, arrange, random), Two-Dimensional Array, Indexing, Slicing, Iterating, Copying, Splitting, Shape Manipulation (reshape, transpose, resize), Arithmetic Operations on Arrays. Data Visualization in Python matplotlib Module, pyplot, plot(),

scatter, bar charts, Formatting, figure(), subplot(), text(), xlabel(), ylabel(), title(), Plotting Simple Mathematical Functions (sin x, x^2).

(8 Hrs)

Unit IV

Connecting to Database: Connecting to a Database, Basic Operations on Database (Crater, Insert, Update, Delete), Fetching Data from a Database, Transaction Control.

(6 Hrs)

Unit V

GUI Programming: GUI Programming using Tkinter, Tkinter Widgets (Label, Message, Entry, Text, Button, tkMessagebox, RadioButton, Checkbutton, Listbox, Menu, Menubutton, Scale, Scrollbar, Canvas), Layout Managers.

(6 Hrs)

<u>**Books for Study:**</u>
1. Dr. Jeeva Jose, Taming Python By Programming, Khanna Publishing
2. John V. Guttag, Introduction to Computation and Programming Using Python with Application to Understanding Data, PHI (2016)
3. https://www.numpy.org/devdocs/user/quickstart.html
4. https://matplotlib.org/users/pyplot_tutorial.html

<u>**Books for Reference:**</u>
1. Charles Dierbach, Introduction to Computer Science using Python, Wiley (2015)
2. https://www.tutorialspoint.com/python/
3. Python for Education by Ajith Kumar B P
4. https://docs.python.org/3/tutorial/index.html
5. Introduction to Computer Science and Programming Using Python Provided by Massachusetts Institute of Technology (MITx) - Available at : (https://www.edx.org/course/introduction-to-computer-science-and-programming-using-python-2)

Marks including choice:

Unit	Marks
1	12
2	12
3	12
4	12
5	12

CORE COURSE XV:5B15BCA WEB TECHNOLOGY

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
V	5B15BCA	2	2	3

COURSE OUTCOME

CO1: Enable students to program for the World Wide Web using HTML, JavaScript, PHP and MySQL.

CO2: Create static and dynamic web pages PHP and MySQL.

CO3: Impart basic knowledge in relational databases, SQL and, Client-server model.

Unit I

Introduction to internet and web, An overview of internet programming –WWW design issues. Introduction to HTML-structure of HTML, tags, attributes, syntax of tags, starting and ending tags, html doc elements-<html>, <title>,<body>,physical style tags, listing, labeling, grouping, <img>-<a>

(8 Hrs)

Unit II

Table tags-<tr>,<td>,<th> attributes-height, width, rowspan, colspan, border, color. Form-tag attributes-type-passwd, submit, radio, check, method, action. Frame-<frame>, <frameset>, <iframe>,<noframe> and other important tags and attributes.

(6 Hrs)

Unit III

Javascript-datatypes, variables, function, object, array.Client-side object hierarchy and document. objectModel, <script>, event handlers, javaScript in urls. Windows and frames dialog boxes, status line, navigator object, opening Windows, closing windows, Location object, historyobject. - Date object- math object- Accessing form object**.**

(11 Hrs)

Unit IV

Introduction to PHP, advantages of PHP, PHP basics- operators and Flow Control, strings and arrays, creating functions**.**

(7 Hrs)

Unit V

Objects, Web Techniques, HTTP Basics, Databases, Using PHP to access database, Client-server model.

(4 Hrs)

Books for Study:
1. Bill Kennedy, Chuck Musciano, HTML: The Definitive Guide, 3rd Ed, O'Reilly Media
2. Flanagan David, JavaScript: The Definitive Guide, 6th Ed, O'Reilly Media
3. RasmusLerdorf, Kevin Tatroe, Peter MacIntyre, Programming PHP, 3rd Ed, O'Reilly Media

Books for Reference:
1. Steven Holzner, PHP: The Complete Reference, 1st Ed, TMH
2. Dave W. Mercer, Allan Kent, Steven D. Nowicki, David Mercer, Dan Squier, Wankyu Choi, HeowEide-Goodman, Ed Lecky-Thompson, Clark Morgan, Beginning PHP5, Wrox
3. Thomas A. Powel, HTML & CSS: The Complete Reference, 5th Ed, TMH

Marks including choice:

Unit	Marks
1	12
2	12
3	12
4	12
5	12

CORE COURSE XVI: 5B16BCA-E01 INFORMATION SECURITY

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
V	5B16BCA-E01	4	3	3

COURSE OUTCOME

CO1: To understand the need of information security and to master information security Concepts, mechanisms and services as well as issues related to information Security.

CO2: To be familiar with cryptography and its categories.

CO3: Distinguish public and private key crypto systems and familiarize the rsa crypto System.

CO4: To attain the knowledge of digital signature and its security services.

Unit I

Introduction to Information Security- The need for Security, Principles of security - confidentiality, Authentications, Integrity, Non-repudiation.Types of attacks- Passive attacks, Active attacks, Virus, Worm, Trojan horse. Introduction to Cryptography, Steganography, Secret Sharing.

(14Hrs)

Unit II

Traditional symmetric Key Ciphers: Introduction-Kirchhoff's principle, cryptanalysis, categories of traditional ciphers; Substitution Ciphers – mono alphabetic ciphers, polyalphabetic ciphers; Transposition Ciphers - keyless and keyed transposition ciphers, Stream and Black Ciphers - stream ciphers, block ciphers.

(16Hrs)

Unit III

Introduction, DES Structure - initial and final permutations, rounds, cipher and reverse cipher, examples; DES Analysis - properties, design criteria, DES weaknesses; Multiple DES - double DES, triple DES; Security of DES - brute-force attack, differential cryptanalysis, linear cryptanalysis.

(16Hrs)

Unit IV

Principles of Public Key Cryptosystems- Public Key Cryptosystem, Applications of Key Cryptosystems, Requirement for Public Key Cryptosystem, Public Key

Cryptanalysis.RSA Algorithm–Description of the Algorithm, Computational Aspects, Security of RSA.

(13Hrs)

Unit V

Comparison- inclusion, verification method, relationship, duplicity; Process- needs for keys, signing the digest; Service- message authentication, message integrity, nonrepudiation, confidentiality; Attacks on Digital Signature- attack types; Digital Signature Schemes- RSA digital signature schemes

(13Hrs)

Books for Study:
1. Behrouz A. Forouzan and DebdeepMukhopadhyay, Cryptography And Network Security, 3rd Ed, McGraw Hill (Units I, II, III, V)
2. William Stallings, Cryptography and Network Security - Principles and Practice Paperback, 7th Ed, Pearson(Unit IV)

Books for Reference:
1. Pieprzyk Josef, Hardjono Thomas and Seberry Jennifer, Fundamentals of Computer Security, Springer, 2003.

Marks including choice:

Unit	Marks
1	12
2	12
3	12
4	12
5	12

CORE COURSE XVI: 5B16BCA-E02 MOBILE COMMUNICATIONS

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
V	5B16BCA-E02	4	3	3

COURSE OUTCOME

CO1: Understand GSM, CDMA concepts and architecture, frame structure, system capacity, services provided.
CO2: Understand about Wireless LAN
CO3: Understand about Mobile IP

Unit I

Introduction – history of wireless communication, A simplified reference model, frequencies for radio transmission, signals, Antennas, signal Propagation, Spread spectrum – DSSS and FHSS, Cellular systems.

(16Hrs)

Unit II

SDMA, FDMA, TDMA and CDMA, GSM – Mobile services, system Architecture, Radio interface, Protocols, Localization and Calling, Handover, Security,GPRS.

(14Hrs)

Unit III

Wireless LAN – infrared versus Radio transmission, IEEE 802.11 – system Architecture, Protocol architecture, Physical Layer, MAC Layer, MAC Management, 802.11b, 802.11a.Introduction to Bluetooth – IEEE802.15.

(14Hrs)

Unit IV

Mobile IP – entities and Terminology, IP Packet delivery, Agent discovery, registration, tunneling, IPV6, Introduction to MANET, TCPover2.5/3G Wireless Networks.

(14Hrs)

Unit V

WAP (1.x) – Architecture, Wireless Datagram Protocol, Wireless Transport Layer

security. Wireless Transaction Protocol, wireless Session Protocol, wireless Application Environment, wireless Markup Language, WML script, Introduction to WAP 2.0.

(14Hrs)

Books for Study:

1. Jochen Schiller, Mobile Communications, 2nd Ed, Pearson

Books for Reference:

1. Roy Blake, Leo Chartrand, Wireless Communication Technology, 1st Ed, Delmar Cengage Learning
2. William C. Y. Lee, Mobile Communications Engineering: Theory and Applications, 2nd Ed, McGraw Hill
3. KamiloFeher, Wireless Digital Communications: Modulation and Spread Spectrum Applications, Prentice Hall;
4. Vijay K. Garg and Jospeh E. Wilkes, Principles and Applications of GSM, Pearson

Marks including choice:

Unit	Marks
1	12
2	12
3	12
4	12
5	12

CORE COURSE XVI: 5B16BCA-E03 C# AND .NET PROGRAMMING

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
V	5B16BCA-E03	4	3	3

COURSE OUTCOME

CO1: To expose students to current trends and styles in programming
CO2: To familiarize simple, modern, general-purpose, object-oriented programming language.

Unit I

Introduction to C# **-** Evolution, Characteristics, applications.Understanding .NET- Origin of .NET Technology, .NET Framework, Common Language Runtime (CLR), .NET Approach. Overview of C#- Program Structure, A Simple C# Program, Namespaces, Command Line Argument, Errors.

(16Hrs)

Unit II:

Basic concepts of Programming: Literals, Variables, Boxing and Unboxing, Data types, Expressions, Branching, Looping, Methods, Arrays, Strings, Structures, Enumerations.

(16Hrs)

Unit III:

Object Oriented aspects of C#, Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading, Delegates, Events, Errors and Exceptions, Multithreading.

(16Hrs)

Unit IV:

Application Development on .NET Web Applications – Web form Fundamentals, Web form Events, Webform Life cycle, Creating a Web Application, Web Services. Windows Applications – Creating a Windows Application.

(14Hrs)

Unit V:

Database Access and .NET Components Accessing Data with ADO.NET Assemblies, Versioning, Attributes, Reflection, Viewing Meta Data, Type Discovery, Reflecting on a type, Marshalling, Remoting.

(10Hrs)

Books for Study:
1. E. Balagurusamy, Programming in C#, 4th Ed, McGraw Hill
2. Jesse Liberty, Programming C#, 2nd Ed, O'Reilly Media

Books for Reference:
1. Jeff Ferguson, Brian Patterson, Jason Beres, Pierre Boutquin and Meeta Gupta, C# Bible, John Wiley & Sons
2. Jeff Prosise, Programming Microsoft .NET, Microsoft Press US
3. Kevin Hoffman, Jeffrey Hasan, ThiruThangarathinam, Denise Gosnell, Jan Narkiewicz, Jeff Gabriel, John Schenken, Christian Holm, Scott Wylie, Jonothon Ortiz, Ed Musters and Professional .NET Framework, Wrox

Marks including choice:

Unit	Marks
1	15
2	15
3	15
4	10
5	5

CORE COURSE XVI: 5B16BCA-E04 BIOINFORMATICS

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
V	5B16BCA-E04	4	3	3

COURSE OUTCOME

CO1: Understand Bioinformatics and biological databases.

CO2: Understand Concept of Biology

CO3: Understand Sequence alignment and Similarity search tools.

CO4: Structural bioinformatics and Bioinformatic tools

Unit I

INTRODUCTION & BIOLOGICAL DATABASES: Introduction to bioinformatics, Goal, Scope, Applications and Limitations; Introduction to Biological databases – databases and types of databases, biological databases – primary, secondary and specialized; Information retrieval from biological databases

(16Hrs)

Unit II

CELL BIOLOGY AND GENETICS: Prokaryotes and Eukaryotes, Introduction to cell structure –Plant and animal cell, Introduction to DNA – Chemical nature of DNA, Central dogma of molecular biology

(20Hrs)

Unit III

SEQUENCE ALIGNMENT: Pairwise sequence alignment – Global and local, Alignment algorithms – Dot matrix method, Dynamic programming method, Scoring matrices – PAM, BLOSUM, Statistical significance of Sequence alignment; Database Similarity Searching – BLAST, FASTA, Comparison of BLAST and FASTA, Statistical significance

(20Hrs)

Unit IV

STRUCTURAL BIOINFORMATICS & BIOINFORMATIC TOOLS: Structure of protein – Amino acids, peptide formation, Structural forms of protein**;** Protein structure visualization – SwissPDB viewer, Pymol, Rasmol; Bioinformatic tools (EMBOSS package, Expasy)

(16Hrs)

Books for Study:

1. Jin Xiong, Essential Bioinformatics Paperback, Cambridge University Press
2. Paul G. Higgs and Teresa K. Attwood, Bioinformatics and Molecular Evolution, Blackwell Publishing Ltd

Books for Reference:

1. P. S. Verma and V. K. Agarwal, Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S.Chand
2. Andreas D. Baxevanis and B. F. Francis Ouellette, Bioinformatics: A Practical Guide To The Analysis Of Genes And Proteins

Marks including choice:

Unit	Marks
I	12
II	18
III	18
IV	12

CORE COURSE XVII: 6B17BCA DESIGN AND ANALYSIS OF ALGORITHM

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
VI	6B17BCA	4	4	3

COURSE OUTCOME

CO1: Knowledge about important computational problems.
CO2: Knowledge to design the algorithm.
CO3: Knowledge to analyze a given algorithm.
CO4: Acquire knowledge to analyzealgorithm control structures and solving recurrences.

Unit I:

Algorithm Design: Introduction, Steps in developing algorithm, Methods of specifying an algorithm, Decisions prior to designing based on the capabilities of the device, based on the nature of solutions, based on the most suitable data structures. Model of Computation: RAM model and PRAM model.

(10 Hrs)

Unit II:

Important Problem Types: Sorting, Searching, String matching, Graph problems, Combinatorial problems, Geometric problems, Numerical problems. Basic Technique for Design of Efficient Algorithm: Brute Force approach, Divide-and-Conquer approach, Greedy approach, Dynamic Programming, Backtracking, Branch-and-Bound technique.

(20 Hrs)

Unit III:

Algorithm Analysis: Importance of algorithm analysis, Time and Space Complexity. Growth of Functions: Asymptotic notations, Cost estimation based on key operations- big Oh, big Omega, little Oh, little Omega and Theta notations.

(8 Hrs)

Unit IV:

Analysing Algorithm Control Structures, Solving Recurrences: Substitution Method, Iteration Method, The Recursion Tree Method, Master's Theorem. Problem Solving using Master's Theorem Case 1, Case 2 and Case 3. Best case, worst case and average case performance analysis.

(20 Hrs)

Unit V:

Study of the structure of algorithms: Strasser's algorithm, Huffman coding, Kruskal's algorithm and Prim's algorithm.

(14 Hrs)

Books for Study:

1. Pallaw, V K, Design and Analysis of Algorithms, Asian Books Private Ltd, 2012, ISBN: 8184121687.
2. Pandey H M, Design and Analysis of Algorithms, University Science Press, 2013, ISBN: 9788131803349.

Books for Reference:

1. Upadhyay N, Design and Analysis of Algorithms, SK Kataria& Sons, 2008.
2. U. Manber, Introduction to Algorithms: A Creative Approach, Addison Wesley, ISBN: 9780201003277.
3. Gilles Brassard and Paul Bratley, Fundamentals of Algorithmics, Prentice-Hall of India, ISBN: 0133350681.
4. Goodman S E and Hedetniemi, Introduction to the Design and Analysis of Algorithms, Mcgraw Hill, ISBN: 0070237530.
5. Horowitz E and Sahni S, Fundamentals of Computer Algorithms, Galgotia Publications Pvt. Ltd, ISBN: 8175152575.

Marks including choice:

Unit	Marks
1	8
2	13
3	13
4	13
5	13

CORE COURSE XVII: 6B18BCA INTRODUCTION TO COMPILER

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
VI	6B18BCA	4	3	3

COURSE OUTCOME

CO1: Knowledge about Compiler
CO2: Knowledge about various phases of compiler design.

Unit I:

Introduction to compiling - definition of compiler, Classification of Compiler: Single pass, Multi pass, Load and Go. Parts of Compilation: Analysis and Synthesis. The phases of a compiler: Lexical Analyser, Syntax Analyser, Semantic Analyser, Intermediate code generator, Code optimizer, Target Program, Symbol table manager.

(15 Hrs)

Unit II:

Programming language basics - lexical analysis – role of lexical analyzer – input buffering - specification of tokens – recognition of tokens using finite automata.

(15 Hrs)

Unit III:

Syntax analysis – role of parser – error handling and recovery – definitions of parsing, top-down parsing and bottom-up parsing - context free grammars – derivations - parse tree – ambiguity – associativity and precedence of operators -   writing a grammar.

(12 Hrs)

Unit IV:

Intermediate code generation – DAG – three address code – addresses and instructions – quadruples – triples – Static Simple Assignment form – types and declarations – type expressions - type equivalences – declarations – type checking – rules – type conversion.

(15 Hrs)

Unit V:

Run time environments – storage optimization – static Vs dynamic allocation – stack allocation of space - activation trees and records – calling sequences. Code generation – issues in the design of a code generator – the target language – a simple target machine model. Code optimization - the principal sources of optimization – data flow analysis – abstraction – data flow analysis schema – data flow schemas on basic blocks.

(15 Hrs)

Books for Study:

1. V Aho A, Ravi Sethi, D Ullman J, Compilers Principles, Techniques and Tools, 2nd Edition, Pearson Education Singapore Pte Ltd, ISBN: 8131721019.

Books for Reference:

1. Principles of Compiler Design by MG Durga and TG Manikumar. ISBN: 978-81-8094-161-0
2. W Appel and Andrew, Modern Compiler Implementation in C, 1st Edition, Cambridge University Press, ISBN: 817596071X.
3. Allen I Holub, Compiler Design in C, 1st Edition, PHI Learning Pvt Ltd, ISBN: 812030778X.

Marks including choice:

Unit	Marks
1	12
2	12
3	12
4	12
5	12

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
VI	6B19BCA	3	3	3

COURSE OUTCOME

CO1: Understand the basics of datacommunication
CO2: Familiarize with OSI referencemodel
CO3: Familiarize students with layers of communicationmodel
CO4: Understand the concepts of networksecurity

Unit I

Introduction to data communication, important elements /components of data communication, Data transmission- Analog, Digital. Transmission media- Guided media, Unguided media. Synchronous / Asynchronous data transmission.Line configuration – Simplex, Half duplex, Duplex.Network topologies – star, Bus, ring, Mesh.Computer networks, Use, network hardware, network structure- point to point connection, multicast, broadcast, classification of networks-LAN, WAN, Man. Network software – protocol hierarchies. design issues for layers, interfaces and services- connection oriented, connection less.

(12Hrs)

Unit II:

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- character count, character stuffing, bit stuffing, physical layer coding violation. Error control, flow control, Elementary data link protocols- unrestricted simplexprotocol,simplexstopandwaitprotocol,simplexprotocolforanoisychannel.

(12Hrs)

Unit III:

Network layer, design issues, services to the transport layer, routing algorithms- adaptive, non-adaptive algorithms, optimality principle, dijkstras shortest path routing algorithm, flow based routing, hierarchical routing, congestion control algorithms – the leaky bucket algorithm, the token bucketalgorithm.

(10Hrs)

Unit IV

Transport layer, design issues, connection management-addressing, establishing and releasing connection, transport layer protocols- TCP,UDP

(10Hrs)

Unit V

Application layer, network security, traditional cryptography, substitution ciphers, transposition ciphers, fundamental principles, secret key algorithm, dataencryption standard, DES chaining, DES breaking.Public key algorithm, RSAalgorithm.

(10Hrs)

Books for Study:

1. Computer Networks, Andrew S. Tanenbaum& David J. Wetherall, Pearson.

Books for Reference:

1. Data Communication and Networking, Behrouz A. Forouzan, McGraw Hill Education.
2. Achyut S. Godbole and AtulKahate, Data communication and Networks, 2nd Ed, McGraw Hill
3. Computer Networking: A Top-Down Approach, Kurose James F. and Ross Keith W., Pearson.
4. R. S. Rajesh, K. S. EaswaraKumar and R. Balasubramanian, Computer Networks – Fundamentals and Applications, VikasPublishing House.

Marks including choice:

Unit	Marks
1	12
2	12
3	12
4	12
5	12

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
VI	6B20BCA-E01	3	3	3

COURSE OUTCOME

CO1: Understanding the importance of dataminingand data ware housing.

CO2: Understand the data management aspects data preprocessing model andinference considerations, complexity considerations, post processing of discovered structures visualization and onlineupdating

Unit I

Introduction; data warehousing – what is, Multidimensional data model, OLAP operations, warehouse schema, Data warehousing Architecture, warehouse server, Metadata, OLAP engine, data warehouse Backend Process.

(12Hrs)

Unit II

Data mining – what is, KDD vs data mining, DBMS vs data mining, DM Techniques, issues and challenges, Applications. (Case studies) *

(8 Hrs)

Unit III

Association rules – What is, Methods, a priori algorithm, partition algorithm, Pincer-search algorithm, FP-tree growth algorithm, incremental and Border algorithms, Generalized Associationrule.

(12 Hrs)

Unit IV

Clustering techniques – Paradigms, Partitioning Algorithms, k – Medoid algorithms, CLARA, CLARANS, hierarchical clustering, DBSCAN, Categorical Clustering, STIRR.

(10 Hrs)

Unit V

Decision trees – what is, tree construction principles, Best split, Splitting indices, Splitting criteria, decision tree construction algorithms, CART, ID3, C4.5, CHAID. Introduction to web, spatial and temporal datamining.

(12 Hrs)

Books for Study:

1. Arun K. Pujari, Data Mining Techniques, 2nd Ed, Univeristy Press

Books for Reference:

1. Jiawei Han,MichelineKamber and Jian Pei, Data Mining: Concepts and Techniques, 3rd Ed, Morgan Kaufmann
2. Margaret H. Dunham, Data Mining - Introductory and Advanced Topics, Pearson

Marks including choice:

Unit	Marks
1	12
2	12
3	12
4	12
5	12

CORE XX: 6B20BCA-E02 NETWORK PROGRAMMING

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
VI	6B20BCA-E02	3	3	3

COURSE OUTCOME

CO1: Understand basics of network programming
CO2: Understand basics of socket options
CO3: Familiarize with DNS

Unit I

Introduction –A Simple Day Time Client – Protocol Independence – ErrorHandlingA Simple - Day Time Server.The Transport Layer: TCP, UDP – TCP Connection EstablishmentandTermination–TIME_WAITState–PortNumbers–

ConcurrentServersBuffer Size and Limitations – Standard Internet Services – Protocol Usage by Common InternetApplications.

(15 Hrs)

Unit II

Socket Introduction – Socket address Structures – Byte Ordering Functions – Byte Manipulation Functions – Elementary TCP Sockets – socket , connect, bind, listen, accept, fork and exec, close, getsockname and getpeername functions.

(15 Hrs)

Unit III

TCP Client/Server Example – TCP Echo Server - main(), str_echo() – TCP Echo Client - main(), str_cli() – startup – termination – Shutdown of ServerHost.

(7 Hrs)

Unit IV

Socket Options – getsockopt and setsockopt functions – Socket States –Generic Socket Options – TCP Socket Options.

(7 Hrs)

Unit V

Name and Address Conversions - DNS – gethostbyname – gethostbyaddr –

getservbyname – getservbyport – getaddrinfo – freeaddrinfo – host_serv – tcp_connect – tcp_listen functions.

(10 Hrs)

Books for Study:

1. W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, "Unix NetworkProgramming The Sockets Networking API Volume I", Pearson

Books for Reference:

1. Barry Nance, "Network Programming in C", Prentice Hall

Marks including choice:

Unit	Marks
1	12
2	12
3	12
4	12
5	12

CORE XX: 6B20BCA-E03DIGITAL IMAGE PROCESSING

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
VI	6B20BCA-E03	3	3	3

COURSE OUTCOME

CO1: Understand geometric transformations
CO2: Understand basic of morphological image processing

Unit I:

Images – DIP components – Problems and Applications – motivation and perceptive – Operations – Imaging – electronic camera – Human Eye – 3D imaging – Depth from triangulation , time-of-flight, interferometry, shading, tomography, Sampling – quantization, Color Image representation, Volumetricdata.

(12 Hrs)

Unit II:

Images in Java – java2D API – java advanced imaging – image manipulation – storage – reading and writing images – display – printing – pixel processing – gray level andcolor enhancement – mapping – image histogram – Histogram equalization – Colour processing.

(12 Hrs)

Unit III:

Neighborhood operations – convolutions and correlation – Linear and rank filteringEdge detection – Hybrid adaptive filters – frequency domain – spatial frequency –Fourier theory – DFT – investigating spectra – image filtering –deconvolution.

(12 Hrs)

Unit IV:

Geometric operation – simple techniques – Affine transformations – Algorithm – interpolation schemes – Wrapping and morphing – segmentation – thresholding– Contextual techniques.

(12 Hrs)

Unit V:

Morphological image processing – Basic concepts – operations – Morphological filtering – Morphological algorithms – Gray scale morphology – image compression. Redundancy – Performance characterization – Lossyand lossless compression techniques – compression of movingimages.

(6 Hrs)

Books for Study:
1. Nick Efford , Digital Image Processing: A Practical Introduction using Java, Addison Wesley

Books for Reference:
1. Rafael C. Gonzalez and Richard E. Woods, Digital Image Processing, 4th Ed, Pearson
2. Jähne, Bernd, Digital Image Processing, Springer

Marks including choice:

Unit	Marks
1	12
2	12
3	12
4	12
5	12

CORE COURSE XX: 6B20BCA-E04 CLOUD COMPUTING

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
VI	6B20BCA-E04	3	3	3

COURSE OUTCOME

CO1: Understand fundamentals of cloud computing
CO2: Understand principles of parallel and distributed computing
CO3: Familiarize with Cloud Computing Architecture

Unit I
Introduction: Cloud Computing at a Glance - Historical Developments - Building Cloud Computing Environments - Computing Platforms and Technologies

(8Hrs)

Unit II

Principles of Parallel and Distributed Computing: Eras of Computing - Parallel vs. Distributed Computing - Elements of Parallel Computing - Elements of Distributed Computing - Technologies for Distributed Computing

(14 Hrs)

Unit III

Virtualization: Introduction - Characteristics of virtualized environments - Taxonomy of virtualization techniques - Virtualization and cloud computing - Pros and Cons of Virtualization - Technology examples

(12 Hrs)

Unit IV

Cloud Computing Architecture : Introduction - The cloud reference model - Types of clouds - Economics of the cloud - Open challenges

(10 Hrs)

Unit V

Cloud Platforms in Industry : Amazon Web Services - Compute Services - Storage Services - Google AppEngine - Architecture and Core Concepts - Microsoft Azure - Azure Core Concepts.

(10 Hrs)

Books for Study:

1. Mastering Cloud Computing, RajkumarBuyya, Christian Vecchiola,S.ThamaraiSelvi, Tata McGraw Hill Education Private Limited

2. Mastering Cloud Computing - Foundations and Applications Programming, RajkumarBuyya, Christian Vecchiola and S. ThamaraiSelvi,MK Publications,

Books for Reference:

1. Cloud Computing: A Practical Approach, Anthony T .Velte, Toby J.Velte, Robert Elsenpeter, Tata McGraw Hill Edition, Fourth Reprint, 2010

2. Cloud Computing, Kumar Saurabh, WileyIndia.

3. Enterprise Cloud Computing Technology Architecture Applications, Gautam,Shroff

Marks including choice:

Unit	Marks
1	12
2	12
3	12
4	12
5	12

CORE COURSE XXI: 6B21BCA LAB V: ENTERPRISE JAVA PROGRAMMING

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
VI	6B21BCA	V SEM 3 HRS VI SEM 2 HRS	2	3

COURSE OUTCOME

CO1: Can write and execute simple JDBC Programs.
CO2: Can write and execute simple RMI Programs.
CO3: Can Write and execute simple servlet programs.
CO4: Can write and execute simple CORBA programs.

Sample Program List

A list of 10 Programs are given below. Each student has to complete and record all the exercises. A detailed problem statement shall be prepared by the faculty concerned.

1. JDBC program to insert, Delete and Update records into Employee table.
2. JDBC program to connect to Student table. Implement the record scrolling functions – first(), last(), next(), previous(), beforeFirst(), afterLast(), absolute() and relative().
3. JDBC program to display database metadata.
4. JDBC program to display Resultset metadata.
5. RMI program for Complex number operation.
6. RMI program for Bank operation.
7. Create an HTML form to read student details such as Roll, name,age, sex, qualification, percentage of marks etc. Write a servlet program that displays the same details.
8. Create an HTML form that reads a file name from the user. Write a servlet program that displays the contents of the file, specified by the user.
9. Session handling servlet that displays total number of visits to that page.
10. CORBA program for arithmetic operation.

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
VI	6B22BCA	V SEM 3 HRS VI SEM 2 HRS	3	3

COURSE OUTCOME

Sample Program List

1. Write a program to find the largest from a list of numbers

2. Write a program to generate first n perfect numbers

3. Write a program to perform the binary search

4. Write a program to find the square root of a number using bisection search method.

5. Write a program to generate Fibonacci series using recursion

6. Write a program to find the LCM and GCD of 2 numbers

7. Write a program to perform merge sort

8. Write a program which reads the contents of a file and copy the contents to another file after changing all the letter to upper case. Exceptions should be handled.

9. Write a program to find the prime numbers in a list of numbers.

10. Write a python program to perform the following

    a) Create table students with fields name,sex,rollno,marks

    b) Insert some rows into the table

    c) Update the marks of all students by adding 2 marks

    d) Delete a student with a given rollno

    e) Display the details of a student with a given rollno

11. Create a simple Login window using Tkinter

12. Create a plot for the mathematical function x^2. The title of the plot and the axes should be labelled.

CORE COURSE XXIII: 6B23BCA LAB VII WEB TECHNOLOGY (LAB -VII)

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
VI	6B23BCA	V SEM 2 HRS VI SEM 2 HRS	2	3

COURSE OUTCOME

Guidelines

1. Follow standard coding method
2. The output of the program should be neatly formatted
3. Practice all the programs in the lab

Sample Program list

1. Develop an HTML page using all basic tags

2. Develop an HTML page to display hotel menu using all types of lists

3. Write an HTML code to insert an image into the web page. Use the attributes height, width and border. Also align some text with respect to the images. The image should have an ALT text in it.

4. Design a HTML page for the following.

        a. Set an image as a link

        b. Open a link in a new browser window

     c. Jump to another part of a document (on same page)

5. Create a web page to display the maximum and minimum temperature of 5 cities using table.

6. Create a web page for your college using frames, images and hyperlink

7. Create a web page that illustrate the onMouseOver and onMouseOut event handlers.

8. Form Validation using Javascript.

9. Create an email registration form. Give necessary validations

10. Write a JavaScript code using arrays

11. Develop an HTML page that accepts any mathematical expression, evaluates that expression and display the result of the evaluation

12. Write a Javascript program to display the current time

13. Write a Javascript program to print the prime numbers within a range

14. Write a Javascript program to show the working of alert ()

15. Write a JavaScript program to find the factorial of a number.

16. Form Processing using PHP

17. Form validation using PHP

18. Storing data in MYSQL using PHP

CORE COURSE XXIV: 6B24BCA PROJECT

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
VI	6B24BCA	5	4	3

Model Question Papers

Model Question Paper-1
5B14BCAPython Programming

Time: 3 Hours   **Max. Marks: 40**

Part A: Short Answer

Answer all questions   **(6 x 1 = 6 Marks)**

1. Give syntax for function definition in python.
2. What are built-in attribute methods.
3. What is the purpose of zeros function in numpy module?
4. Explain the use of linspace function in numpy with an example?
5. What is meant by widget in Tkinter?
6. Give syntax for connecting to a database in python.

Part B: Short Essay

Answer any 6 questions

                                                                                          (6 x 2 = 12 Marks)

7. What are the different methods to run python?
8. What is the difference between mutable and immutable objects in python?
9. How a module can be created? Give an example.
10. Write a recursive function in python to find the nth Fibonacci number and use it to generate a Fibonacci series of required numbers.
11. Explain about built-in exceptions in python.
12. How a class is defined? Explain with an example.
13. Explain 2 different methods for changing the shape of an array.
14. Explain about message widget.

Part C: Essay

Answer any 4 questions

                                                                                          (4 x 3 = 12 Marks)

15. Explain about sets in python.
16. Explain about branching statements in python.
17. How python can be used to write in to a file? Explain with an example.
18. Explain how operator overloading can be done in python with an example.
19. Explain how transaction control can be done in python.
20. Explain about pack layout manger.

Part D: Long Essay

Answer any 2 questions

                                                                                          (2 x 5 = 10 Marks)

21. Explain in detail about lists and dictionaries in python.
22. Explain about exception handling in python.
23. What are the object-oriented programming features of python?
24. Explain about 5 widgets in Tkinter.

Model Question Paper-2
3B07BCA JAVA PROGRAMMING
Time: 3 Hours   **Max. Marks: 40**

Section A
Answer All the questions   (6 x 1 = 6 marks)
1. What is a token?
2. What is platform independancy?
3. What do you mean by method?
4. What is the use of t'his' keyword?
5. What are threads?
6. What is GUI?

SECTION B
Write short notes on <u>ANY SIX</u> of the following questions(6 x 2 = 12 marks)

7. How to create and use an one dimensional array in Java?
8. Define an applet.
9. Syntax of try _____ catch statement with multiple catch.
10. Short note on thread groups.
11. Explain APPLET tag.
12. Write about any two methods of button class.
13. Short note on StringBuffer class
14. Explain any two string operations in Java

SECTION C

Answer <u>ANY FOUR</u>   of the following questions   (4 x 3 = 12 marks)

15. Write a Java program to illustrate applet lifecycle.
16. Short note on Thread Priorities in Java.
17. Write an overview of filter streams in Java.
18. What do you mean by event listeners in Java?
19. What is thread synchronization. Explain.
20. Explain exception handling in Java.

SECTION D

Write an essay on <u>ANY TWO</u> of the following questions   (2 x 5 = 10 marks)

21. Write a program to handle exceptions with multiple catch block.
22. Explain the AWT controls.
23. With suitable example, explain packages in java.
24. Write a Java program to create a thread by extending thread class.

Model Question Paper-3
4B08BCA OPERATING SYSTEMS

Time: 3 Hours   Max. Marks: 40

SECTION A

Answer ALL Questions   (6 x 1=6)

1. Define OS
2. List out different process states
3. Mention different process scheduling criteria's
4. What is internal fragmentation
5. What is rotational latency
6. List out different types of files

SECTION B

Answer ANY SIX of the following Questions(6 x 2=12)

7. What are the functions of an OS?
8. Write a short note on microkernals
9. Write a short note on PCB
10. Mention about conditions for deadlocks
11. Differentiate between paging and segmentation
12. Write a short note on overlays
13. What is seek time
14. Write a short note on file attributes

SECTION C

Write an essay on ANY FOUR of the following Questions(4 x 3=12)

15. With example explain system calls
16. Explain IPC
17. With example explain LRU page replacement algorithm
18. Explain segmentation
19. Explain about RAID
20. with example explain Access matrix

SECTION D

Write Long essay on ANY TWO of the following Questions(2 x 5=10)

21. OS is a resource manager. Explain
22. Explain the techniques for handling deadlocks
23. Explain any 4 disk scheduling algorithms in detail
24. Explain different directory structures

Model Question Paper-4
5B13BCA ENTERPRISE JAVA PROGRAMMING
Time: 3 Hours   Max. Marks: 40

SECTION A
Answer All the questions   (6 x 1 = 6 marks)

1.   What is IDL?
2. What is RMI?
3. What are the packages used in a servlet API?
4. How can you load or register the driver in JDBC?
5. List the different init() functions in ORB.
6. Explain the JDBC URL.

SECTION B

Write short notes on ANY SIX of the following questions   (6 x 2 = 12 marks)
7. What is SQL exception?
8. How can you create data members and methods in IDL?
9. What are cookies?
10. What is CORBA?
11. Explain servlet lifecycle.
12.What are RMI stubs and skeltons?
13. What are BLOB and CLOB?
14. How can you configure clients and servers for remote class loading.

SECTION C
Answer ANY FOUR of the following questions   (4 x 3 = 12 marks)
15. Write short note on different kinds of statements in JDBC.
16. Describe Java classes generated in an IDL interface.
17. What is a CORBA naming service?
18. With suitable examples explain DatabaseMetaData and ResultsetMetaData.
19. Describe session tracking in servlet.
20. Explain error handling in servlets.

SECTION D

Write an essay on ANY TWO of the following questions   (2 x 5 = 10 marks)
21. Explain the JDBC architecture with a sample program.
22. Describe the elements of the Servlet API.
23. Explain the RMI architecture, with a diagram.
24. Explain the CORBA architecure.

PART B

BCA GENERIC ELECTIVECOURSES
WORK AND CREDIT DISTRIBUTION
(2019 ADMISSION ONWARDS)

STUDENTS OF OTHER DEPARTMENTS CAN CHOOSE **ANY ONE OF THE** **GENERICELECTIVECOURSESFROM THE POOL OFFIVE COURSES.**

COURSE CODE	COURSE TITLE	SEMESTER	HOURS PER WEEK	CREDIT	EXAM HOURS	MARKS (INTERNAL + EXTERNAL)
5D01BCA	PROGRAMMING WITH C	5	2	2	2	5+20
5D02BCA	WEB TECHNOLOGY	5	2	2	2	5+20
5D03BCA	DATABASE MANAGEMENT SYSTEM	5	2	2	2	5+20
5D04BCA	CYBER LAW	5	2	2	2	5+20
5D05BCA	FUNDAMENTALS OF COMPUTERS AND PROGRAMMING	5	2	2	2	5+20

EVALUATION

ASSESSMENT	WEIGHTAGE
EXTERNAL	4
INTERNAL	1

CONTINUOUS INTERNAL ASSESSMENT FOR THEORY

COMPONENT	WEIGHTAGE	REMARKS
COMPONENT1: TEST	80%	MINIMUM OF 2 TESTS SHOULD BE CONDUCTED. MARKS FOR THE TEST COMPONENT SHOULD BE CALCULATED AS THE AVERAGE OF THE BEST TWO MARKS OBTAINED IN THE TESTS CONDUCTED.
COMPONENT 2: ASSIGNMENT/ SEMINAR/VIVA	20%	ANY ONE COMPONENT

PATTERN OF QUESTION PAPER FOR END SEMESTER ASSESSMENT

Part A	**Short Answer**	**6 Questions x 1 Mark = 6 Marks**
	Answer all questions	6 Questions x 1 Mark = 6 Marks
Part B	**Short Essay**	**6 Questions x 2 Marks = 12 Marks**
	Answer any 4 questions	4 Questions x 2 Marks = 8 Marks
Part C	**Essay**	**2 Questions x 6 Marks = 12 Marks**
	Answer any 3 questions	1 Question x 6 Marks = 6 Marks
Total Marks Including Choice: 30		
Maximum Marks for the Course: 20		

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
V	5D01BCA	2	2	2

COURSE OUTCOME

CO1: *Understanding the basic concepts in programming.*
CO2: *Familiarize the basic syntax and semantics of C language.*
CO3: *Familiarize with advanced features of C*
CO4: *Develop skill in programming*

Unit I

The C character set, Identifiers and keywords, Classes of Data Types, constants, variable declarations. Expressions, statements, operators and expressions: arithmetic operators, unary operators, relational operator, logical operators, assignment operator, the conditional operator. Library functions: data input and output functions like getchar(), putchar(),scanf(), printf(), gets and puts.

(10 Hrs)Unit II

Control statements: Branching: The if-else statements. Looping: The while, do-while and for loops. The switch statements, Break and continue, comma operator.

(8 Hrs)

Unit III

Functions**,** defining a function, accessing a function, function prototype, passing arguments to a function, Returning from a function, recursion, program structure. Storage classes: automatic, static, register and extern(global).

(8 Hrs)

Unit IV

Arrays, Structure and Union: Defining an array, processing an array, passing arrays to functions, multidimensional arrays. Structure and union.Defining a structure, processing a structure.Union.

(5 Hrs)

Unit V:

Strings: Basic concepts, standard library string functions- strlen, strcpy, strcmp, strcat&strrev.

(5 Hrs)

Books for Study:

1. E. Balaguruswamy, Programming in ANSI C, 7th Ed, TMH

Books for Reference:

1. V. Rajaraman, Computer Basics and C Programming, PHI

2. Ashok N. Kamthane, Programming with ANSI and Turbo C, Pearson

3. YeshavantKanetkar, Let Us C, 16th Ed, BPB

4. Noel Kalicharan, C by Example, Cambridge University Pres

Marks including choice:

Unit	Marks
1	6
2	6
3	6
4	6
5	6

GENERIC ELECTIVE COURSE: 5D02BCA WEB TECHNOLOGY

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
V	5D02BCA	2	2	2

COURSE OUTCOME

CO1: *Enable students to program for the World Wide Web using HTML, JavaScript.*
CO2: *Create static and dynamic web pages.*
CO3: *Impart basic knowledge in Client-server model.*

UNIT I

Introduction to Internet and WWW, Introduction to HTML, structure of HTML, HTML elements, attributes, syntax of tags , starting and ending tags, physical style tags, listing, labeling, grouping, images and linking

(6 Hrs)

UNIT II

HTML Tables-tags-<tr>,<td>,<th> attributes. HTML Form-tag, attributes-type-passwd, submit, radio, check, method, action.

(8Hrs)

UNIT III

Frames-<frame>, <frameset>, <iframe>,<noframe> and other important tags and attributes.Simple programs using frames.

(6 Hrs)

UNIT IV

Javascript- Introduction, data types, variables, operators, functions, objects, arrays. Client-side object hierarchy and document object Model, <script>, event handlers, javascript in urls.

(8Hrs)

UNIT V

Windows and frames-dialog boxes, status line, navigator object, opening Windows, closing windows, Location object, history object.- Date object- math object- Accessing form object

(8Hrs)

Books for Study:
1. Bill Kennedy, Chuck Musciano, HTML: The Definitive Guide, 3rd Ed, O'Reilly Media
2. Flanagan David, JavaScript: The Definitive Guide, 6th Ed, O'Reilly Media

Books for Reference:
1. Thomas A. Powel, HTML & CSS: The Complete Reference, 5th Ed, TMH

Marks including choice:

Unit	Marks
1	6
2	6
3	6
4	6
5	6

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
V	5D03BCA	2	2	2

COURSE OUTCOME

CO1: To understand the fundamentals of database management system
CO2: To develop Skill in designing database
CO3: To understand the concept of SQL commands
CO4: To develop Skill in writing queries

Unit I

Introduction–Field,Record,Entity,Attribute,Relation,Domain,Tuple-advantages of database systems- data models (Network model, Hierarchical Model, DBTG CODASYL model, Relational Model(E-R)) - system structure.

(8 Hrs)

Unit II:

Database administrator- data base users, Constraints (Primary, Foreign, Candidate, Unique)- Relational Algebra (Union, Intersection, Difference, Product, Project, Selection).

(8 Hrs)

Unit III:

SQL: Introduction to SQL, database languages, DDL(create, alter, Drop), DML(Insert into, Select, update, Delete) and DCL commands. Data Types in SQL

(8 Hrs)

Unit IV:

SQL Functions(Different Types of Functions), Operators (Arithmetic, Relational, Logical), Sub Quires (in Detail), Clauses (Having, Group By)

(6 Hrs)

Unit V:

Joins(Different Types of Join Statements), View, Introduction to Sequence

(6 Hrs)

Books for Study:

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan, Database System Concepts, 6th Ed, TMH

2. NarainGehani, The Database Book Principles and Practice Using MySQL, University Press

Books for Reference:

1. ElmasriRamez and NavatheShamkant, Fundamentals of Database System, 7th Ed, Pearson

Marks including choice:

Unit	Marks
1	6
2	6
3	6
4	6
5	6

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
V	5D04BCA	2	2	2

CO1: To understand the fundamentals of cyber law
CO2: To know about different types of cyber crimes
CO3: To understand about Intellectual Property Rights

UNITI

Fundamentals of Cyber Law: Jurisprudence of Cyber Law- Overview of Computer and Web Technology- Introduction to Indian Cyber Law- Overview of General Laws and Procedures in India; Freedom of Expression on the Internet.

(8 Hrs)

UNIT II

Cyber Crimes: Meaning of Cyber Crimes –Cybercrimes under IPC, Cr.P.C and Indian Evidence Law

(8 Hrs)

UNIT III

Cybercrimes under the Information Technology Act,2000 - Cybercrimes under International Law

(8 Hrs)

UNIT IV

Hacking Child Pornography, Cyber Stalking, Denial of service Attack, Virus Dissemination, Software Piracy, Internet Relay Chat (IRC) Crime, Credit Card Fraud, Net Extortion, Phishing etc

(8 Hrs)

UNIT V

Intellectual Property Issues and Cyberspace: The Indian Perspective; Overview of Intellectual Property related Legislation-Copyright law & Cyberspace.

(**4 Hrs)**

Books for Study:

1. Information Technology law and Practice, Sharma,Vakul , Universal law Publishing, 2011
2. Cyber law, Rattan, Jyoti. New Delhi: Bharat law House,2011.

Books for Reference:

1. Guide to Cyber Laws, Rodney D. Ryder, 2nd Edit, Wadhwa and Company, NagpurSeth,Kanika.
2. Cyber Law in the Information Technology Act. Nagpur : Lexis Nexis Butterworth Wadhwa,2009
3. Guide of Cyber Law , Rodney D.Ryder,2nd Edition.
4. Cyber Law ,Faruq Ahmed, in India.

Marks including choice:

Unit	Marks
1	6
2	6
3	6
4	6
5	6

SEMESTER	COURSE CODE	HOURS PER WEEK	CREDIT	EXAM HRS
5	**5D05BCA**	**2**	**2**	**2**

COURSE OUTCOME

CO1: To know the working principle of a computer
CO2: To understand the concept of number system
CO3: To understand the basics of computer network
CO4: To understand the basics of programming

Unit I:

Introduction to Computers: Characteristics, Generation, Basic operations of a computer system: Inputting, storing, processing, outputting and controlling, CPU, ALU, Control Unit, Main Memory Unit, Secondary storage devices: tape, floppy, hard disk, CD, DVD.

(12Hrs)

Unit II:

Representation of information: Number system: binary, octal and hexadecimal system, Conversion: decimal to binary, decimal to octal, decimal to hexadecimal, binary to decimal, octal to decimal and hexadecimal to decimal, Different code used: BCD, ASCII, EBCDIC, and GRAY Code.

(8Hrs)

Unit III:

Introduction to Computer networking: Goals, Transmission modes: simplex, half duplex and full duplex, Classification of networks: LAN, MAN and WAN, Topologies: bus, star, ring, and mesh.

(8 Hrs)

Unit IV:

Computer Programming: Introduction, algorithm, flowchart, characteristics of a good program. Programming languages: machine, assembly and high-level languages, Assembler, Compiler and Interpreter. Source code and object code.

(8Hrs)

Books for Study:

1. Computer Fundamentals, Pradeep.K. Sinha&PritiSinha, BPB Pub

2. Introduction to Information Technology, V. Rajaraman, Prentice Hal

3. Computer Networks 3rd Edn, A S Tanenbaum . Pearson Pub

Books for Reference:

1. Peter Norton, Introduction to Computers,6e, (Indian Adapted Edition)

2. B Forouzan, Introduction to data communication and networking

Marks including choice:

Unit	Marks
I	9
II	6
III	8
IV	7

Model Question Papers

GENERIC ELECTIVE COURSE FOR SEMESTER V

Model Question Paper-1
5D04BCACYBER LAW

Time: 2 Hours   Max. Marks: 20

Part A

Answer all questions   (*6 questions x Mark 1each = 6*)

1. Freedom of expression is a very important value in our society, but the right to express yourself or give your opinion about a person has its limits.(True/False)
2. ---------- is created inciting a religious group to act or pass objectionable remarks against a country, national figures etc.
3. --------------are the **crimes w**hich are committed with the use of any electronic system, network or device.
4. Section ------ of the Indian Penal Code is dealing with stalking.
5. Which protocol is a service that allows people to chat with each other online?
6. What is patent infringement?

Part B

Answer any 4 questions   (*4 questions x Marks 2 each=8*)

7. Comment on 'Cyber Law'
8. Describe Indian Evidence Law in detail.
9. Under the Cybercrimes of International Law what are Content-related offences?
10. Explain Credit Card Fraud, Net Extortion.
11. Write notes on Software Piracy.
12. Explain the role of Cyber Law in 'Intellectual Property'

Part C

Answer any 1 questions   (*1 questions x Marks 6 each=6*)

13. Discuss any six cybercrimes by giving the section, particulars and punishment for the offence.
14. Explain at least two reasons for establishing the patent system