

SCHEME UNDER CHOICE BASED CREDIT SYSTEM FOR BACHELOR OF COMPUTER APPLICATIONS (BCA) w.e.f. 2022-2023

SEMESTER	CORE COURSE	CREDIT	ABILITY ENHANCEMENT COMPULSORY COURSE AECC	CREDIT	SKILL ENHANCEMENT COURSE SEC	CREDIT	Discipline Specific Elective DSE	Credit	Generic Elective Courses	Credit
I	CC- Computer Fundamentals CC- PC Software CC-Mathematics CC-Digital Electronics CC-Practical Lab Based on PC Software	4.5 4.5 4.5 4.5 3	Communicative English/Environmental Sciences	2					Hobby Clubs (NCCCESE)*	1
II	CC-Programming in C CC-Computer Organization and Architecture CC- System Analysis and Design CC-Operating System CC-Practical Lab Based on Programming in C and Operating System	4.5 4.5 4.5 4.5 3	Environmental Science/Communicative English	2					Hobby Club (NCCCESE)*	1
III	CC-Data Structures CC-Database Management System CC- Data Communication and Networking CC- Practical Lab based on Data Structures and Database Management system	4.5 4.5 4.5 3	Hindi/Sanskrit	2	SEC-I Mathematical Foundation of Computing & Analysis	3				
IV	CC-Introduction to Web Designing CC-Software Engineering CC- Artificial Intelligence CC-Practical Based on Web Designing	4.5 4.5 4.5 3			SEC-II Data Mining	3			Personality Development (NCCCESE)*	1
V					SEC-III (Choose any One) • Cyber Security • Machine Learning • Software Testing	3	DSE-I DSE-II DSE-III	6 6 6		
VI					SEC-IV (Choose any One) • Cloud Computing • Management Information System • Internet of Things	3	DSE-IV DSE-V DSE-VI	6 6 6		

Note: In the first semester, in case of AECC-I, the students will opt either English or EVS and vice-versa in the Second semester in case of AECC-II.

***NCCCESE: Non CGPA Credit Courses Compulsory Specified Course**

CHAUDHARY BANSI LAL UNIVERSITY, BHIWANI

Scheme and Syllabi of Bachelor of Computer Applications under CBCS (Semester I to VI) (w.e.f. 2022-23)

SEMESTER-I					
Paper Code	Paper Name	Type of Course	Credits (Theory/ Practical)	Contact Hours (Theory/ Practical)	Marks (External + Internal)
22BCA101	Computer Fundamentals	Core	4.5	4.5	80+20=100
22BCA102	PC Software	Core	4.5	4.5	80+20=100
22BCA103	Mathematics	Core	4.5	4.5	80+20=100
22BCA104	Digital Electronics	Core	4.5	4.5	80+20=100
22BCA105	Practical Lab Based on PC Software (22BCA102)	Core	3	6	80+20=100
SEMESTER-II					
22BCA201	Programming in C	Core	4.5	4.5	80+20=100
22BCA202	Computer Organization and Architecture	Core	4.5	4.5	80+20=100
22BCA203	System Analysis and Design	Core	4.5	4.5	80+20=100
22BCA204	Operating System	Core	4.5	4.5	80+20=100
22BCA205	Practical Lab Based on 22BCA201 and 22BCA204	Core	3	6	80+20=100
SEMESTER-III					
22BCA301	Data Structures	Core	4.5	4.5	80+20=100
22BCA302	Database Management System	Core	4.5	4.5	80+20=100
22BCA303	Data Communication and Networking	Core	4.5	4.5	80+20=100
22BCA304	Practical Lab based on 22BCA301 and 22BCA302	Core	3	6	80+20=100
SEMESTER-IV					
22BCA401	Introduction to Web Designing	Core	4.5	4.5	80+20=100
22BCA402	Software Engineering	Core	4.5	4.5	80+20=100
22BCA403	Artificial Intelligence	Core	4.5	4.5	80+20=100
22BCA404	Practical Based on 22BCA401	Core	3	6	80+20=100

SEMESTER –V

Paper Code	Paper Name	Type of Course	Credits (Theory/ Practical)	Contact Hours (Theory/ Practical)	Marks (External + Internal)
Choose One:	Choose Any One:	Discipline Specific Elective	4 (T)+2 (P)	4 (T)+4 (P)	80+20=100 (T) 80+20=100 (P)
22BCA501	R Programming				
22BCA502	Programming in JAVA				
Choose One:	Choose Any One:	Discipline Specific Elective	4 (T)+2 (P)	4 (T)+4 (P)	80+20=100 (T) 80+20=100 (P)
22BCA503	Introduction to Linux				
22BCA504	Open Source Software				
Choose One:	Choose Any One:	Discipline Specific Elective	4 (T)+2 (P)	4 (T)+4 (P)	80+20=100 (T) 80+20=100 (P)
22BCA505	Object Oriented Programming using C++				
22BCA506	Introduction to .net				
SEMESTER -VI					
Choose One:	Choose Any One:	Discipline Specific Elective	4 (T)+2 (P)	4 (T)+4 (P)	80+20=100 (T) 80+20=100 (P)
22BCA601	Programming in SCILAB				
22BCA602	Visual Basic				
22BCA603	Computer Graphics				
Choose One:	Choose Any One:	Discipline Specific Elective	4 (T)+2 (P)	4 (T)+4 (P)	80+20=100 (T) 80+20=100 (P)
22BCA604	Programming with Python				
22BCA605	Android Programming				
22BCA606	PHP Programming				
22BCA607	Project Work/Dissertation	Discipline Specific Elective	6	6	80+20=100

Skill Enhancement Courses offered by Department of IC&T
Scheme of Examination of Skill Enhancement Courses for BCA under CBCS
(w.e.f. 2022-23)

SEMESTER-III					
Paper Code	Paper Name	Type of Course	Credits (Theory/ Practical)	Contact Hours (Theory/ Practical)	Marks (External + Internal)
22USECBCA301	Mathematical Foundation of Computing & Analysis	Skill Enhancement Course	3	3	80+20=100
SEMESTER-IV					
22USECBCA401	Data Mining	Skill Enhancement Course	3	3	80+20=100
SEMESTER-V					
Choose One:	Choose One:	Skill Enhancement Course	3	3	80+20=100
22USECBCA501	Cyber Security				
22USECBCA502	Machine Learning				
22USECBCA503	Software Testing				
SEMESTER-VI					
Choose One:	Choose One:	Skill Enhancement Course	3	3	80+20=100
22USECBCA601	Cloud Computing				
22USECBCA602	Management Information System				
22USECBCA603	Internet of Things				

Scheme of Examination and Syllabus for BCA 1st Semester

(w.e.f. 2022-2023)

SEMESTER-I					
Paper Code	Paper Name	Type of Course	Credits (Theory/ Practical)	Contact Hours (Theory/ Practical)	Marks (External + Internal)
22BCA101	Computer and Programming Fundamentals	Core	4.5	4.5	80+20=100
22BCA102	PC Software	Core	4.5	4.5	80+20=100
22BCA103	Mathematics	Core	4.5	4.5	80+20=100
22BCA104	Digital Electronics	Core	4.5	4.5	80+20=100
22BCA105	Practical Lab Based on 22BCA102	Core	3	6	80+20=100

22BCA101

Computer Fundamentals

Course Objectives: To familiarize the students with the fundamentals of Computer system, software and hardware, types of memory, concepts of programming languages, structured programming and networking concepts including types of network and topologies.

Maximum Marks: 100
External Examination: 80
Internal Assessment: 20
Max. Time: 3 Hrs

Note: There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Students will have to attempt one question from each unit. Each question shall carry equal marks.

UNIT-I

Computer Fundamentals: Generations of Computers, Definition, Block Diagram along with its components, characteristics & classification of computers, Limitations of Computers, Human-Being VS Computer, Applications of computers in various fields. Memory: Concept of primary & secondary memory, RAM, ROM, types of ROM, Cache Memory, flash memory, Secondary storage devices: Sequential & direct access devices viz. magnetic tape, magnetic disk, optical disks i.e. CD, DVD, virtual memory.

UNIT-II

Computer hardware & software: I/O devices, definition of software, relationship between hardware and software, types of software. Overview of operating system: Definition, functions of operating system, concept of multiprogramming, multitasking, multithreading, multiprocessing, time-sharing, real time, single-user & multi-user operating system. Computer Virus: Definition, types of viruses, Characteristics of viruses, anti-virus software.

UNIT-III

Computer Languages: Analogy with natural language, machine language, assembly language, high-level languages, fourth generation languages, compiler, interpreter, assembler, Linker, Loader, characteristics of a good programming

language, Planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation, Algorithms and Flow Chart.

Structured programming concepts, Programming methodologies viz. top-down and bottom up programming, Advantages and disadvantages of Structured programming.

UNIT-IV

Overview of Networking: An introduction to computer networking, Network types (LAN, WAN, MAN), Network topologies, Modes of data transmission, Forms of data transmission, Transmission channels(media), Introduction to internet and its uses, Applications of internet, Hardware and Software requirements for internet, Intranet, Applications of intranet.

Course Outcomes: After the completion of the course, the students will be able to learn basic computer terminologies, formulate opinions about the impact of computers on society, possess the knowledge of basic hardware peripherals and use of different number systems and the basics of programming.

Suggested Readings:

1. Gill N. S., 2020. Computing Fundamentals and Programming in C, Khanna Books Publishing Co., New Delhi.
2. Balagurusamy E., 2008. Computing Fundamentals and C Programming, Tata McGraw Hill.
3. Norton, P., 2017. Introduction to Computer, McGraw-Hill
4. Leon, A. & Leon, M., 2009. Introduction to Computers, Leon Tech World
5. Rajaraman, V., 2015. Fundamentals of Computers, PHI
6. Ram, B., 2020. Computer Fundamentals, Architecture & Organization, New Age International (P) Ltd.

22BCA102

PC Software

Course Objectives: The objectives of this course is to learn students about the Operating system like MS Windows, documentation in MS Word, applying formulas and functions in MS Excel and designing of attractive presentation in MS PowerPoint.

Maximum Marks: 100
External Examination: 80
Internal Assessment: 20
Max. Time: 3 Hrs

Note: There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Students will have to attempt one question from each unit. Each question shall carry equal marks.

UNIT-I

MS-Windows: Operating System-Definition & functions, basics of Windows. Basic components of windows, icons, types of icons, taskbar, activating windows, using desktop, title bar, running applications, exploring computer, managing files and folders, copying and moving files and folders. Control panel – display properties, adding and removing software and hardware, setting date and time, screensaver and appearance. Using windows accessories.

UNIT-II

Documentation Using MS-Word - Introduction to word processing interface, Toolbars, Menus, Creating & Editing Document, Formatting Document, Finding and replacing text, Format painter, Header and footer, drop cap, Auto-text, Autocorrect, Spelling and Grammar Tool, Document Dictionary, Page Formatting, Bookmark, Previewing and printing document, Advance Features of MS-Word-Mail Merge, Macros, Tables, File Management, Printing, Styles, linking and embedding object, Template.

UNIT-III

Electronic Spread Sheet using MS-Excel - Introduction to MS-Excel, Cell, cell address, Creating & Editing Worksheet, Formatting and Essential Operations, Moving and copying data in excel, Header and footer, Formulas and Functions, Charts, Cell referencing, Page setup, Macros, Advance features of MS-Excel-Pivot table & Pivot Chart, Linking and Consolidation, Database Management using Excel-Sorting, Filtering, Validation, What-if analysis with Goal Seek, Conditional formatting.

UNIT-IV

Presentation using MS-PowerPoint: Presentations, Creating, Manipulating & Enhancing Slides, Organizational Charts, Excel Charts, Word Art, layering art Objects, Animations and Sounds, Inserting Animated Pictures or Accessing through Object, Inserting Recorded Sound Effect or In-Built Sound Effect.

Course Outcomes: After the completion of the course, students will be able to understand computer software, problem-solving skills, working with various features of MS Word, MS Excel and MS PowerPoint.

Suggested Readings:

1. Russell A. Stultz Learn Microsoft Office — BPB Publication
2. Courter, G., Marquis, A., 1999. Microsoft Office 2000: Professional Edition. BPB.
3. Koers, D., 2001. Microsoft Office XP Fast and Easy. PHI.
4. Nelson, S L and Kelly, J., 2002. Office XP: The Complete Reference. Tata McGrawHill.

22BCA103 Mathematics

Course Objectives: This course will teach students mathematical skills and knowledge for their intrinsic beauty, effectiveness in developing proficiency in analytical reasoning, and utility in modeling and solving real world problems

Maximum Marks: 100
External Examination: 80
Internal Assessment: 20
Max. Time: 3 Hrs

Note: There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Students will have to attempt one question from each unit. Each question shall carry equal marks.

UNIT-I

SETS: Sets, Subsets, Equal Sets Universal Sets, Finite and Infinite Sets, Operation on Sets, Union, Intersection and Complements of Sets, Cartesian Product, Cardinality of Set, Simple Applications.

DETERMINANTS: Definition, Minors, Cofactors, Properties of Determinants, Applications of determinants in finding area of triangle, Solving a system of linear equations.

MATRICES: Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices, Adjoint, Inverse, solving system of linear equation Cramer's Rule.

UNIT-II

RELATIONS AND FUNCTIONS: Properties of Relations, Equivalence Relation, Partial Order Relation Function: Domain and Range, Onto, Into and One to One Functions, Composite and Inverse Functions.

LIMITS & CONTINUITY: Limit at a Point, Properties of Limit, Computation of Limits of Various Types of Functions, Continuity of a function at a Point, Continuity Over an Interval, Sum, product and quotient of continuous functions, Intermediate Value Theorem, Type of Discontinuities.

UNIT-III

DIFFERENTIATION: Derivative of a function, Derivatives of Sum, Differences, Product & Quotient of functions, Derivatives of polynomial, trigonometric, exponential, logarithmic, inverse trigonometric and implicit functions, Logarithmic Differentiation, Chain Rule and differentiation by substitution.

UNIT-IV

INTEGRATION: Indefinite Integrals, Methods of Integration by Substitution, By Parts, Partial Fractions, Integration of Algebraic and Transcendental Functions, Reduction Formulae for simple and Trigonometric Functions, Definite Integral as Limit of Sum, Fundamental Theorem of Integral Calculus, Evaluation of definite integrals by substitution, using properties of definite integral,

Course Outcomes: After the completion of the course, students will be able to learn set, determinant and inverse of a matrix, relations, functions, limits & continuity, Integration and differentiability of the functions.

Suggested Readings:

1. Narayan S., 1942. Differential Calculus, S. Chand. Publishers.
2. Narayan S., 2005. Integral Calculus, S. Chand. Publishers.
3. Thomas G.B., Hass J., Heil C., and Weir M.D., 2018. Thomas' Calculus, Pearson Education
4. Narayan S. and Mittal P.K., 2010. A Textbook of Matrices, S Chand & Company.

22BCA104

Digital Electronics

Course Objectives: To understand the structure, function and characteristics of computer systems. To understand the design of the various functional units and components of computers. To identify the elements of modern instructions sets and their impact on processor design.

Maximum Marks: 100
External Examination: 80
Internal Assessment: 20
Max. Time: 3 Hrs

Note: There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Students will have to attempt one question from each unit. Each question shall carry equal marks.

UNIT-I

Information Representation: Number Systems, Binary Arithmetic, Fixed-point and Floating-point representation of numbers, BCD Codes, Error detecting and correcting codes; Character Representation – ASCII, EBCDIC, Unicode

UNIT-II

Binary Logic: Boolean Algebra, Boolean Theorems, Boolean Functions and Truth Tables, Canonical and Standard forms of Boolean functions, Simplification of Boolean Functions: Venn Diagram, Karnaugh Maps.

UNIT-III

Digital Logic: Introduction to digital signals, Basic Gates – AND, OR, NOT, Universal Gates and their implementation – NAND, NOR, Other Gates – XOR, XNOR etc. NAND, NOR, AND-OR-INVERT and OR-AND-INVERT implementations of digital circuits,

Combinational Logic – Characteristics, Design Procedures, analysis procedures, Multilevel NAND and NOR circuits.

UNIT-IV

Combinational Circuits: Half-Adder, Full-Adder, Half-Subtractor, Full-Subtractor, Parallel binary adder/subtractor, Encoders, Decoders, Multiplexers, Demultiplexers, Comparators, Code Converters, BCD to Seven-Segment Decoder.

Course Outcomes: After the completion of the course, students will be able to understand the structure, function and characteristics of computer systems, design of the various functional units and components of computers, elements of modern instructions sets and their impact on processor design.

Suggested Readings:

1. Gill, N. S. and Dixit J.B., 2016. Digital Design and Computer Organisation, University Science Press (Laxmi Publications), New Delhi.
2. Mano, M.M., 2006. Digital Logic and Computer Design, Prentice Hall of India Pvt. Ltd.
3. Rajaraman V. and Radhakrishnan T., 2007. An Introduction to Digital Computer Design, Prentice Hall of India Pvt. Ltd.
4. Tanenbaum, A.S., 2013. Structured Computer Organization, Prentice Hall of India Pvt. Ltd.
5. Carter, N., 2002. Schaum's Outlines Computer Architecture, Tata McGraw-Hill

22BCA105

Practical Lab Based on 22BCA102

Maximum Marks: 100
External Examination: 80
Internal Assessment: 20
Max. Time: 3 Hrs

Note: - Every student will maintain practical record of programs done during practical lab in a file. Examination will be conducted through a question paper set jointly by the external and internal examiners. The question paper will consist of questions based on the list of practicals. An examinee will be asked to write the programs and run on computer. Evaluation will be made on the basis of the examinee's performance in written solutions and presentation with viva-voce and practical record.

Practical Examination will be conducted externally as per the following distribution of marks:

Writing solutions of problems and executing on the Computer:	50 marks.
Presentation & Viva voce:	20 marks.
Practical record:	10 marks.
Internal Assessment:	20 marks

Scheme of Examination and Syllabus for BCA 2nd Semester

(w.e.f. 2022-2023)

SEMESTER-II					
Paper Code	Paper Name	Type of Course	Credits (Theory/ Practical)	Contact Hours (Theory/ Practical)	Marks (External + Internal)
22BCA201	Programming in C	Core	4.5	4.5	80+20=100
22BCA202	Computer Organization and Architecture	Core	4.5	4.5	80+20=100
22BCA203	System Analysis and Design	Core	4.5	4.5	80+20=100
22BCA204	Operating System	Core	4.5	4.5	80+20=100
22BCA205	Practical Lab Based on 22BCA201 and 22BCA204	Core	3	6	80+20=100

22BCA201

Programming in C

Course Objectives: To familiarize the students with algorithmic thinking and algorithmic representations, introduce students to basic data types and control structures in C, structured programming concepts and standard library functions in C language.

Maximum Marks: 100
External Examination: 80
Internal Assessment: 20
Max. Time: 3 Hrs

Note: There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Students will have to attempt one question from each unit. Each question shall carry equal marks.

UNIT-I

Overview of C: History of C, Importance of C, Elements of C: C character set, identifiers and keywords, Data types, Constants and Variables, Assignment statement, Symbolic constant, Structure of a C Program, printf(), scanf() Functions, Operators & Expression: Arithmetic, relational, logical, bitwise, unary, assignment, shorthand assignment operators, conditional operators and increment and decrement operators, Arithmetic expressions, evaluation of arithmetic expression, type casting and conversion, operator hierarchy & associativity.

UNIT-II

Decision making & branching: Decision making with IF statement, IF-ELSE statement, Nested IF statement, ELSE-IF ladder, switch statement, goto statement. Decision making & looping: For, while, and do-while loop, jumps in loops, break, continue statement, Nested loops.

UNIT-III

Functions: Standard Mathematical functions, Input/output: Unformatted & formatted I/O function in C, Input functions viz. getch(), getche(), getchar(), gets(), output functions viz., putch(), putchar(), puts(), string manipulation functions. User defined functions: Introduction/Definition, prototype, Local and global variables, passing parameters, recursion.

UNIT-IV

Arrays, strings and pointers: Definition, types, initialization, processing an array, passing arrays to functions, Array of Strings. String constant and variables, Declaration and initialization of string, Input/output of string data, Introduction to pointers. Storage classes in C: auto, extern, register and static storage class, their scope, storage, & lifetime.

Course Outcomes: After completion of course, the students will be able to design an algorithmic solution to a problem using problem decomposition and step-wise refinement, implement program solution to an algorithm, design specification and learn the concepts of C Language.

Suggested Readings:

1. Sinha, P. K., Sinha, Priti, 2007. Computer Fundamentals. BPB Publications, New Delhi.
2. Balaguruswamy, E., 2017. Programming in C, Tata McGraw Hill, New Delhi.
3. Kanetkar, Y., 2016. Let us C. BPB Publication, New Delhi.
4. Kernighan, W.B. and Dennis R., 2015. The C Programming Language, Pearson Publications, New Delhi.
5. Goel, A., 2010. Computer Fundamentals, Pearson Education.
6. Forouzan, B., Gilberg A., and Richard, F., 2007. Structured programming approach using C, Cengage learning, 2007

Computer Organization and Architecture

Course Objectives: This course will familiarize the students about the functional knowledge about PC hardware, operations and concepts, functional units of a standard PC with its working and memory organization in a computer. The course will also help students to learn Organization of CPU and memory.

Maximum Marks: 100
External Examination: 80
Internal Assessment: 20
Max. Time: 3 Hrs

Note: There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Students will have to attempt one question from each unit. Each question shall carry equal marks.

UNIT-I

Sequential Logic: Flip-flops, Triggering of Flip-flops, Analysis of clocked sequential circuits, State reduction and Assignment, Flip-flop excitation, Design of counters, Design with state equations

Overview of Register Transfer and Microoperations: Register Transfer Language, Register transfer, Bus and Memory transfer, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic Logic Shift Unit

UNIT-II

Basic Computer Organization and Design: Instruction codes, Computer registers, Computer instructions, Timing and Control, Instruction cycle, Memory-Reference Instructions, Design Basic computer, Design of Accumulator Unit.

UNIT-III

Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction format, Addressing Modes, Data transfer and manipulation, Program Control, Reduced Instruction Set Computer (RISC).

Pipeline Processing: Pipeline and Vector Processing, Parallel processing, Pipelining, Arithmetic Pipeline, Instruction pipeline and Arrays Processors.

UNIT-IV

Input/Output Organization: Asynchronous Data Transfer, Programmed I/O (concepts only); Interrupts: Types of interrupts, processing interrupts, interrupt hardware and priority, DMA: DMA Controller, DMA Transfer Modes; I/O Processor.

Course Outcomes: After completion of course, students would be able to understand concepts of Logic gates, flip flops and counters, concept of Computer Architecture, Pipeline processing, RISC and CISC architectures, DMA, organization of Central Processing Unit. This develop a base for designing advance micro-processors.

Suggested Readings:

1. Mano, M.M., 1992. Computer System Architecture, Pearson
2. Tanenbaum, A., 2016. Structured Computer Organization, Pearson Education India
3. Stallings, W., 2015. Computer Organization and Architecture: Designing for Performance, Pearson
4. Hayes J.P., 1998. Computer Architecture and Organization, McGraw Hill Education
5. Carpinelli, J.D., 2002. Computer systems Organization & Architecture, Pearson Education.
6. Hamacher, V.C., Vranesic, Z.G. and Zaky, S.G., 1996. Computer Organization 4th Edition, McGraw-Hill

22BCA203

System Analysis and Design

Course Objectives: This course will provide an understanding of the role of systems analyst and software development firms for their role in distributing meaningful ERP modules and other business intelligent system. This course will also provide an understanding of the role of system analysis and design within various systems development stages.

Maximum Marks: 100
External Examination: 80
Internal Assessment: 20
Max. Time: 3 Hrs

Note: There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Students will have to attempt one question from each unit. Each question shall carry equal marks.

UNIT-I

Introduction to system, Definition and characteristics of a system, Elements of system, Types of system, System development life cycle, Role of system analyst, Analyst/user interface, System planning and initial investigation: Introduction, Bases for planning in system analysis, Sources of project requests, Initial investigation, Fact finding, Information gathering, information gathering tools, Fact analysis, Determination of feasibility.

UNIT-II

Structured analysis, Tools of structured analysis: DFD, Data dictionary, Flow charts, Gantt charts, decision tree, decision table, structured English, Pros and cons of each tool, Feasibility study: Introduction, Objective, Types, steps in feasibility analysis, Feasibility report, Oral presentation, Cost and benefit analysis: Identification of costs and benefits, classification of costs and benefits, Methods of determining costs and benefits, interpret results of analysis and take final action.

UNIT-III

System Design: System design objective, Logical and physical design, Design Methodologies, structured design, Form-Driven methodology (IPO charts), structured walkthrough, Input/output and form design: Input design, Objectives of input design, Output design, Objectives of output design, Form design, Classification of forms, requirements of form design, Types of forms, Layout considerations, Form control.

UNIT-IV

System testing: Introduction, Objectives of testing, Test plan, testing techniques/Types of system tests, Quality assurance goals in system life cycle, System implementation, Process of implementation, System evaluation, System maintenance and its types, System documentation, Forms of documentation.

Course Outcomes: After completion of course, students would be able to understand an apply the activities of the management and systems analyst, and in the overall development of system with understanding of Testing software and complying the various software quality parameters.

Suggested Readings:

1. Awad, E.M., 2010. Systems Analysis and design, Galgotia Publications Pvt. Ltd.
2. Loomis, M.E.S, 1990. Data Management and Data Structures, PHI
3. Lee, B. 1979. Introductory System analysis and Design Vol. I & II, Blackwell Publishers
4. Dixit, J.B. and Kumar R., 2017. Structured System Analysis and Design, Laxmi Publications (P) Ltd.

22BCA204

Operating System

Course Objectives: This course will provide students an understanding about basic concepts of Operating Systems, basic Unix concepts related to concurrency and control of programs, Identify and define key terms related to operating system and Unix commands.

Maximum Marks: 100
External Examination: 80
Internal Assessment: 20
Max. Time: 3 Hrs

Note: There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Students will have to attempt one question from each unit. Each question shall carry equal marks.

UNIT-I

Fundamentals of Operating system: Introduction to Operating System, its need and operating System services, Early systems, Structures - Simple Batch, Multi programmed, timeshared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems.

Process Management: Process concept, Operation on processes, Cooperating Processes, Threads, and Inter-Process Communication.

UNIT-II

CPU Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms: FCFS, SJF, Round Robin & Queue Algorithms.

Deadlocks: Deadlock characterization, Methods for handling deadlocks, Banker's Algorithm.

UNIT-III

Memory Management: Logical versus Physical address space, Swapping, Contiguous allocation, Paging, Segmentation.

Virtual Memory: Demand paging, Performance of demand paging, Page replacement, Page replacement algorithms, Thrashing.

UNIT-IV

File management: File system Structure, Allocation methods: Contiguous allocation, linked allocation, Indexed allocation, Free space management: Bit vector, linked list, Grouping, Counting.

Device Management: Disk structure, Disk scheduling: FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK.

Course Outcomes: After completion of the course, students will be able to understand basic operating system fundamentals, how an operating system can be used as a service, apply Linux programming concepts and build a foundation stone to understand operating systems working.

Suggested Readings:

1. Silberschatz, A. and Galvin, P.B., 2004. Operating System Concepts, Addison-Wesley publishing. Co., 7th. Ed.
2. Gary, N., 2000. Operating Systems, Addison Wesley Publication.
3. Tannenbaum, A.S., 2001. Modern Operating Systems, Pearson Education Asia, Second Edition.
4. Stallings, W., 2001. Operating Systems, Internals and Design Principles, 4th Edition, PH.
5. Walia, E., 2002. Operating Systems Concepts, Khanna Publishes, New Delhi.

22BCA205

Practical Lab Based on 22BCA201 and 22BCA204

Maximum Marks: 100
External Examination: 80
Internal Assessment: 20
Max. Time: 3 Hrs

Note: - Every student will maintain practical record of programs done during practical lab in a file. Examination will be conducted through a question paper set jointly by the external and internal examiners. The question paper will consist of questions based on the list of practicals. An examinee will be asked to write the programs and run on computer. Evaluation will be made on the basis of the examinee's performance in written solutions and presentation with viva-voce and practical record.

Practical Examination will be conducted externally as per the following distribution of marks:

Writing solutions of problems and executing on the Computer:	50 marks.
Presentation & Viva voce:	20 marks.
Practical record:	10 marks.
Internal Assessment:	20 marks