DIRECTORATE OF DISTANCE EDUCATION
KURUKSHETRA UNIVERSITY KURUKSHETRA
(Established by the State Legislature Act XII of 1956)
("A" Grade NAAC Accredited)

BACHELOR OF COMPUTER APPLICATIONS
SCHEME OF EXAMINATION (w.e.f. 2016-17)

SECOND YEAR						
Paper No.	Title of Paper	External Marks	Internal Marks	Maximum Marks	Pass Marks	Exam Duration
BCA-201	Operating System	80	20	100	35	3hrs
BCA-202	Data Structures	80	20	100	35	3hrs
BCA-203	Computer Architecture	80	20	100	35	3hrs
BCA-204	Data Base Management System	80	20	100	35	3hrs
BCA-205	Software Engineering	80	20	100	35	3hrs
BCA-206	Mathematical Foundations-II	80	20	100	35	3hrs
BCA-207	Lab – I Based on BCA-202 using 'C'			100	35	3hrs
BCA-208	Lab – II Based on BCA-204			100	35	3hrs

BCA-201 Operating System

Maximum Marks:100   **External: 80**
Minimum Pass Marks: 35   **Internal: 20**
Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT – I
Introductory Concepts: Operating system functions and characteristics, historical evolution of operating systems, Real time systems, Distributed systems, Methodologies for implementation of O/S service system calls, system programs.
Process management: Process concepts, Process states and Process Control Block.

UNIT – II
CPU Scheduling: Scheduling criteria, Levels of Scheduling, Scheduling algorithms, Multiple processor scheduling.
Deadlocks: Deadlock characterization, Deadlock prevention and avoidance,   Deadlock   detection   and   recovery,   practical considerations.

UNIT – III
Concurrent Processes: Critical section problem, Semaphores, Classical process co-ordination problems and their solutions, Inter-process Communications.
Storage Management: memory management of single-user and multiuser operating system, partitioning, swapping, paging and segmentation, virtual memory, Page replacement Algorithms, Thrashing.

UNIT – IV
Device and file management: Disk scheduling, Disk structure, Disk management, File Systems: Functions of the system, File access and allocation methods, Directory Systems: Structured Organizations, directory   and file protection mechanisms.

TEXT BOOKS:

1. Silberschatz A., Galvin P.B.,and Gagne G., "Operating System Concepts", Wiley India, New Delhi.
2. Godbole, A.S., "Operating Systems", Tata McGraw-Hill Publishing Company, New Delhi.

REFERENCE BOOKS:

1. Deitel, H.M., "Operating Systems", Pearson Education India, New Delhi.
2. Tanenbaum, A.S., "Operating System- Design and Implementation", Prentice Hall of India, New Delhi.

BCA – 202   DATA STRUCTURES

Maximum Marks:100   **External: 80**
Minimum Pass Marks: 35   **Internal: 20**
Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT – I
Introduction: Elementary data organization, Data Structure definition, Data type vs. data structure, Categories of data structures, Data structure operations, Applications of data structures, Algorithms complexity and time-space tradeoff, Big-O notation.
Strings: Introduction, String strings, String operations, Pattern matching algorithms.

UNIT – II
Arrays: Introduction, Linear arrays, Representation of linear array in memory, Traversal, Insertions, Deletion in an array, Multidimensional arrays, Sparce matrics, Searching and Sorting using Array.
Linked List: Introduction, Array vs. linked list, Representation of linked lists in memory, Traversal, Insertion, Deletion, Searching in a linked list, Header linked list, Circular linked list, Two-way linked list.

UNIT – III

Stack: Introduction, Array and linked representation of stacks, Operations on stacks, Applications of stacks: Polish notation, Quick Sort, Recursion.

Queues: Introduction, Array and linked representation of queues, Operations on queues, Deques, Priority Queues

UNIT – IV

Tree: Introduction, Definition, Representing Binary tree in memory, Traversing binary trees, Binary search trees: introduction, storage, Searching, Insertion and deletion in a Binary search tree, Heap sort

Graph: Introduction, Graph theory terminology, Sequential and linked representation of graphs, traversal algorithms in graphs, Warshall's algorithm for shortest path.

Text Books
1. Seymour Lipschutz, "Data Structure", Tata-McGraw-Hill
2. Horowitz, Sahni & Anderson-Freed, "Fundamentals of Data Structures in C", Orient Blackswan, New Delhi.

REFERENCE BOOKS:

1. Trembley, J.P. And Sorenson P.G., "An Introduction to Data Structures With Applications", Mcgraw- Hill India, New Delhi.
2. Mark Allen Weiss Data Structures and Algorithm Analysis In C, Addison- Wesley, (An Imprint Of Pearson Education), New Delhi.
3. Yedidyah Langsam, Moshe J. Augenstein, and Aaron M. Tenenbaum, "Data Structures Using C", Prentice- Hall of India Pvt. Ltd., New Delhi.

BCA – 203 COMPUTER ARCHITECTURE

Maximum Marks:100   **External: 80**
Minimum Pass Marks: 35   **Internal: 20**
Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT -I

Basic Computer Organisation and Design: Instruction Codes, Computer registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory reference instructions, Input-Output and Interrupt, Design of Basic computer, Design of accumulator logic.

UNIT -II

Register Transfer and Microoperations: Register Transfer Language (RTL), register transfer, Bus and Memory Transfers, Arithmetic Microoperations, Logic Microoperations, Shift Microoperations, Arithmetic Logic Shift Unit, Microprogrammed Control: Control memory; address sequencing, microprogram sequencer, Design of Control Unit

UNIT -III

Central Processing Unit: General registers Organization, Stack Organization, Instruction formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Program Interrupt, RISC, CISC.

UNIT -IV

Memory Organization: Memory hierarchy, Auxiliary Memory, Associative Memory, Interleaved memory, Cache memory, Virtual Memory, Memory Management Hardware, Input Output Organization : Peripheral devices , Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access(DMA),Input-Output Processor(IOP).

Text Books
1. Computer System Architecture By. Moris Mano, Pearson Education.
2. Computer Architecture and Organization By J.P. Hayes, Tata Mcgraw Hill.

REFERENCE BOOKS:
1. W. Stallings, Computer Organisation and Architecture, Pearson Education,
2. P.V.S. Rao, "Computer System Architecture", PHI
3. Carl Hamachar, "Computer Architecture", Tata Mcgraw Hill.

BCA – 204 DATABASE MANAGEMENT SYSTEM

Maximum Marks: 100   **External: 80**
Minimum Pass Marks:35   **Internal: 20**
Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT – I

Basic Concepts – Data, Information, Records and files. Traditional file–based Systems, Database Approach, Database Management System (DBMS), Components of DBMS, DBMS Functions, Advantages and Disadvantages of DBMS, Database Administrator, Applications Developers and Users. Database System Architecture – Three Levels of Architecture, External, Conceptual and Internal Levels, Schemas, Mappings and Instances, Data Independence – Logical and Physical Data Independence

UNIT – II

Classification of Database Management System, Centralized and Client Server architecture to DBMS, Data Models: Records- based Data Models, Object-based Data Models, Physical Data   Models and Conceptual Modeling, Entity-Relationship Model – Entity Types, Entity Sets, Attributes Relationship Types, Relationship Instances and ER Diagrams.

UNIT – III

Relational Data Model:-Brief History, Terminology in Relational Data Structure, Relations, Properties of Relations, Keys, Domains, Integrity Constraints over Relations, Base Tables and Views, Basic Concepts of Hierarchical and Network Data Model, Codd's Rules for Relational Model, Relational Algebra:-Selection and Projection, Set Operation, Renaming, Join and Division

UNIT – IV

Functional Dependencies:- Purpose, Data Redundancy and Update Anomalies, Full Functional Dependencies and Transitive Functional Dependencies, Decomposition and Normal Forms (1NF, 2NF, 3NF & BCNF).
Introduction to SQL: Data Definition and data types, SQL Operators, Specifying Constraints in SQL, Basic DDL, DML and DCL commands in SQL, Simple Queries, Nested Queries, Tables, Views.

TEXT BOOKS:
1. Elmasri & Navathe, "Fundamentals of Database Systems", Pearson Education.
2. Sudarshan & Karth, "Database Systems SIE", Mcgraw Hill India.

REFERENCE BOOKS:
1. Thomas Connolly Carolyn Begg, "Database Systems", 3/e, Pearson Education
2. C. J. Date, "An Introduction to Database Systems", 8th edition, Addison Wesley N. Delhi.

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BCA – 205   Software Engineering

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MaximumMarks:100   **External: 80**
Minimum Pass Marks: 35   **Internal: 20**
Time: 3 hours

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UNIT – I

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Introduction: Program vs. Software, Software Engineering, Programming paradigms, Software Crisis – problem and causes, Phases in Software development: Requirement Analysis, Software Design, Coding, Testing, Maintenance, Software Development Process Models: Waterfall, Prototype, Evolutionary and Spiral models, Role of Metrics.

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UNIT – II

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Feasibility Study, Software Requirement Analysis and Specifications: SRS, Need for SRS, Characteristics of an SRS, Components of an SRS, Problem Analysis, Information gathering tools, Organising and structuring information, Requirement specification, validation and Verification.. SCM

UNIT – III

Structured Analysis and Tools: Data Flow Diagram, Data Dictionary, Decision table, Decision tress, Structured English, Entity-Relationship diagrams , Cohesion and Coupling.
Gantt chart, PERT Chart, Software Maintenance: Type of maintenance, Management of Maintenance, Maintenance Process, maintenance characteristics.

UNIT – IV

Software Project Planning: Cost estimation: COCOMO model, Project scheduling, Staffing and personnel planning, team structure, Software configuration management, Quality assurance plans, Project monitoring plans, Risk Management. Software testing strategies: unit testing, integration testing, Validation testing, System testing, Alpha and Beta testing.

TEXT BOOKS:
1. Pressman R. S., "Software Engineering – A Practitioner's Approach", Tata McGraw Hill.
2. Jalote P., "An Integrated approach to Software Engineering", Narosa.

REFERENCE BOOKS:
1. Sommerville, "Software Engineering", Addison Wesley.
2. Fairley R., "Software Engineering Concepts", Tata McGraw Hill.
3. James Peter, W Pedrycz, "Software Engineering", Wiley Inida.

BCA – 206   MATHEMATICAL FOUNDATIONS - II

Maximum Marks:100   **External: 80**
Minimum Pass Marks: 35   **Internal: 20**
Time: 3 hours

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UNIT – I

Derivative of functions of defined parametrically, Derivative of Logarithmic exponential, trigonometric, inverse trigonometric and hyperbolic functions. Derivatives of higher orders, Successive differentiation and Leibnitz's Theorem, Tangents and Normals: Length of tangent, suntangent, normal and subnormal. Polar subtangent, Polar subnormal, pedal equations.

UNIT– II

Taylor's theorem and Maclaurin's theorem: Taylor and Maclaurin series expansion in one and two variables, indeterminate forms. Asymptotes: Cartesian coordinate, intersection of curve and its asymptotes, Asympotes in polar coordinates. Multiple points: cusp, nodes and conjugate points, types of cusp, test for concavity and convexity. Points of inflexion.

UNIT – III

Curvature: radius of curvature for Cartesian, parametric, polar curves. Newton;s method, radius of curvature for pedal curve, tangential polar equation , center of curvature and evolute , circle of curvature ,chord of curvature . Tracing of curves in Cartesian, parametric and polar coordinates.

UNIT – IV

Partial derivatives of first and second order. Euler's theorem on homogeneous functions, Differentiation of composite and implicit functions. The notion of total differential, Extreme values: Maxima and Minima of function of two or more variable, Lagrange's method of multipliers.

Text Books:

1. Ravish. R. Singh, "Engineering Mathematics", Mcgraw-Hill Pvt. Ltd., New Delhi

REFERENCE BOOKS:
1. Om. P. Chug, R.S. Dahiya, G.L. Gupta, "Topics in Mathematics (Calculus & solid geometry)", Laxmi Publications (P) Ltd., New Delhi.
2. Shanti Narayan, "Differential Calculus", S. Chand and Co. Ltd.
3. S. K. Pundir and B. Singh, "Advance Calculus", Pragati Prakashan.
4. J.N. Sharma, A.R. Vasishtha, "Real Analysis", Krishna Prakashan Media(P) Ltd., Meerut (U.P.)
5. Shanti Narayan, "Integral Calculus", S. Chand and Co. Ltd.
6. Shanti Narayan, "A course of Mathematical Analysis", S. Chand and Co. Ltd.