# Integral University, Lucknow
## Department of Computer Application
### STUDY & EVALUATION SCHEME
#### Choice Based Credit System

**Bachelor of Computer Application (BCA)**  
w.e.f. Session 2016-17

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### Year II\textsuperscript{nd}, Semester IV\textsuperscript{th}

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Course Category</th>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Periods</th>
<th>Evaluation Scheme</th>
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<td>CA209</td>
<td>Data Compression</td>
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<td>CA212</td>
<td>Computer Architecture and Microprocessor</td>
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**L** - Lecture  
**T** - Tutorial  
**P** - Practical  
**C** - Credit  
**CT** - Class Test  
**TA** - Teacher Assessment  

**Sessional Total (CA)** = Class Test + Teacher Assessment  

**Subject Total** = Sessional Total (CA) + End Semester Examination (ESE)
UNIT-I
Relation: Relations on sets, Types of relations in a set, Properties of relations, Composition of relations, Representation of relations, Closures of relations.
Function: Types of functions, Composition of functions, Recursively defined function. [7]

UNIT-II
Algebraic Structures: Properties, Semi group, Monoid, Group, Abelian group, Properties of group, Subgroup, Cyclic group, Cosets, Permutation groups, Homomorphism, Isomorphism and Automorphism of groups.
Propositional Logic: Preposition, Tautologies, Contradictions, Algebra of Proposition, Logical implication, Logical equivalence, Normal forms, Predicates and Quantifiers. [8]

UNIT-III

UNIT-IV
Automata: Introduction of the Language, Kleene closure, Arithmetic expressions, Regular expressions, Generalized transition graph, Conversion of regular expression to Finite Automata, Non deterministic finite automata, Deterministic finite automata, Conversion of NFA to DFA, Optimization of DFA.

UNIT-V
Non-Regular language: Pumping lemma, Introduction to Pushdown Automata, Introduction to Turing Machine, Introduction to Chomsky Normal Form (CNF), Chomsky Hierarchy. [8]

REFERENCES:
1. Liptschutz, Seymour, “Discrete Mathematics”, TMH.
CA209 DATA COMPRESSION
w.e.f. Session 2016-17

UNIT-I:

UNIT-II:
Huffman Coding Algorithms: Minimum variance Huffman codes.
Adaptive Huffman coding: Update procedure, Encoding procedure, Decoding procedure, Applications of Hoffman coding.

UNIT-III:
Arithmetic Coding: Coding a sequence, Generating a Binary code, Comparison of Arithmetic and Huffman coding.
Applications: File Compression, Image Compression
Lossless Image Compression: Multi-resolution Approaches.
Context Based Compression: Dynamic Markov Compression.

UNIT-IV:
Mathematical Preliminaries for Lossy Coding, Distortion criteria, Models.
Scalar Quantization: The Quantization problem, Uniform Quantizer, Adaptive Quantization, Non uniform Quantization.

UNIT-V:
Vector Quantization, Advantages of Vector Quantization over Scalar Quantization, The Linde-Buzo-Gray Algorithm, Tree structured Vector Quantizers, Structured Vector Quantizers.

REFERENCES:

UNIT-I

UNIT-II

UNIT-III

UNIT-IV

UNIT-V
REFERENCES:

CA211 SOFTWARE SECURITY

w.e.f. Session 2016-17

UNIT-I

UNIT-II
Root of Software Problem: A Brief History of Software, Bad Software is Ubiquitous, The Trinity of Problem, Future of Software.

UNIT-III
Seven Touch Point for Software Security: Seven Terrific Touch Point, Black & White: Two Threads Inextricably Intertwined, Touch Points as Best Practices, Software Security: Multidisciplinary effort, Touch points to success

UNIT-IV

UNIT-V
An Enterprise Software Security Program: The Business Climate, Building Blocks of Change, Building an Improvement Program, Establishing a Metrics Program, Continuous Improvement, COTS and existing applications, Adopting a Secure Development Lifecycle. [8]

REFERENCES:

CA212 COMPUTER ARCHITECTURE AND MICROPROCESSOR

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UNIT-I
8-bit Microprocessor: Introduction, Pin diagram and internal architecture of 8085 microprocessor, Registers sets.
16-bit Microprocessor: Introduction, Pin diagram and internal architecture of 8086 microprocessor, Registers sets.
Interrupts: Hardware and Software Interrupts. [8]

UNIT-II
Assembly Language Programming and Instructions: Data transfer, Arithmetic operations, Logical operations, Branch operations, Looping counting, Indexing, Programming techniques, Counters and time delays.
Parallel computing: Introduction, Parallelism in Uniprocessor Systems, Parallel computer structures, Architectural classification schemes, Parallel processing applications. [8]

UNIT-III
Pipelining Processing and overlapped parallelism: Principle of Linear Pipelining, Classification of Pipelined Processor, General Pipelined and reservation tables, Interleaved memory organizations, Arithmetic pipelines.
Principles of designing pipelined processors: Pipeline instruction execution, Pre-fetch buffer, Internal forwarding and Register tagging, Hazard detection and resolution. [8]

UNIT-IV
Pipeline scheduling theory: Scheduling problem, Collision vector, State diagram, Pipeline scheduling optimization, Multiple vector task dispatching, Masking and Data routing.
Program partitioning and scheduling: Grain size and Latency, Grain packing and scheduling, Static multiprocessor scheduling.
Program flow mechanism: Control flow vs. Data flow, Demand-driven mechanism, Comparison of flow mechanism. [8]

UNIT-V
SIMD Interconnection network: Static, Dynamic networks, Mesh connected Illiac network, Cube interconnection network, Shuffle-exchange and Omega network.
Parallel Algorithms for Array Processors: SIMD Matrix multiplication, SIMD Fast Fourier transforms. [8]
REFERENCES:

3. Hall D V, ”Microprocessor Interfacing”, TMH.
5. Aditya P Mathur, “Introduction to Microprocessor”, TMH.
UNIT-I
Introduction: Definition and types of Operating systems, Batch Systems, Multiprogramming, Time-Sharing, Parallel, Distributed and Real-Time Systems, Operating System Structure, Operating System Components and Services, System Calls, System Programs, Virtual Machines. [8]

UNIT-II

UNIT-III

UNIT-IV

UNIT-V
Disk Management: Disk Structure, Disk scheduling, Disk management, Recovery, Swap-Space Management, Disk Reliability.
Introduction to Android Operating System. [8]

REFERENCES:
UNIT-I
Java Basic: Comparison of C++ and JAVA, JAVA and Internet, JAVA support systems, JAVA environment, JAVA program structure, Tokens, Statements, JVM, Constant and Variables, Data Types, Declaration of variables, Scope of variables, Symbolic constants, Type Casting.
Operators: Arithmetic, Relational, Logical assignments, Increment and Decrement, Conditional, Bitwise, Special, Expressions and its evaluation. [8]

UNIT-II
Defining a Class, Adding variables and Methods to classes, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods.
Inheritance: Extending a Class, Overriding Methods, Final Variables and Methods, Final Classes, Finalize Methods, Abstract Methods and Classes, Visibility Control. [8]

UNIT-III
Arrays: One Dimensional and Two Dimensional, Strings, Vectors, Wrapper Classes.
Interface: Defining Interface, Extending Interface, Implementing Interface, Accessing Interface Variable.
Exception Handling: Concepts of Exceptions, Types of Exception, Try and Catch keyword, Nested Try and Catch. [8]

UNIT-IV
Threads: Creating Threads, Extending Threads Class, Stopping and Blocking a Thread, Life Cycle of a Thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization.
Package: System Packages, Using System Package, Adding a Class to a Package, Hiding Classes. [8]

UNIT-V
Applets: Local and Remote Applets, Writing Applets, Applets life cycle, Creating an executable Applet, Designing a Web Page, Applet Tag, Adding Applet to HTML File, Running the Applet, Passing parameters to Applets, Aligning the display, HTML Tags and Applets, Getting input from the user. [8]

REFERENCES:
3. Naughton, Schildt, “The Complete Reference JAVA 2”, TMH.
List of practical:

1. Study of 8085 and 8086.
2. Assembly Language programs for 8086
   (i) Address and Data Transfer.
   (ii) Addition, Subtraction.
   (iii) Block transfer.
   (iv) Find greatest numbers.
   (v) Find r's and (r-l)'s complements of signed and unsigned number.
   (vi) Multiplication of two hexadecimal/octet numbers.
   (vii) Division of two hexadecimal/octet numbers.
3. Rotation control of stepper motor using interface card.
List of practical using JAVA language:

1. Program illustrating Classes and Objects.
2. Program illustrating Method Overloading and Method Overriding.
3. Program illustrating concept of Interface.
4. Program illustrating use of Final and Super keyword.
5. Program that illustrates the following
   a) Creation of simple package.
   b) Accessing a package.
6. Program for creating multiple threads
   a) Using Thread class.
   b) Using Runnable Interface.
7. Program that illustrates the following
   a) Handling predefined exceptions.
   b) Handling user defined exceptions.
8. Program to illustrate the concept of Applets.
10. Incorporating Graphics.
11. Working with Colors and Fonts.
Students are required to select a topic of the relevant field in Computer Application and register it formally. They will be required to prepare relevant presentation as per allotted dates. Students will also be required to submit their work in form of hard and soft copies for purpose of evaluation.