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

Year IInd, Semester IVth

S. No.	Course Category	Subject Code	Name of the Subject	Periods				Evaluation Scheme				Subject Total
								Sessional (CA)			End Sem. Exam	
				L	T	P	C	CT	TA	Total	ESE	
1.	Elective - II	CA208	Discrete Mathematics	3	1	0	4	25	15	40	60	100
		CA209	Data Compression									
2.	Elective - III	CA210	Software Engineering and Project Management	3	1	0	4	25	15	40	60	100
		CA211	Software Security									
3.	Core	CA212	Computer Architecture and Microprocessor	3	1	0	4	25	15	40	60	100
4.	Core	CA213	Operating System	3	1	0	4	25	15	40	60	100
5.	Core	CA214	JAVA Programming	3	1	0	4	25	15	40	60	100
6.	Core	CA215	Microprocessor Lab	0	0	3	2	30	30	60	40	100
7.	Core	CA216	JAVA Programming Lab	0	0	3	2	30	30	60	40	100
8.	Core	CA217	Seminar	0	0	2	1	30	30	60	40	100
Total				**15**	**5**	**8**	**25**					**800**

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)

CA208 DISCRETE MATHEMATICS

w.e.f. Session 2016-17

L	T	P
3	1	0

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

Lattices: Ordered set, Posets , Hasse diagram, Hasse diagram of partially ordered set, Consistent enumeration, Isomorphic ordered set, Well ordered set, Introduction to Lattices, Properties of lattices, Bounded lattices, Distributive lattices, and Complemented lattices. [7]

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.

Finite Automata with output: Moore machine, Mealy machine, Conversions (Moore machine to Mealy machine and vice-versa). [10]

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.
2. Trembley, J.P and R. Manohar, “Discrete Mathematical Structure with Application to Computer Science”, TMH.
3. Hopcroft J.E, Ullman J.D., “Introduction to Automata theory, Languages and Computation”, Narosa Publishing House.
4. C.L.Liu, “Elements of Discrete Mathematics”, McGraw Hill.

CA209 DATA COMPRESSION

w.e.f. Session 2016-17

L	T	P
3	1	0

UNIT-I:
Introduction to Compression Techniques: Loss less compression, Lossy Compression, Measures of performance, Modeling and coding, Mathematical Preliminaries for Lossless compression.
Introduction to Information Theory and Models: Physical models, Probability models, Markov models. [8]

UNIT–II:
Huffman Coding Algorithms: Minimum variance Huffman codes.
Adaptive Huffman coding: Update procedure, Encoding procedure, Decoding procedure, Applications of Hoffman coding. [8]

UNIT-III:
Arithmetic Coding: Coding a sequence, Generating a Binary code, Comparison of Arithmetic and Huffman coding.
Dictionary Techniques: Introduction, Static Dictionary: Diagram Coding, Adaptive Dictionary: The LZ77 Approach, The LZ78 Approach.
Applications: File Compression, Image Compression
Lossless Image Compression: Multi-resolution Approaches.
Context Based Compression: Dynamic Markov Compression. [8]

UNIT–IV:
Mathematical Preliminaries for Lossy Coding, Distortion criteria, Models.
Scalar Quantization: The Quantization problem, Uniform Quantizer, Adaptive Quantization, Non uniform Quantization. [8]

UNIT-V:
Vector Quantization, Advantages of Vector Quantization over Scalar Quantization, The Linde-Buzo-Gray Algorithm, Tree structured Vector Quantizers, Structured Vector Quantizers. [8]

REFERENCES:

1. Khalid Sayood, “Introduction to Data Compression”, Morgan Kaufmann Publishers.
2. David Salomon, “Data Compression: The Complete Reference”, Springer.
3. Mark Nelson and Jean-loup Gailly, “The Data Compression Book”, M&T Books.

CA210 SOFTWARE ENGINEERING AND PROJECT MANAGEMENT

w.e.f. Session 2016-17

L	T	P
3	1	0

UNIT-I

Software Product and SDLC: Software Engineering Fundamentals, Definition of Software Products, Phases of Software Development Life Cycle, Software Development Paradigm, Software Life Cycles Models: Build and Fix Model, Waterfall Model, Prototype Model, Iterative Model, Evolutionary Model, Spiral Model, Software Requirements Analysis and Specification: SRS, Characteristics of SRS. [8]

UNIT-II

Software Design Principles: Software Design, Design Process, Design Principles: Abstraction, Refinement, Modularity, Information Hiding, Modular Design: Effective Modular Design and Functional Independence, Cohesion, Coupling, Top down and Bottom up Strategies, Coding: Coding Standard and Guidelines, Testing: Black Box Testing and White Box Testing. [8]

UNIT-III

Software Configuration Management: Concept of Configuration Management. Software Maintenance: Categories of Maintenance, Software Reliability: Reliability, Reliability Metrics, Quality Concept: Quality Control, Quality Assurance, Software Quality, Scheduling Tools, Time Estimation, Resource Allocation, Differentiate Projects, Programs and Business Process, Elements of Proposal Process. [8]

UNIT-IV

CASE Tools: Relevance of CASE Tool: Building block for CASE Tools, Integrated Case Tool Environment, Generation of CASE Tool, High End and Low End CASE Tools.

Project Management Fundamentals: Definition of Project, Project Specification and Parameters, Principles of Project Management, Project Management Life Cycle, Program Management Plan: Concept, Elements, Planning Issues, Benefits of Program Management. [8]

UNIT-V

Software Project Management, Project Activities: Engineering Task, Management Task, Work Break down Structure: Concept of WBS, Meaning of Product Oriented Deliverable, Features of WBS, Comparison of Functional based vs. product Oriented Deliverability, Resource and Cost Requirements, Software Project Plans, Software Project Estimation, Project Monitoring and Progress Control, Risk Management: Risk Management Plan, Risk Mitigation Strategies, Software Measurement, Project Metrics, Project Audit: Data Collection, Analysis. [8]

REFERENCES:

1. R. Pressman, “Software Engineering”, TMH.
2. Pankaj Jalote, “An Integrated Approach to Software Engineering”, Narosa.
3. Rajib Mall, “Fundamental of Software Engineering”, PHI.
4. Pankaj Jalote, “Software Project Management in Practice”, Person Education.

CA211 SOFTWARE SECURITY

w.e.f. Session 2016-17

L	T	P
3	1	0

UNIT-I

Security Fundamentals: The Security Problem, Security Problems in Software, Solving the Problem: The Three Pillars of Software Security, Rise of Security Engineering.

Software Security Issue: The Problem, Software Assurance and Software Security, Threats to Software Security, Sources of Software Insecurity, Benefits of Detecting Software Security Defects Early, Managing Secure Software Development. [8]

UNIT-II

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

Risk Management Framework: Putting Risk Management into Practice, The Five Stage of Activity, RMF, Applying the RMF, The Importance of Measurement, Risk Management Framework for Software Security. [8]

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

Secure Software Architecture and Design: Software Security practices for architecture and Design: Architectural Risk Analysis, Software Security Knowledge for Architecture and Design, Security Principles, Security Guidelines, Attack Patterns. [8]

UNIT-IV

Making Software Secure: Defining Properties of Secure Software, Security Properties of Software, Assertion and Specification for Desired Security properties.

Architecture Design Principles: Architectural Level of Design, Architecting with Design Operators, Functional Design Strategies. [8]

UNIT-V

Knowledge for Software Security: Experience, Expertise and Security, Security Knowledge: A Unified View, Security Knowledge and Touch Points, The Department of Homeland Security Build Security in Portal, Knowledge Management: Ongoing, Software Security recent issue.

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:

1. Julia H. Allen, Sean Barnum, Robert J. Ellison, Gary McGraw, Nancy R. Mead, “Software Security Engineering: A guide for Project Mangers”, Addison Wesley Professional.
2. Gary McGraw, “Software Security: Building Security In”, Addison Wesley Professional.
3. Mark Dowd, John McDonald, Justin Schuh, “The Art of Software Security Assessment: Identifying and Preventing Software Vulnerabilities”, Addison Wesley Professional.

4. Julia H. Allen, Sean Barnum, Robert J. Ellison, Gary McGraw, Nancy R. Mead, “Software Security Engineering: A guide for Project Mangers”, Addison Wesley Professional.
5. Julia H. Allen, Sean Barnum, Robert J. Ellison, Gary McGraw, Nancy R. Mead, “Software Security Engineering: A guide for Project Mangers”, Addison Wesley Professional.
6. Clifford Berg, “High Assurance Design: Architecting Secure and Reliable Enterprise Application”, Addison Wesley Professional.
7. Stephen T. Albin, John, “The Art of Software Architecture: Design Methods and Techniques”, Wiley & Sons.

CA212 COMPUTER ARCHITECTURE AND MICROPROCESSOR

w.e.f. Session 2016-17

L	T	P
3	1	0

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:

1. Gaonkar, Ramesh S, “Microprocessor Architecture, Programming and Applications with 8085”, Penram International Publishing.
2. Ray A K , Bhurchandi K M , “Advanced Microprocessors and Peripherals”, TMH.
3. Hall D V ,”Microprocessor Interfacing’, TMH.
4. Liu and Gibson G A , “ Microcomputer System: The 8086/8088 family” ,PHI.
5. Aditya P Mathur, “Introduction to Microprocessor”, TMH.
6. M Rafiqzzaman, “Microprocessors, Theory and Applications”, TMH.
7. Hwang and Briggs, “Computer Architecture and Parallel Processing”, TMH.

CA213 OPERATING SYSTEM

w.e.f. Session 2016-17

L	T	P
3	1	0

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

Process Management: Process Concept, Process Scheduling, Cooperating Processes, Threads, Interprocess Communication, CPU Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Real-Time Scheduling and Algorithm evaluation. [8]

UNIT-III

Process Synchronization And Deadlocks: The Critical-Section Problem, Synchronization Hardware, Semaphores, Classical Problems of Synchronization, Critical Regions, Monitors, Deadlocks-System Model, Characterization, Deadlock Prevention, Avoidance and Detection, Recovery from Deadlock, Combined approach to Deadlock Handling. [8]

UNIT-IV

Memory Management: Logical and Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation with Paging, Virtual Memory, Demand Paging and its performance, Page Replacement Algorithms, Allocation of Frames, Thrashing, Page Size and other considerations, Demand Segmentation. [8]

UNIT-V

File Management: File Systems, Secondary Storage Structure, File concept, Access methods, Directory implementation, Efficiency and performance, Recovery.

Disk Management: Disk Structure, Disk scheduling, Disk management, Recovery, Swap-Space Management, Disk Reliability.

Windows NT-Design Principles, System Components, Environmental subsystems, File system, Networking and Program interface.

Introduction to Android Operating System. [8]

REFERENCES:

1. Abraham Siberschatz and Peter Galvin “Operating System Concepts”, Wiley.
2. Milan Milankovic, “Operating Systems, Concept and Design”, McGraw Hill.
3. Harvey M Deital, “Operating System”, Addison Wesley.
4. Tannenbaum, “Operating System”, TMH.

CA214 JAVA PROGRAMMING

w.e.f. Session 2016-17

L	T	P
3	1	0

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:

1. E. Balagurusamy, **"**Programming in Java**",** TMH Publications.
2. Peter Norton, **"**Peter Norton Guide to Java Programming**",** Techmedia Publications.
3. Naughton, Schildt, "The Complete Reference JAVA 2", TMH.
4. Dustin R. Callway, "Inside Servlets", Addison Wesley.

CA215 MICROPROCESSOR LAB

w.e.f. Session 2016-17

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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/octal numbers.
   (vii) Division of two hexadecimal/octal numbers.
3. Rotation control of stepper motor using interface card.

CA216 JAVA PROGRAMMING LAB

w.e.f. Session 2016-17

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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.
9. Working with Panel and Layout.
10. Incorporating Graphics.
11. Working with Colors and Fonts.

CA217 SEMINAR

w.e.f. Session 2016-17

L	T	P
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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.