Bachelor of Computer Application			
Programme/Class:		**Year:**2 nd	**Semester:**3 rd
Subject Code: BCA-201 N	**Subject Title:** Object oriented programming using JAVA		
Course out comes:	On completion of the course, the student will be able to:		
CO 1:	Use the syntax and semantics of java programming language and basic concepts of OOP.		
CO 2:	Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.		
CO 3:	Apply the concepts of Multi-threading and Exception handling to develop efficient and error free codes.		
Credits:4		**Core Compulsory**	
Max. Marks: 30 + 70		**Min. Passing Marks: 40**	
Tot al No. of Lectures-Tutorials-Practical(in hours per week): 4-0-0			

Unit	Topic	No. of Lectures
I	Java introduction: History-Java and the Internet-Java Applets and ApplicationsFeatures of Java, Basic of OOP ,How Java differs from C and C++ , Java Program Structure, Simple Java Program, Java Tokens, Java Statements, Java Virtual Machine, Command Line Arguments, Constants, Variables, and Data Types, Type Casting, Operators and Expressions, Decision Making and Branching	10
II	Type Casting, Operators and Expressions, Decision Making and Branching. Classes, Objects and Methods, Constructors, Static Members, Nesting of Methods, Inheritance: Extending a. Class, Overriding Methods, final Variables and Methods, Final Classes, Finalize Methods, Abstract Methods and Classes	10
III	Interfaces: Introduction, Defining Interfaces, Extending Interfaces, implementing Interfaces, Accessing Interface Variables. Packages: Introduction, Java API Packages, Using system Packages, Naming Conventions, Creating Packages, Accessing a Packages, Using a Package, Adding a Class to a Package, Hiding Classes. Arrays, String and Vectors, String Handling, Wrapper Classes	10
IV	Managing Errors and Exceptions: Introduction, Types of Errors, Exceptions, Syntax of Exception Handling Code, Multiple Catch Statements, Using finally Statement, Throwing Our Own Exceptions, Using Exceptions for Debugging. Multithreaded Programming: Introduction, Creating Threads, Extending the Thread Class, Stopping and Blocking a Thread, Life Cycle of a Thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization.	10
V	Managing Input/Output Files in Java: Introduction, Concepts of Streams Stream Classes, Byte Stream Classes, Character Stream Classes, Using Streams, Other Useful I/O Classes, using the File Class, Input/Output Exceptions, and Creation of Files.	10

Suggested Readings:

- Balagurusamy, Programming with Java, A Primer 2nd Edition, Tata McGraw Hill, New Delhi
- Herbert Schildt, The Complete Reference- Java, 7th Edition, Tata McGraw- Hill Publishing Co. Limited, New Delhi.

Suggested equivalent online courses:

https://nptel.ac.in/courses/106105191

This course can be opted as an elective by the students of following subjects: NONE

Suggested Continuous Evaluation Methods:

Continuous Internal Evaluations hall be based on allotted Assignment and Class Tests. The marks shall

Internal Assessment	Marks
Class Interaction	5
Quiz/Assignments	5
Seminar/Presentation	5
Unit Test/Class Test	15
Total	30

Bachelor of Computer Application			
Programme/Class:		**Year:**2 nd	**Semester:**3 rd
Subject Code: BCA-203 N	**Subject Title:** Numerical Analysis and Statistical Techniques		
Course out comes:	On completion of the course, the student will be able to:		
CO 1:	Analyze statistical data graphically using frequency distributions and cumulative frequency distributions		
CO 2:	Analyze statistical data using measures of central tendency, dispersion and location		
CO 3:	Employee the principles of linear regression and correlation, including least square method, predicting a particular value of Y for a given value of X and significance of the correlation coefficient.		
CO4:	Use different probability distributions to solve simple practical problems.		
Credits:4		**Core Compulsory**	
Max. Marks: 30 + 70		**Min. Passing Marks: 40**	

Tot al No. of Lectures-Tutorials-Practical(in hours per week): 4-0-0

Unit	Topic	No. of Lectures
I	Mathematical Modeling and Engineering Problem Solving: A Simple Mathematical Model, Conservation Laws and Engineering Problems Approximations and Round-Off Errors: Significant Figures, Accuracy and Precision, Error Definitions, Round-Off Errors Truncation Errors and the Taylor Series: The Taylor Series, Error Propagation, Total Numerical Errors, Formulation Errors and Data Uncertainty	10

II	Solutions of Algebraic and Transcendental Equations: The Bisection Method, The Newton-Raphson Method, The Regula-falsi method, The Secant Method. Interpolation: Forward Difference, Backward Difference, Newton's Forward Difference Interpolation, Newton's Backward Difference Interpolation, Lagrange's Interpolation.	10
III	Solution of simultaneous algebraic equations (linear) using iterative methods: Gauss-Jordan Method, Gauss-Seidel Method. Numerical differentiation and Integration: Numerical differentiation, Numerical integration using Trapezoidal Rule, Simpson's 1/3rd and 3/10th rules. Numerical solution of 1st and 2nd order differential equations: Taylor series, Euler's Method, Modified Euler's Method, Runge-Kutta Method for 1st and 2nd Order Differential Equations.	10
IV	Least-Squares Regression: Linear Regression, Polynomial Regression, Multiple Linear Regression, General Linear Least Squares, Nonlinear Regression Linear Programming: Linear optimization problem, Formulation and Graphical solution, Basic solution and Feasible solution.	10
V	Random variables: Discrete and Continuous random variables, Probability density function, Probability distribution of random variables, Expected value,	10
	Variance. Distributions: Discrete distributions: Uniform, Binomial, Poisson, Bernoulli, Continuous distributions: uniform distributions, exponential, Normal distribution state all the properties and its applications.	

Suggested Readings:

- Introductory Methods of Numerical Methods, S. S. Shastri
- Fundamentals of Mathematical Statistics, S. C. Gupta, V. K. Kapoor

Suggested equivalent online courses:

https://nptel.ac.in/courses/106103068

This course can be opted as an elective by the students of following subjects: NONE

Suggested Continuous Evaluation Methods:

Continuous Internal evaluations hall be based on allotted Assignment and Class Tests. The marks shall

	Internal Assessment	**Marks**	
	Class Interaction	5	
	Quiz/Assignments	5	
	Seminar/Presentation	5	
	Unit Test/Class Test	15	
	Total	30	

Bachelor of Computer Application			
Programme/Class:		**Year:** 2nd	**Semester:** 3rd
Subject Code: BCA-205 N	**Subject Title:** Operating System		
Course out comes:	On completion of the course, the student will be able to:		
CO 1:	Understand fundamental operating system abstractions such as processes, threads, files, semaphores, IPC abstractions, shared memory regions, etc.,		
CO 2:	Analyze important algorithms e.g. Process scheduling and memory management algorithms		

CO 3:	Categorize the operating system's resource management techniques, dead lock management techniques, memory management techniques

Credits:4	**Core Compulsory**
Max. Marks: 30 + 70	**Min. Passing Marks: 40**

Tot al No. of Lectures-Tutorials-Practical(in hours per week): 4-0-0

Unit	Topic	No. of Lectures
I	Introduction: Definition, Design Goals, Evolution; Batch processing, Multiprogramming, Timesharing; Structure and Functions of Operating System.	10
II	Process Management: Process states, State Transitions, Process Control Structure, Context Switching, Process Scheduling, Threads.	10
III	Memory Management: Address Binding, Dynamic Loading and Linking Concepts, Logical and Physical Addresses, Contiguous Allocation, Fragmentation, Paging, Segmentation, Combined Systems, Virtual Memory, Demand Paging, Page fault, Page replacement algorithms, Global Vs Local Allocation, Thrashing, Working Set Model, Paging.	10
IV	Concurrent Processes: Process Interaction, Shared Data and Critical Section, Mutual Exclusion, Busy form of waiting, Lock and unlock primitives, Synchronization, Classical Problems of Synchronization, Semaphores, Monitors, Conditional Critical Regions, System Deadlock, Wait for Graph, Deadlock Handling Techniques: Prevention, Avoidance, Detection and Recovery	10
V	File and Secondary Storage Management: File Attributes, File Types, File Access Methods, Directory Structure, Allocation Methods, Free Space management; Disk Structure, Logical and Physical View, Disk Head Scheduling.	10

Suggested Readings:

● A. Silberschatz, P. B. Galvin, G. Gagne, Operating System Concepts, Addison Wesley ● W. Stalling, Operating Systems, Internals and Design Principles, PHI. ● A. S. Tanenbaum, Modern operating Systems

Suggested equivalent online courses:

https://nptel.ac.in/courses/106102132

This course can be opted as an elective by the students of following subjects: NONE

Suggested Continuous Evaluation Methods:

Continuous Internal Evaluations hall be based on allotted Assignment and Class Tests. The marks shall

	Internal Assessment	Marks	
	Class Interaction	5	
	Quiz/Assignments	5	
	Seminar/Presentation	5	
	Unit Test/Class Test	15	
	Total	30	

Bachelor of Computer Application			
Programme/Class:		**Year:**2nd	**Semester:**3rd
Subject Code: BCA-207 N	**Subject Title:** Computer Organization and Architecture		
Course out comes:	On completion of the course, the student will be able to:		
CO 1:	Remember and Understand the basics of computer architecture, organization and Design.		
CO 2:	Understand the operations of CPU, I/O and Memory		
CO 3:	Understand the concept of parallel processing and pipelining		
Credits:4		**Core Compulsory**	
Max. Marks: 30 + 70		**Min. Passing Marks: 40**	

Tot al No. of Lectures-Tutorials-Practical(in hours per week): 4-0-0

Unit	Topic	No. of Lectures
I	Basic Organization: Stored Program Concept, Components of a Computer System, Machine Instruction, Opcodes and Operands, Instruction Cycle, Organization of Central Processing Unit: ALU, Hardwired & Micro programmed Control Unit, General Purpose and Special Purpose Registers.	10
II	Functioning of CPU: Instruction Formats, Op Codes, Instruction Types, Addressing Modes, Common Microprocessor Instructions, Multi-core	10
	Architecture, Multiprocessor and Multicomputer.	
III	Memory Organization: Memory Hierarchy, Cache Memory, Main Memory (DRAM and ROM),Secondary Memory, Virtual Memory, Auxiliary memory, Associative memory, Characteristics of different types of Memory.	10
IV	I/O Organization: Peripheral devices, I/O interface, Modes of Transfer, Priority Interrupt, Direct Memory Access, Input-Output Processor, and Serial Communication. I/O Controllers, Asynchronous data transfer, Strobe Control, Handshaking.	10
V	Parallel processing, Amdahl's law, Pipelining, Flynn's classification, spacetime diagram, speedup ratio, Arithmetic pipeline, Instruction pipeline	10

Suggested Readings:

- Morris Mano, Computer System Architecture, 3rd Edition, Prentice-Hall of India Private Limited.
- William Stallings, Computer Organization and Architecture, 4th Edition, Prentice Hall of India Private Limited.

Suggested equivalent online courses:

https://nptel.ac.in/courses/106103068

This course can be opted as an elective by the students of following subjects: NONE

Suggested Continuous Evaluation Methods:

Continuous Internal Evaluations hall be based on allotted Assignment and Class Tests. The marks shall

	Internal Assessment	Marks	
	Class Interaction	5	
	Quiz/Assignments	5	

	Seminar/Presentation	5	
	Unit Test/Class Test	15	
	Total	30	