

Sandip University

Neelam Vidya Vihar, Vill.: Sijoul. P.O. : Mailam, Dist.:Madhubani, Bihar -847235

Website : <http://www.sandipuniversity.edu.in>

Toll-Free No.- 1800-313-2714 Ph: 7549991044.

School: Computer Science & Application	Programme: BCA (Bachelor of Computer Application)
Year: Second Year	Semester -IV
Course: Java Programming	Course Code: BCA401
Theory: 3 Hours/Week	Max. University Theory Examination: 60 Marks
Tutorial : 1Hr/Week	Continuous Internal Assessment: 40 Marks
Max. Time for Theory Exam.: 2:30 Hrs	Credit: 4

Objectives :

1	To understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
2	To understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
3	To have the ability to write a computer program to solve specified problems.
4	To be able to use the Java SDK environment to create, debug and run simple Java programs.

Unit Number	Details	Hours
1	Introduction to Java: Features of Java, JDK Environment Object Oriented Programming Concept: Overview of Programming, Paradigm, Classes, Abstraction, Encapsulation, Inheritance, Polymorphism, Difference between C++ and JAVA	10
2	Java Programming Fundamental: Structure of JAVA program, Data types, Variables, Operators, Keywords, Naming Convention, Decision Making (if, switch), Looping (for, while), Type Casting	9
3	Classes and Objects: Creating Classes and objects, Memory allocation for objects, Constructor, Implementation of Inheritance, Implementation of Polymorphism, Method Overloading, Method Overriding, Nested and Inner classes	10
4	Arrays and Strings: Arrays, Creating an array, Types of Arrays, String class Methods, String Buffer methods. Abstract Class, Interface and Packages: Modifiers and Access Control, Ab-	9

	stract classes and methods, Interfaces, Packages Concept, Creating user defined packages Musée des Beaux Arts – W. H. Auden	
5	Exception Handling: Exception types, Using try catch and multiple catch, Nested try, throw throws and finally, Creating User defined Exceptions. Applet Programming: Introduction, Types Applet, Applet Life cycle, Creating Applet, Applet tag.	7
Total (Hrs)		45

Course Outcome

Student Should able to :

CO1	Explain the fundamental concepts and features of Java Programming language.
CO2	Implement the basic principles of Object Oriented Programming which includes inheritance, polymorphism, encapsulation and abstraction.
CO3	Create arrays, and perform different operations on it.
CO4	Develop applications by using Java Programming

Resources

Recommended Books	1. E Balagurusamy , Programming with JAVA, TMH, 2007 2. Herbert Schildt , “Java-The Complete Reference”, 8th Edition, 2009.
Reference Books	1. Java Programming (For absolute beginners) Russell PHI 2. Cay Horstmann, “Core Java”, Wiley Publication , 3rd Edition., 2009

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School: Computer Science & Application	Programme: BCA (Bachelor of Computer Application)
Year: Second Year	Semester –IV
Course: Mobile Application	Course Code:BCA402
Theory : 3 Hrs/Week	Max. University Theory Examination: 60 Marks
	Continuous Internal Assessment: 30 Marks Tutorials: 10 Marks
Max. Time for Theory Exam.: 2:30 Hrs	Credit: 4

Objectives :

1	To study the specifications and functionalities of various protocols/standards of mobile networks
2	To study the specifications of ad hoc network

Unit Number	Details	Hours
1	Introduction to Personal Communications Services (PCS): PCS Architecture, Mobility management, Networks signalling. Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signalling.	10
2	General Packet Radio Services (GPRS): GPRS Architecture, GPRS NetworkNodes. Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP.	9
3	Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML). Wireless Local Loop(WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.	8
4	Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G.	8

5	Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBALTAR systems. Wireless Enterprise Networks: Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols.	10
Total (Hrs)		45

Course Outcome

Student Should able to :

CO1	Understand the basic concepts function on multidisciplinary teams
CO2	a recognition of the need for, and an ability to engage in life-long learning
CO3	an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Resources

Recommended Books	<ol style="list-style-type: none"> 1. Jochen Schiller, "Mobile Communications", Pearson Education, Second Edition 2002. 2. C.K. Toh, "Ad Hoc Mobile Wireless Networks: Protocols and Systems", Pearson Education, 2002. 3. William Stallings, "Wireless Communications and Networks", Pearson Education 2002.
Reference Books	<ol style="list-style-type: none"> 1. "Pervasive Computing", Burkhardt, Pearson 2. "Mobile Communication", J. Schiller, Pearson 3. "Wireless and Mobile Networks Architectures", Yi-Bing Lin & Imrich Chlamtac, John Wiley & Sons, 2001 4. "Mobile and Personal Communication systems and services", Raj Pandya, Prentice Hall of India, 2001.

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School: Computer Science & Application	Programme: BCA (Bachelor of Computer Application)
Year: Second Year	Semester –IV
Course: Software Engineering	Course Code: BCA403
Theory : 3 Hrs/Week	Max. University Theory Examination: 60 Marks
Tutorial : 1Hr/Week	Continuous Internal Assessment: 40 Marks
Max. Time for Theory Exam.: 2:30 Hrs	Credit: 4

Objectives :

1	To understand user conceptual models and development of better specification.
2	To understand the principles of designing a software.
3	To learn the different software life cycle models.
4	Understanding of the role of project management including planning, scheduling etc.
5	Understanding different software testing techniques.

Unit Number	Details	Hours
1	Software Process: Introduction ,S/W Engineering Paradigm , life cycle models (water fall, incremental, spiral, evolutionary, prototyping, object oriented) ,System engineering, computer based system, verification, validation, life cycle process, agile life cycle model, development process, system engineering hierarchy.	12
2	Software requirements: Functional and non-functional , user, system, requirement engineering process, feasibility studies, requirements, elicitation, validation and management, software prototyping, prototyping in the software process, rapid prototyping techniques, user interface prototyping, S/W document. Analysis and modeling, data, functional and behavioral models, structured analysis and data dictionary.	13
3	Design Concepts and Principles: Design process and concepts, modular design, design heuristic, design model and document, Architectural design, software architecture, data design, architectural design, transform and transaction mapping, user interface design, user interface design principles. Real time systems, Real time software design, system design, real time executives, data acquisition system, monitoring and control system.	13

4	<p>Software Configuration Management: The SCM process, Version control, Change control, Configuration audit, SCM standards.</p> <p>Software Project Management: Measures and measurements, S/W complexity and science measure, size measure, data and logic structure measure, information flow measure. Estimations for Software Projects, Empirical Estimation Models, Project Scheduling.</p>	12
5	<p>Testing: Taxonomy of software testing, levels, test activities, types of s/w test, black box testing testing boundary conditions, structural test-ing, test coverage criteria based on data flow, mechanisms, regression testing, testing in the large. S/W testing strategies, strategic approach and issues, unit testing, integration testing, validation testing, system testing and debugging.</p> <p>Trends in Software Engineering: Reverse Engineering and Re-engineering – wrappers – Case Study of CASE tools.</p>	10
Total (Hrs)		60

Course Outcome	
Student Should able to :	
CO1	Will be able to learn about software process and requirement.
CO2	Will be able to learn about various software process and principles.
CO3	Apply the methods to design the software and to do its maintenance.
CO4	To learn about software configuration and project management.
CO5	Will be able to make possible about software testing and the latest trends in software engineering.

Resources	
Recommended 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”, John Wiley & Sons.

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School: Computer Science & Application	Programme: BCA (Bachelor of Computer Application)
Year: Second Year	Semester -IV
Course: Data Communication and Networking	Course Code: BCA404
Theory : 3 Hrs/Week	Max. University Theory Examination: 60 Marks
	Continuous Internal Assessment: 40 Marks
Max. Time for Theory Exam.: 2:30 Hrs	Credit: 4

Objectives :

1	To Understand data communication and its fundamentals
2	To learn Physical Layer and its functions
3	To understand data Link Layer and its techniques
4	To learn about Network Layer and Transport Layer
5	To get acquainted with Application Layer and Network Security

Unit Number	Details	Hours
1	Basic concepts : Components of data communication, standards and organizations, Network Classification, Network Topologies ; network protocol; layered network architecture; overview of OSI reference model; overview of TCP/IP protocol suite.	11
2	Physical Layer: Cabling, Network Interface Card, Transmission Media Devices-Repeater, Hub, Bridge, Switch, Router, Gateway.	8
3	Data Link Layer : Framing techniques; Error Control; Flow Control Protocols; Shared media protocols -CSMA/CD and CSMA/CA.	7
4	Network Layer : Virtual Circuits and Datagram approach, IP addressing methods – Subnetting; Routing Algorithms (adaptive and non-adaptive) Transport Layer: Transport services, Transport Layer protocol of TCP and UDP	10
5	Application Layer : Application layer protocols and services – Domain name system, HTTP, WWW, telnet, FTP, SMTP Network Security : Common Terms, Firewalls, Virtual Private Networks	9
Total (Hrs)		45

Course Outcome	
Student Should able to :	
CO1	Describe various standard network models
CO2	Understand various guided transmission media
CO3	Implement and analyze routing and congestion issues in network design
CO4	Analyze various layers of OSI Models

Resources	
Recommended Books	<ol style="list-style-type: none"> 1. Behrouz and Forouzan-Introduction to Data Communication and Networking - 2ndEdition -TMH-2001 2. William stallings, “Data and computer communications”, Pearson education Asia, 7 Ed., 2002.
Reference Books	<ol style="list-style-type: none"> 1. A.S.Tanenbaum, “Computer Networks”; Pearson Education Asia, 4 Ed. 2003. 2. D.E. Comer, Internetworking with TCP/IP, Vol. I, Prentice Hall of India, 1998.

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School: Computer Science & Application	Programme: BCA (Bachelor of Computer Application)
Year: Second Year	Semester –IV
Course: Design & Analysis of Algorithm	Course Code: BCA405
Theory : 3 Hrs/Week	Max. University Theory Examination: 60 Marks
	Continuous Internal Assessment: 40 Marks
Max. Time for Theory Exam.: 2:30 Hrs	Credit: 4

Objectives :

1	Explain various computational problem solving techniques.
2	Apply appropriate method to solve a given problem.
3	Describe various methods of algorithm analysis.

Unit Number	Details	Hours
1	Introduction: What is an Algorithm? Algorithm Specification, Analysis Framework, and Performance Analysis: Space complexity, Time complexity. Asymptotic Notations: Big-Oh notation (O), Omega notation (Ω), Theta notation (Θ), and Little-oh notation (o), Mathematical analysis of Non-Recursive and recursive Algorithms with Examples. Important Problem Types: Sorting, Searching, String processing, Graph Problems, Combinatorial Problems. Fundamental Data Structures: Stacks, Queues, Graphs, Trees, Sets and Dictionaries.	10
2	Divide and Conquer: General method, Binary search, Recurrence equation for divide and conquer, Finding the maximum and minimum, Merge sort, Quick sort , Strassen’s matrix multiplication , Advantages and Disadvantages of divide and conquer. Decrease and Conquer Approach: Topological Sort.	10
3	Greedy Method: General method, Coin Change Problem, Knapsack Problem, Job sequencing with deadlines . Minimum cost spanning trees: Prim’s Algorithm, Kruskal’s Algorithm. Single source shortest paths: Dijkstra's Algorithm. Optimal Tree problem: Huffman Trees and Codes. Transform and Conquer Approach: Heaps and Heap Sort	10
4	Dynamic Programming: General method with Examples, Multistage	

	Graphs. Transitive Closure: Warshall's Algorithm, All Pairs Shortest Paths: Floyd's Algorithm, Optimal Binary Search Trees, Knapsack problem, Bellman-Ford Algorithm, Travelling Sales Person problem, Reliability design	10
5	Backtracking: General method , N-Queens problem, Sum of subsets problem, Graph coloring, Hamiltonian cycles. Programme and Bound: Assignment Problem, Travelling Sales Person problem, 0/1 Knapsack problem: LC Programme and Bound solution, FIFO Programme and Bound solution . NP-Complete and NP-Hard problems: Basic concepts, non10 deterministic algorithms, P, NP, NP-Complete, and NP-Hard classes.	10
Total (Hrs)		60

Course Outcome

Student Should able to :

CO1	Describe computational solution to well known problems like searching, sorting etc.
CO2	Estimate the computational complexity of different algorithms.
CO3	Devise an algorithm using appropriate design strategies for problem solving.

Resources

Recommended Books	<ol style="list-style-type: none"> 1. Introduction to the Design and Analysis of Algorithms, Anany Levitin:, 2nd Edition, 2009. Pearson. 2. Computer Algorithms/C++, Ellis Horowitz, Satraj Sahni and Rajasekaran, 2nd Edition, 2014, Universities Press
Reference Books	<ol style="list-style-type: none"> 1. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein, 3rd Edition, PHI. 2. Design and Analysis of Algorithms, S. Sridhar, Oxford (Higher Education).

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School: Computer Science & Application	Programme: BCA (Bachelor of Computer Application)
Year: First Year	Semester -IV
Course: Java Programming Lab	Course Code: BCA41L
Practical : 3 Hrs/Week	Max. University Practical Examination: 25 Marks
	Lab Continuous Internal Assessment: 25 Marks
Max. Time for Exam.: 3 Hrs	Credit: 1

Objectives:

1	To write programs based upon java concepts.
2	To create animation & events based upon advanced java concepts.
3	To develop programs using java collection API as well as java Standard Library.
4	To write, debug & document well structured java application

Sr. No.	Description
	Group A: C++ Assignments (Any SIX Assignments)
1	WAP to find the largest of n natural numbers.
2	WAP to find whether a given number is prime or not.
3	Write a menu driven program for following: a. Display a Fibonacci series b. Compute Factorial of a number c. WAP to check whether a given number is odd or even. d. WAP to check whether a given string is palindrome or not.
4	WAP to print the sum and product of digits of an Integer and reverse the Integer.
5	Write a program to create an array of 10 integers. Accept values from the user in that array. Input another number from the user and find out how many numbers are equal to the number passed, how many are greater and how many are less than the number passed.
6	Write a program that will prompt the user for a list of 5 prices. Compute the average of the prices and find out all the prices that are higher than the calculated average.
7	Write a program in java to input N numbers in an array and print out the Armstrong numbers from the set.
8	Write java program for the following matrix operations: a. Addition of two matrices b. Summation of two matrices c. Transpose of a matrix

	d. Input the elements of matrices from user. and Rectangle.
9	Write a java program that computes the area of a circle, rectangle and a Cylinder using function overloading.
	Group B: (Any Three Assignments)
10	Write a Java for the implementation of Multiple inheritance using interfaces to calculate the area of a rectangle and triangle.
11	Write a java program to create a frame window in an Applet. Display your name, address and qualification in the frame window.
12	Write a java program to draw a line between two coordinates in a window.
13	Write a java program to display the following graphics in an applet window. a. Rectangles b. Circles c. Ellipses d. Arcs e. Polygons
	Group C: (Any One Assignments)
14	Write a program that reads two integer numbers for the variables a and b. If any other character except number (0-9) is entered then the error is caught by NumberFormatException object. After that ex.getMessage() prints the information about the error occurring causes.
15	Write a program for the following string operations: a. Compare two strings b. Concatenate two strings c. Compute length of a string
16	Create a class called Fraction that can be used to represent the ratio of two integers. Include appropriate constructors and methods. If the denominator becomes zero, throw and handle an exception.

Term Work

Term Work assessment shall be conducted for the Project, Tutorials and Seminar. Term work is continuous assessment based on work done, submission of work in the form of report/journal, timely completion, attendance, and understanding. It should be assessed by subject teacher of the institute. At the end of the semester, the final grade for a Term Work shall be assigned based on the performance of the student and is to be submitted to the University.

Notes:

1	The experiments from the regular practical syllabus will be performed (15 Marks).
2	The regular attendance of students during the syllabus practical course will be monitored and marks will be given accordingly (5 Marks).
3	Good Laboratory Practices (5 Marks)

Practical/Oral/Presentation:

Practical shall be conducted and assessed jointly by internal and external examiners. The performance in the Practical examination shall be assessed by at least a pair of examiners appointed as examiners by the University. The examiners will prepare the mark/grade sheet in the format as specified by the University, authenticate and seal it. Sealed envelope shall be submitted to the head of the department or authorized person.

Notes:

1	One experiment from the regular practical syllabus will be conducted. (Total 15 Marks).
2	Complete laboratory journal (05 Marks).
3	Viva-voce (05 Marks).

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School: Computer Science & Application	Programme: BCA (Bachelor of Computer Application)
Year: Second Year	Semester -IV
Course: Computer Network Lab	Course Code: BCA 42L
Practical : 3 Hrs/Week	Max. University Practical Examination: 25 Marks
	Lab Continuous Internal Assessment: 25 Marks
Max. Time for Exam.: 3 Hrs	Credit: 1

Description (If any):

For the experiments below modify the topology and parameters set for the experiment and take Multiple rounds of reading and analyze the results available in log files. Plot necessary graphs And conclude. Use NS2/NS3.

PART A:

1.	Implement three nodes point – to – point network with duplex links between them. Set the queue size, vary the bandwidth and find the number of packets dropped.
2.	Implement transmission of ping messages/trace route over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion.
3.	Implement an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination.
4.	Implement simple ESS and with transmitting nodes in wire-less LAN by simulation and determine the performance with respect to transmission of packets.
5.	Implement and study the performance of GSM on NS2/NS3 (Using MAC layer) or equivalent environment.
6.	Implement and study the performance of CDMA on NS2/NS3 (Using stack called Callnet) or equivalent environment.

PART B:

Implement the following in Java:

7.	Write a program for error detecting code using CRC-CCITT (16- bits).
8.	Write a program to find the shortest path between vertices using bellman-ford algorithm.
9.	Using TCP/IP sockets, write a client – server program to make the client send the file name and to make the server send back the contents of the requested file if present.
10.	Write a program on datagram socket for client/server to display the messages on client side, typed at the server side.
11.	Write a program for simple RSA algorithm to encrypt and decrypt the data.
12.	Write a program for congestion control using leaky bucket algorithm.

Term Work :

assessment shall be conducted for the Project, Tutorials and Seminar. Term work is continuous assessment based on work done, submission of work in the form of report/journal, timely completion, attendance, and understanding. It should be assessed by subject teacher of the institute. At the end of the semester, the final grade for a Term Work shall be assigned based on the performance of the student and is to be submitted to the University.

Notes

1	The experiments from the regular practical syllabus will be performed (15 Marks).
2	The regular attendance of students during the syllabus practical course will be monitored and marks will be given accordingly (5 Marks).
3	Good Laboratory Practices (5 Marks)

Practical/Oral/Presentation:

Practical shall be conducted and assessed jointly by internal and external examiners. The performance in the Practical examination shall be assessed by at least a pair of examiners appointed as examiners by the University. The examiners will prepare the mark/grade sheet in the format as specified by the University, authenticate and seal it. Sealed envelopes shall be submitted to the head of the department or authorized person.