Computer Science (Hons.)
SEMESTER-V

Theory Full Marks- 60 **Time: 3 Hours**

C-11.1 INTERNET TECHNOLOGY

UNIT-I
Java: Use of Objects, Array and ArrayList class

UNIT-II
JavaScript: Data types, operators, functions, control structures, events and event handling.

UNIT-III
JDBC: JDBC Fundamentals, Establishing Connectivity and working with connection interface, Working with statements, Creating and Executing SQL Statements, Working with Result Set Objects.

UNIT-IV
JSP: Introduction to Java Server Pages, HTTP and Servlet Basics, The Problem with Servlets, The Anatomy of a JSP Page, JSP Processing, JSP Application Design with MVC, Setting Up the JSP Environment, Implicit JSP Objects, Conditional Processing, Displaying Values, Using an expression to Set an Attribute, Declaring Variables and Methods, Error Handling and Debugging, Sharing Data Between JSP Pages, Requests, and Users, Database Access.

UNIT-V
Java Beans: Java Beans Fundamentals, JAR files, Introspection, Developing a simple Bean, Connecting to DB

Text Books:
1.Ivan Bayross, Web Enabled Commercial Application Development Using Html, DHTML, Javascript, Perl CGI , BPB Publications, 2009.
2. Cay Horstmann, BIG Java, Wiley Publication , 3rd Edition., 2009
3. Herbert Schildt , Java 7, The Complete Reference, , 8th Edition, 2009.
4. Jim Keogh ,The Complete Reference J2EE, TMH, , 2002.
5. O'Reilly , Java Server Pages, Hans Bergsten, Third Edition, 2003.

Mid Semester: 15 Marks, 1 Hour

Computer Science (Hons.)
SEMESTER-V

Theory Full Marks- 25 Time: 6 Hours

C-11.2 INTERNET TECHNOLOGY LAB

Create event driven program for following:

1. Print a table of numbers from 5 to 15 and their squares and cubes using alert.
2. Print the largest of three numbers.
3. Find the factorial of a number n.
4. Enter a list of positive numbers terminated by Zero. Find the sum and average of these numbers.
5. A person deposits Rs 1000 in a fixed account yielding 5% interest. Compute the amount in the account at the end of each year for n years.
6. Read n numbers. Count the number of negative numbers, positive numbers and zeros in the list.

Marks Distributions

1.	Experiments	2 X 8	=	16
2.	Records		=	04
3.	Viva- Voce		=	05
	Total		=	25

Computer Science (Hons.)
SEMESTER-V

Theory Full Marks- 60 **Time: 3 Hours**

C-12.1 THEORY OF COMPUTATION

UNIT-I
Alphabets, string, language, Basic Operations on language, Concatenation, KleeneStar

UNIT-II
Regular Expressions, Transition Graphs, Deterministics and non-deterministic finite automata, NFA to DFA Conversion, Regular languages and their relationship with finite automata, Pumping lemma and closure properties of regular languages.

UNIT-III
Context free grammars, parse trees, ambiguities in grammars and languages, Pushdown automata (Deterministic and Non-deterministic), Pumping Lemma, Properties of context free languages, normal forms.

UNIT-IV
RAM, Turing Machine as a model of computation, Universal Turing Machine, Language acceptability, decidability, halting problem, Recursively enumerable and recursive languages, unsolvability problems.

Recommended Books:

1. Daniel I.A.Cohen, Introduction to computer theory –John Wiley (1996 2nd Edition).

2. Lewis & Papadimitriou, Elements of the theory of computation –II Edition PHI 1997.

3. Hoperoft, Aho, Ullman, Introduction to Automata theory, Language & Computation –**3rd** Edition 2006, Pearson Education.

4. P. Linz, An Introduction to Formal Language and Automata 4th edition Publication Jones Bartlett 2006

Mid Semester: 15 Marks, 1 Hour

Computer Science (Hons.)
SEMESTER-V

Theory Full Marks- 25 Time: 6 Hours

C-12.2 THEORY OF COMPUTATION LAB

Marks Distributions

1. Experiments	2 X 8	=	16
2. Records		=	04
3. Viva- Voce		=	05
Total		=	25

Computer Science (Hons.)
SEMESTER-V

Theory Full Marks- 60 **Time: 3 Hours**

DSE-1.1 INFORMATION SECURITY

UNIT-I
Introduction: Security, Attacks, Computer Criminals, Security Services, Security Mechanisms. Cryptography: Substitution ciphers, Transpositions Cipher, Confusion, diffusion, Symmetric, Asymmetric Encryption. DES Modes of DES, Uses of Encryption, Hash function, key exchange, Digital Signatures, Digital Certificates.

UNIT-II
Program Security: Secure programs, Non malicious Program errors, Malicious codes virus, Trap doors, Salami attacks, Covert channels, Control against program

UNIT-III
Threats: Protection in OS: Memory and Address Protection, Access control, File Protection, User Authentication. Database Security: Requirements, Reliability, Integrity, Sensitive data, Inference, Multilevel Security.

UNIT-IV
Security in Networks: Threats in Networks, Security Controls, firewalls, Intrusion detection systems, Secure e-mails

UNIT-V
Administrating Security: Security Planning, Risk Analysis, Organisational Security Policy, Physical Security. Ethical issues in Security: Protecting Programs and data. Information and law.

Text Book:
1. C. P. Pfleeger, S. L. Pfleeger; Security in Computing, PHI, 2006
2. W. Stallings; Network Security Essentials: Applications and Standards, 4/E, 2010

Mid Semester: 15 Marks, 1 Hour

Computer Science (Hons.)
SEMESTER-V

Theory Full Marks- 25 Time: 6 Hours

DSE-1.2 INFORMATION SECURITY LAB

1. Demonstrate the use of Network tools: ping, ipconfig, ifconfig, tracert, arp, netstat, whois
2. Use of Password cracking tools : John the Ripper, Opherack. Verify the strength of passwords using these tools.
3. Perform encryption and decryption of Caesar cipher. Write a script for performing these operations.
4. Perform encryption and decryption of a Rail fence cipher. Write a script for performing these operations.
5. Use nmap/zenmap to analyse a remote machine.
6. Use Burp proxy to capture and modify the message.
7. Demonstrate sending of a protected word document.
8. Demonstrate sending of a digitally signed document.
9. Demonstrate sending of a protected worksheet.
10. Demonstrate use of steganography tools.
11. Demonstrate use of gpg utility for signing and encrypting purposes.

Marks Distributions

1.	Experiments	2 X 8	=	16
2.	Records		=	04
3.	Viva- Voce		=	05
	Total		=	25

Computer Science (Hons.)
SEMESTER-V

Theory Full Marks- 60 **Time: 3 Hours**

DSE-2.1 ANDROID PROGRAMMING

UNIT-I
Introduction: History of Android, Introduction to Android Operating Systems, Android Development Tools, Android Architecture. Overview of object oriented programming using Java: OOPs Concepts: Inheritance, Polymorphism, Interfaces, Abstract class, Threads, Overloading and Overriding, Java Virtual Machine.

UNIT-II
Development Tools: Installing and using Eclipse with ADT plug-in, Installing Virtual machine for Android sandwich/Jelly bean (Emulator), configuring the installed tools, creating a android project , – Hello Word, run on emulator, Deploy it on USB-connected Android device.

UNIT-III
User Interface Architecture: Application context, intents, Activity life cycle, multiple screen sizes.

UNIT-IV
User Interface Design: Form widgets, Text Fields, Layouts, Button control, toggle buttons, Spinners (Combo boxes), Images, Menu, Dialog.

UNIT-V
Database: Understanding of SQLite database, connecting with the database.

Text Book:
Android application Development for Java Programmers: James C. Sheusi. Cengage Learning, 2013.

Mid Semester: 15 Marks, 1 Hour

Computer Science (Hons.)
SEMESTER-V

Theory Full Marks- 25 Time: 6 Hours

DSE-2.2 ANDROID PROGRAMMING

Practical exercises based on concepts listed in theory.

Marks Distributions

1. Experiments	2 X 8	=	16
2. Records		=	04
3. Viva- Voce		=	05
Total		=	25

Computer Science (Hons.)
SEMESTER-VI

Theory Full Marks- 60 **Time: 3 Hours**

C-13.1 ARTIFICIAL INTELLIGENCE

UNIT-I
Intelligent Agents, Solving problems by searching, Uninformed search strategies(BFS, DFS, DLS, IDS, BD and Uniform cost search), Informed search and exploration (Greedy Best first, A* and its variations) Constraint satisfaction Problems, Adversarial search(Alpha-beta pruning)

UNIT-II
Knowledge and reasoning, logical agent (Wumpus world), Propositional logic, First order logic, Inference in first order logic(Forward chaining, backward chaining, Resolution) , Knowledge representation.

UNIT-III
Planning, Partial-Order planning, Planning Graphs, Planning and acting in the real world, Uncertain knowledge and reasoning.

UNIT-IV
Learning from Observations, Decision trees, Neural network (Multilayer), Reinforcement Learning.

UNIT-V
NLP, Communication, A formal grammar for a fragment of English, Syntactic analysis (chat parsing), semantic Interpretation, Ambiguity of grammar, Machine Translation.

Text Book: Stuart Russell and Peter Norvig, "ARTIFICIAL INTELLIGENCE A MODERN APPROACH" 2/e

Mid Semester: 15 Marks, 1 Hour

Computer Science (Hons.)
SEMESTER-VI

Theory Full Marks- 25 Time: 6 Hours

C-13.2 ARTIFICIAL INTELLIGENCE LAB

1. Write a prolog program to calculate the sum of two numbers.
2. Write a prolog program to find the maximum of two numbers.
3. Write a prolog program to calculate the factorial of a given number.
4. Write a prolog program to calculate the nth Fibonacci number.
5. Write a prolog program, insert_nth(item, n, into_list, result) that asserts that result is the list into_list with item inserted as the n'th element into every list at all levels.
6. Write a Prolog program to remove the Nth item from a list.
7. Write a Prolog program, remove-nth(Before, After) that asserts the After list is the Before list with the removal of every n'th item from every list at all levels.
8. Write a Prolog program to implement append for two lists.
9. Write a Prolog program to implement palindrome(List).
10. Write a Prolog program to implement max(X,Y,Max) so that Max is the greater of two numbers X and Y.
11. Write a Prolog program to implement maxlist(List,Max) so that Max is the greatest number in the list of numbers List.
12. Write a Prolog program to implement sumlist(List,Sum) so that Sum is the sum of a given list of numbers List.
13. Write a Prolog program to implement two predicates evenlength(List) and oddlength(List) so that they are true if their argument is a list of even or odd length respectively.
14. Write a Prolog program to implement reverse(List,ReversedList) that reverses lists.
15. Write a Prolog program to implement maxlist(List,Max) so that Max is the greatest number in the list of numbers List using cut predicate.
16. Write a Prolog program to implement GCD of two numbers.
17. Write a prolog program that implements Semantic Networks/Frame Structures.

Marks Distributions

1. Experiments	2 X 8	=	16
2. Records		=	04
3. Viva- Voce		=	05
Total		=	25

Computer Science (Hons.)
SEMESTER-VI

Theory Full Marks- 60 **Time: 3 Hours**

C-14.1 DESIGN AND ANALYSIS OF ALGORITHMS

UNIT-I
Analysis and Design of Algorithm (Case study insertion sort and merge sort)Asymptotic Analysis, Divide and Conquer, Recurence Relations, Strassens Matix Multiplication.

UNIT-II
Sorting: Quick sort, heap sort, Counting sort, lower bound for sorting, Randomized quicksort, Order Statistics.

UNIT-III
Amotized Analysis (Aggregate analysis, Accounting analysis, Potential analysis), 2-3-4 tree Advanced Data structure: Fibonacci heap, Redblack tree, hashing, data structure on disjoint set, Sciccinet Data Structure.

UNIT-IV
Dynamic Programming : Matrix Chain multiplication, LCS, TSP, Branch and Bound.
Greedy Algoithm: MST: Krushkal , Prims, Dijkstra Algorithm, Huffman Coding, Maxflow matching, Computational geometry: Convex Hall,0-1-knaplock, fractional knapsack, Back tracking (4-Queen Prob.)

UNIT-V
Complexity Class: P. PSPACE, NP, NP-Hard, NP Complete, Satisfiability, Cheque, Vertex Cover, Independent set, Exact cover, Graph Coloring, Hamiltonian, Cycle Matching. Approximation Algorithm: Vertex Cove, TSP, Indepentent Set, Sum of subset.

Text Book:
Introduction To Algorithm: Corman Leisenm, Rives & Stein

Mid Semester: 15 Marks, 1 Hour

Computer Science (Hons.)
SEMESTER-VI

Theory Full Marks- 25 Time: 6 Hours

C-14.2 DESIGN AND ANALYSIS OF ALGORITHMS LAB

1. i. Implement Insertion Sort (The program should report the number of comparisons)
ii. Implement Merge Sort(The program should report the number of comparisons)
2. Implement Heap Sort(The program should report the number of comparisons)
3. Implement Randomized Quick sort (The program should report the number of comparisons)
4. Implement Radix Sort
5. Create a Red-Black Tree and perform following operations on it:
i. Insert a node
ii. Delete a node
iii. Search for a number & also report the color of the node containing this number.
6. Write a program to determine the LCS of two given sequences
7. Implement Breadth-First Search in a graph
8. Implement Depth-First Search in a graph
9. Write a program to determine the minimum spanning tree of a graph

For the algorithms at S.No 1 to 3 test run the algorithm on 100 different inputs of sizes varying from 30 to 1000. Count the number of comparisons and draw the graph. Compare it with a graph of nlogn.

Marks Distributions

1.	Experiments	2 X 8	=	16
2.	Records		=	04
3.	Viva- Voce		=	05
	Total		=	25

Computer Science (Hons.)
SEMESTER-VI

Theory Full Marks- 60 **Time: 3 Hours**

DSE-3.1 CLOUD COMPUTING

UNIT-I

Overview of Computing Paradigm: Recent trends in Computing : Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing. Introduction to Cloud Computing: Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers, Benefits and limitations of Cloud Computing.

UNIT-II

Cloud Computing Architecture: Comparison with traditional computing architecture (client/server), Services provided at various levels, Service Models- Infrastructure as a Service(IaaS), Platform as a Service(PaaS), Software as a Service(SaaS), How Cloud Computing Works, Deployment , Models- Public cloud, Private cloud, Hybrid cloud, Community cloud, Case study of NIST architecture.

UNIT-III

Case Studies: Case Study of Service, Model using Google App Engine, Microsoft Azure, Amazon EC2, Eucalyptus.

UNIT-IV

Service Management in Cloud Computing, Service Level Agreements (SLAs), Billing & Accounting, Comparing Scaling Hardware: Traditional vs. Cloud, Economics of Scaling.

UNIT-V

Cloud Security: Infrastructure Security- Network level security, Host level security, Application level security, Data security and Storage- Data privacy and security Issues, Jurisdictional issues raised by Data location, Authentication in Cloud Computing.

Text Books

1. *Cloud Computing Bible,* Barrie Sosinsky, *Wiley-India,* 2010
2. *Cloud Computing: Principles and Paradigms,* Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, *Wile,* 2011
3. *Cloud Computing: Principles, Systems and Applications, Editors:* Nikos

Mid Semester: 15 Marks, 1 Hour

Computer Science (Hons.)
SEMESTER-VI

Theory Full Marks- 25 Time: 6 Hours

DSE-3.2 CLOUD COMPUTING LAB

1. Create virtual machines that access different programs on same platform.
2. Create virtual machines that access different programs on different platforms .
3. Working on tools used in cloud computing online-
a) Storage
b) Sharing of data
c) manage your calendar, to-do lists,
d) a document editing tool
4. Exploring Google cloud
5. Exploring microsoft cloud
6. Exploring amazon cloud

Marks Distributions

1. Experiments	2 X 8	=	16
2. Records		=	04
3. Viva- Voce		=	05
Total		=	25

Computer Science (Hons.)
SEMESTER-VI

Theory Full Marks- 75+25 Time: 6 Hours

DSE-4.1 PROJECT WORK

DSE-4.2 PROJECT SEMINAR CUM VIVA VOCE

24/6/2016
(Dr. P.S. Mishra)

24.06.16