M.D. UNIVERSITY, ROHTAK

(NAAC Accredited 'A+' Grade)

SCHEME OF STUDIES AND EXAMINATION
B.TECH (Computer Science & Information Technology)
SEMESTER 5th AND 6th
Scheme effective from 2020-21

COURSE CODE AND DEFINITIONS:

Course Code	Definitions
L	Lecture
T	Tutorial
P	Practical
BSC	Basic Science Courses
ESC	Engineering Science Courses
HSMC	Humanities and Social Sciences including Management courses
PCC	Professional Core Courses
LC	Laboratory Courses
MC	Mandatory Courses
PT	Practical Training
S	Seminar
TH	Theory
Pr	Practical

General Notes:

1. Mandatory courses are non credit courses in which students will be required passing marks in internal assessments.
2. Students will be allowed to use non programmable scientific calculator. However, sharing of calculator will not be permitted in the examination.
3. Students will be permitted to opt for any elective course run by the department. However, the department shall offer those electives for which they have expertise. The choice of the students for any elective shall not be binding for the department to offer, if the department does not have expertise. To run the elective course a minimum of 1/3rd students of the class should opt for it.

Scheme of Studies and Examination
B.TECH (Computer Science & Information Technology) – 5th Semester
w.e.f. 2020-21

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
				L	T	P			Internal Assessment	External Examination	Practical	Total	
1	Engineering Science Course	ESC-IT-301G	Signals and systems	3	0	0	3	3	25	75		100	3
2	Professional Core Course	PCC-CSE-303G	Computer Networks	3	0	0	3	3	25	75		100	3
3	Professional Core Course	PCC-IT-303G	Web Technology	3	0	0	3	3	25	75		100	3
4	Professional Core Course	PCC-CSE-307G	Design & Analysis of Algorithms	3	0	0	3	3	25	75		100	3
5	Professional Core Course	PCC-CSE-309G	Programming in Java	3	0	0	3	3	25	75		100	3
6	Professional Elective Course	Refer Annexure-I	Elective-I Common with CSE	3	0	0	3	3	25	75		100	3
7	Professional Core Course	LC-IT-317G	Web Technology Lab	0	0	2	2	1	25	-	25	50	3
8	Professional Core Course	LC-CSE-323G	Computer Networks Lab	0	0	3	3	1.5	25		25	50	3
9	Professional Core Course	LC-IT-319G	Design & Analysis of Algorithms Lab.	0	0	3	3	1.5	25		25	50	3
10	Professional Core Course	LC-CSE327G	Programming in Java Lab	0	0	3	3	1.5	25		25	50	3
11	Training	PT-CSIT329G	Practical Training – 1	-	-	-	-	-	-	-	* Refer Note 1		
			TOTAL					**23.5**				**800**	

Note:

1. The evaluation of Practical Training-I will be based on seminar, viva-voce, report submitted by the students. According to performance, the students are awarded grades A, B, C, F. A student who is awarded 'F' grade is required to repeat Practical Training.
2. Choose any one from Elective-1

Excellent: A; Good   : B; Satisfactory: C; Not Satisfactory: F.

Scheme of Studies and Examination
B.TECH (Computer Science & Information Technology) – 6th Semester
w.e.f. 2020-21

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
				L	T	P			Internal Assessment	External Examination	Practical	Total	
1	Professional Core Course	PCC-CSE-304G	Artificial Intelligence	3	0	0	3	3	25	75		100	3
2	Engineering Science Course	ESC-CSE-308G	Mobile and Wireless Communication	3	0	0	3	3	25	75		100	3
3	Professional Core Course	PCC-IT-304G	Cloud Computing	3	0	0	3	3	25	75		100	3
4	Professional Core Course	PCC-CSE-306G	Advanced Java Common with CSE	3	0	0	3	3	25	75		100	3
5	Professional Elective Course	Refer Annexure-I	Elective-II Common with CSE	3	0	0	3	3	25	75		100	3
6	Open Elective Course	Refer Annexure-II	Elective –III Common with IT	3	0	0	3	3	25	75		100	3
7	Project	PROJ-CSE-322G	Project-I	0	0	4	4	2	25		25	50	3
8	Professional Core Course	LC-CSE-326G	Artificial Intelligence Lab using python	0	0	3	3	1.5	25		25	50	3
9	Professional Core Course	LC-CSE-328G	Advanced Java Lab	0	0	3	2	1	25		25	50	3
10	Mandatory Courses	MC-317G	Constitution of India	2	0	0							
			TOTAL CREDIT					22.5	225	450	75	750	

Note:

1. Each student has to undergo practical training of 6 weeks during summer vacation after 6th semester and its evaluation shall be carried out in 7th Semester.
2. Choose any one from Elective-II
3. Choose any one from Elective-III

Annexure I

Elective –I (Professional Elective Course)

1. PEC-CSE-311G:Software Engineering
2. PEC-CSE-313G : System Programming and System Administration
3. PEC-CSE-315G :Digital Image Processing

Annexure II

Elective –II (Professional Elective Course)

1. PEC-CSE-310G:Advanced Database Management System
2. PEC-CSE-312G :Mobile Application Development
3. PEC-CSE-314G:Computer Graphics

Annexure III

Elective –III (Professional Elective Course)

1. PEC-IT-302G: Information Retrieval
2. PEC-IT-304G : Soft Computing
3. PEC-IT-306G : Internet of things

ESC-IT-301G   **SIGNALS AND SYSTEM**

B.TECH SEMESTER V   SESSIONAL: 25

L   T   P   THEORY EXAM: 75

3   0   0   TOTAL: 100

Course Objectives:

The aim of the course is for:
1.   Understanding the fundamental characteristics of signals and systems.
2.   Understanding the concepts of vector space, inner product space and orthogonal series.
3.   Understanding signals and systems in terms of both the time and transform domains, taking advantage of the complementary insights and tools that these different perspectives provide.
4.   Development of the mathematical skills to solve problems involving convolution, filtering, modulation and sampling.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Detailed contents:

UNIT-I

INTRODUCTION TO SIGNALS AND SYSTEMS:

Signals and systems as seen in everyday life, and in various branches of engineering and science. Signal properties: periodicity, absolute integrability, determinism and stochastic character. Some special signals of importance: the unit step, the unit impulse, the sinusoid, the complex exponential, some special time-limited signals; continuous and discrete time signals, continuous and discrete amplitude signals. System properties: linearity: additivity and homogeneity, shift-invariance, causality, stability, realizability. Examples.

UNIT-II

BEHAVIOR OF CONTINUOUS AND DISCRETE-TIME LTI SYSTEMS

Impulse response and step response, convolution, input-output behavior with aperiodic convergent inputs, cascade interconnections. Characterization of causality and stability of LTI systems. System representation through differential equations and difference equations. State-space Representation of systems. State-Space Analysis, Multi-input, multi-output representation. State Transition Matrix and its Role. Periodic inputs to an LTI system, the notion of a frequency response and its relation to the impulse respons

UNIT-III

FOURIER, LAPLACE AND Z- TRANSFORMS

Fourier series representation of periodic signals, Waveform Symmetries, Calculation of Fourier Coefficients. Fourier Transform, convolution/multiplication and their effect in the frequency domain, magnitude and phase response, Fourier domain duality. The DiscreteTime Fourier Transform (DTFT) and the Discrete Fourier Transform (DFT). Parseval's Theorem. Review of the Laplace Transform for continuous time signals and systems, system functions, poles and zeros of system functions and signals, Laplace domain analysis, solution to differential equations and system behavior. The z-Transform for discrete time signals and systems, system functions, poles and zeros of systems and sequences, z-domain analysis.

UNIT-IV

SAMPLING AND RECONSTRUCTION

The Sampling Theorem and its implications. Spectra of sampled signals. Reconstruction: ideal interpolator, zero-order hold, first-order hold. Aliasing and its effects. Relation between continuous and discrete time systems. Introduction to the applications of signal and system theory: modulation for communication, filtering, feedback control systems.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

a.   Understand the concepts of continuous time and discrete time systems.
b.   Analyse systems in complex frequency domain.
c.   Understand sampling theorem and its implications.

REFERENCES:

1.   A. V. Oppenheim, A. S. Willsky and S. H. Nawab, "*Signals and systems*", Prentice Hall India, latest edition
2.   J. G. Proakis and D. G. Manolakis, "*Digital Signal Processing: Principles, Algorithms, and Applications*", Pearson, latest edition.
3.   H. P. Hsu, "*Signals and systems*", Schaum's series, McGraw Hill Education, latest edition.
4.   S. Haykin and B. V. Veen, "*Signals and Systems*", John Wiley and Sons, latest edition.
5.   A. V. Oppenheim and R. W. Schafer, "Discrete-Time Signal Processing", Prentice Hall, latest edition.
6.   M. J. Robert "*Fundamentals of Signals and Systems*", McGraw Hill Education, latest edition.
7.   B. P. Lathi, "Linear Systems and Signals", Oxford University Press, latest edition.

Course code	PCC-CSE-303G	
Category	Professional Core Course	
Course title	Computer Networks	
Scheme and Credits	L T P Credits	
	3 0 0 3	
Class work	25 Marks	
Exam	75 Marks	
Total	100 Marks	
Duration of Exam	03 Hours	

Objectives of the course

a. To develop an understanding of modern network architectures from a design and Performance perspective.
b. To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs).
c. To provide an opportunity to do Network programming
d. To provide a WLAN measurement ideas.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit: 1
Introduction: Data communication,Components, Data Representation, Simplex, Half Duplex and Full Duplex Transmission, Modulation and Multiplexing, Computer networks, distributed processing, Internet, Topologies, Packet and circuit switching, connectionless and connection oriented services.

Network Models: OSI model and TCP/IP Model

Physical Layer – LAN: Ethernet, Token Bus, Token Ring, MAN Architecture- DQDB, WAN Architectures- Frame Relay, ATM, SONET/SDH

Unit: 2
Data Link Layer and Medium Access Sub Layer: MAC Addressing, Framing, Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window Protocol.

Medium Access Control: Random access, Controlled Access and channelization protocols.

Network Layer: Logical addressing, classful and classless addressing, subnetting, IPv4, ICMPv4, ARP, RARP and BOOTP, IPv6, IPv6 addressing, DHCP.

Unit: 3
Network Devices: Repeater, hub, switch, router and gateway.
Routing Algorithms: introduction to routing, Shortest Path Algorithm, Flooding, Hierarchical Routing, Link State and Distance Vector Routing

Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), TCP connection management,

Unit: 4

Congestion Control, Quality of Service, QoS Improving techniques.

Application Layer: Domain Name Space (DNS), EMAIL, File Transfer Protocol (FTP), HTTP, SNMP

Network Security: Firewalls, security goals, types of attack, symmetric and asymmetric key ciphers.

Suggested books:

1. Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGraw-Hill.
2. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice Hall India.

References:

1. Computer Networks, latest Edition, Andrew S. Tanenbaum, Pearson New International Edition.
2. Internetworking with TCP/IP, Volume 1, latest Edition Douglas Comer, Prentice Hall of India.
3. TCP/IP Illustrated, Volume 1, W. Richard Stevens, Addison-Wesley, United States of America.

Course Outcomes

1. Explain the functions of the different layer of the OSI Protocol.
2. Draw the functional block diagram of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) and describe the function of each.
3. Identify and connect various connecting components of a computer network.
4. Configure DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.

PCC-IT-303G   **WEB TECHNOLOGY**

B.TECH SEMESTER V   SESSIONAL: 25

L T P   THEORY EXAM: 75

3   0 0   TOTAL :   100

Pre-requisites: Computer Networks Course Objectives:

1.   To familiarize the students with the basic concepts of internet, its history, ways to connect to internet and basics of world wide web and search engines.
2.   To familiarize the student with the fundamental language of internet i.e. HTML
3.   To teach the student aware of the concepts of cascading style sheets
4.   To teach the student the students the basics of client side and Server side scripting

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Detailed contents:

UNIT-I

INTRODUCTION TO NETWORKS AND WWW
Introduction to internet, history, Working of Internet, Modes of Connecting to Internet, Internet Address, standard address, classful and classless ip addressing, subnetting, supernetting, w3c consortium, searching the www: Directories search engines and Meta search engines, search fundamentals, search strategies, Architecture of the search engines, Crawlers and its types, Delivering multimedia over web pages, VRML.

UNIT-II

HYPERTEXT MARKUP LANGUAGE
The anatomy of an HTML document: Marking up for structure and style: basic page markup, absolute and relative links, ordered and unordered lists, embedding images and controlling appearance, table creation and use, frames, nesting and targeting.

UNIT-III

STYLE SHEETS
Separating style from structure with style sheets, Internal style specifications within HTML, External linked style specification using CSS, page and site design considerations.

UNIT-IV

CLIENT SIDE PROGRAMMING

Introduction to Client side programming, Java Script syntax, the Document object model, Event handling, Output in JavaScript, Forms handling, cookies, Introduction to VBScript, Form Handling.

SERVER SIDE SCRIPTING

CGI, Server Environment, Servlets, Servlet Architecture, Java Server Pages, JSP Engines, Beans, Introduction to J2EE.

Course Outcomes:

At the end of the course/session the student would be

a.   Acquainted with the basics of internet &search engines.
b.   Have a hands on HTML
c.   Learned the need and basics of CSS
d.   Learned the concepts of client side and server side scripting.

REFERENCES

1.   *"Fundamentals of the Internet and the World Wide Web"*, **Raymond Greenlaw and Ellen Hepp, TMH , latest edition.**
2.   *"Internet & World Wide Programming"*, **Deitel,Deitel & Nieto, Pearson Education**
3.   *"Complete idiots guide to java script"*. **Aron Weiss, QUE.**
4.   *"Network firewalls"*, **Kironjeet syan - New Rider Pub.**

PCC-CSE-307G   DESIGN & ANALYSIS OF ALGORITHMS

B.TECH SEMESTER V   SESSIONAL: 25

L   T   P   THEORY EXAM: 75

3   0   0   TOTAL: 100

Pre-requisites: Data

structure and Algorithm

Course Objectives:

1. Analyze the asymptotic performance of algorithms.
2. Write rigorous correctness proofs for algorithms.
3. Demonstrate a familiarity with major algorithms and data structures.
4. Apply important algorithmic design paradigms and methods of analysis.
5. Synthesize efficient algorithms in common engineering design situations.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Detailed contents:

Unit-I

INTRODUCTION

Characteristics of algorithm, Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.

Unit-II

FUNDAMENTAL ALGORITHMIC STRATEGIES

Brute-Force, Greedy, Dynamic Programming, Branch and-Bound and backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving, Bin Packing, Knapsack, Job sequencing with deadline, Optimal Binary Search tree, N-Queen problem, Hamiltonian Cycle, TSP, Heuristics – characteristics and their application domains.

Unit-III

GRAPH AND TREE TRAVERSAL ALGORITHMS

Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.

Unit-IV

TRACTABLE AND INTRACTABLE PROBLEMS

Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard, Cook's theorem, Standard NP-complete problems and Reduction techniques.

ADVANCED TOPICS

Approximation algorithms, Randomized algorithms, Class of problems beyond NP – P SPACE

Course Outcomes:

1.   For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.
2.   Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms.
3.   Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation.
4.   Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. For a given problems of dynamic-programming and develop the dynamic programming algorithms, and analyze it to determine its computational complexity.
5.   For a given model engineering problem model it using graph and write the corresponding algorithm to solve the problems.
6.   Explain the ways to analyze randomized algorithms (expected running time, probability of error).
7.   Explain what an approximation algorithm is. Compute the approximation factor of an approximation algorithm (PTAS and FPTAS).

REFERENCES

1.   **Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, "*Introduction to Algorithms*", MIT Press/McGraw-Hill; 3rd edition, [ISBN: 978-0262533058], 2009.**

2.   **Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "*Fundamentals of Algorithms*",**

Universities Press; 2nd edition [ISBN: 978-8173716126], 2008.

3.   Jon Kleinberg and Éva Tardos, *"Algorithm Design"*, Pearson Publisher; 1st edition [ISBN: 978-0321295354], 2012.
Michael T Goodrich and Roberto Tamassia, *"Fundamentals of Algorithms"* Wiley Press; 1st edition [ISBN: 978-8126509867], 2006.

Course code	PCC-CSE-309G
Category	Professional Core Course
Course title	Programming in JAVA
Scheme and Credits	L T P Credits 3 0 3
Class work	25 Marks
Exam	75 Marks
Total	100 Marks
Duration of Exam	03 Hours

Objectives of the course
1. Programming in the Java programming language,
2. Knowledge of object-oriented paradigm in the Java programming language,
3. The use of Java in a variety of technologies and on different platforms.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit: 1

Introduction to Java: Evolution of Java, Object Oriented Programming Structure, Overview and characteristics of Java, Java program Compilation and Execution Process, Organization of the Java Virtual Machine, Client side Programming, Platform Independency & Portability, Security, Relation b/w JVM, JRE and JDK, Introduction to JAR format, Naming Conventions, Data types & Type casting, operators, Security Promises of the JVM, Security Architecture and Security Policy, security aspects, sandbox model;

Unit: 2

OOPS Implementation: Classes, Objects, attributes, methods, data encapsulation, reference variables, Constructors, Anonymous block, Method Overloading, Static Data members, Block & methods;

Memory Structure: Stack, Heap, Class & Method area;

Class loading & Execution flow: Static vs Dynamic Class loading, implicit vs explicit class loading, class loading operations;

Argument Passing Mechanism: Passing primitive arguments, passing objects, Wrapper Classes;

This keyword: Referencing instance members, Intra class constructor chaining, Method chaining;

Inheritance & code reusability: Extending classes for code reusability, Usage of super keyword, Method Overriding, Object class;

Inheritance & Runtime Polymorphism: Static & Dynamic binding, Inheritance and Is-A relation, Runtime Polymorphism and Generalization, Abstract classes & methods, Final Keyword;

Interfaces and Role based Inheritance: Feature & Role based Inheritance, Static & Dynamic classing Environment, classes & interfaces, interface applications in real scenarios;

Has-A relation: Aggregation & Composition, Nested classes, Inner classes, Anonymous Inner classes, String Buffer Class, tokenizer, applets, Life cycle of applet and Security concerns;

Unit: 3

Threads: Creating Threads, Thread Priority, Blocked States, Extending Thread Class, Runnable Interface, Starting Threads, Thread Synchronization, Synchronize Threads, Sync Code Block, Overriding Synced Methods, Thread Communication, wait, notify and notify all.

Swing & AWT:
Swing class hierarchy, containers, user interface components, graphics context, AWT Components, Component Class, Container Class, Layout Manager Interface Default Layouts, Insets and Dimensions, Border Layout, Flow Layout, Grid Layout, Card Layout Grid Bag Layout AWT Events, Event Models, Listeners, Class Listener, Adapters, Action Event Methods Focus Event Key Event, Mouse Events, Window Event

Package & Scopes: Need of Packages, Associating classes to Packages, Class path environment variable, Import Keyword and Feature of static import, Public, protected, private & default scope, Private Inheritance;

Exception Handling: exception and error, Exception Handling & Robustness, Common Exceptions and Errors, Try and catch block, Exception handlers, Throw keyword, Checked and Unchecked Exceptions, Role of finally, User defined Exceptions;

Unit-4

Collection Framework: Role and Importance of Collection Framework, List & Set based collection, Iterator & List Iterator, Maps, Searching elements in List, Hash and Tree based collections, Role of equals and hashCode() methods, Comparable and Comparator Interfaces, Thread Safety and Vector, Difference b/w Enumeration and Iterator, Type safety and Generics, Common algorithms and Collections class, Using Properties class for managing properties files;
Database Connectivity Using JDBC: Overview of native and ODBC Drives, Introduction to JDBC, Type of JDBC drivers, Usage of drivers, Defining properties based Connection Factory;
Basic database operations: Insert, Delete, Update, and Select;
Prepared Statement: Statement, Prepared Statement, Setting Query parameters, Executing Queries;
Callabe Statement: Creating PL/SQL Stored procedures and functions, Creating Callable statements, Executing procedures & functions, Batch Updation, Transacting Queries, Programmatic initialization of database, ResultSetMetaData, DatabaseMetaData;
Input/Output Stream, Stream Filters, Buffered Streams, Data input and Output Stream, Print Stream Random Access File,
Reflection: reflection API, newInstance()method, javap tool, creating javap tool, creating applet viewer, call private method, java 9 features;

Course Outcome:
1. Knowledge of the structure and model of the Java programming language, (knowledge)
2. Use the Java programming language for various programming technologies (understanding)
3. Develop software in the Java programming language,

Text Books:
1. Patrick Naughton and HerbertzSchidt, "Java-2 the complete Reference",TMH
2. Sierra & bates, "Head First Java", O'Reilly.

References:

1. E. Balaguruswamy, "Programming with Java", TMH
2. Horstmann, "Computing Concepts with Java 2 Essentials", John Wiley.
3. Decker &Hirshfield, "Programming.Java", Vikas Publication.

LC-IT-317G   **WEB TECHNOLOGY LAB**

 B.TECH SEMESTER V   SESSIONAL: 25

 L   T P   THEORY EXAM: 25

 3   0 0   TOTAL :   50

Hands on practical experiments based on theory subject.

Course code	LC-CSE-323G			
Category	Engineering Science Course			
Course title	Computer Networks Lab			
Scheme and Credits	L	T	P	Credits
	0	0	2	0
Class work	25 Marks			
Exam	25 Marks			
Total	50 Marks			
Duration of Exam	03 Hours			

LC-IT-319G   **DESIGN & ANALYSIS OF ALGORITHMS LAB**

B.TECH   SEMESTER V   SESSIONAL: 25

L   T   P   THEORY EXAM: 25

0   0   4   TOTAL: 50

Hands-on experiments related to the course contents of PCC-IT-307G

Course code	LC-CSE-327G			
Category	Engineering Science Course			
Course title	Programming in Java Lab			
Scheme and Credits	L	T	P	Credits
	3	0		3
Class work	25Marks			
Exam	75Marks			
Total	100Marks			
Duration of Exam	03Hours			

List of Experiment

1. Create a java program to implement stack and queue concept.

2. Write a java package to show dynamic polymorphism and interfaces.

3. Write a java program to show multithreaded producer and consumer application.

4. Create a customized exception and also make use of all the5 exception keywords.

5. Convert the content of a given file into the upper case content of the same file.

6. Develop an analog clock using applet.

7. Develop a scientific calculator using swings.

8. Create an editor like MS-word using swings.

9. CreateaservletthatusesCookiestostorethenumberoftimesauserhasvisited your servlet.

10. Create a simple java bean having bound and constrained properties.

Course code	PCC-CSE-304G			
Category	Professional Core Course			
Course title	Artificial Intelligence			
Scheme and Credits	L	T	P	Credits
	3	0		3
Class work	25 Marks			
Exam	75 Marks			
Total	100 Marks			
Duration of Exam	03 Hours			

Objectives of the course

1. To provide historical perspective of AI and its foundation.
2. To provide the most fundamental knowledge to the students so that they become familiar with basic principles of AI towards problem solving, inference, knowledge representation and learning.
3. Explore application of AI techniques in Expert systems, Neural Networks.
4. Explore the current trends, potential, limitations, and implications of AI.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit: 1
Introduction: Definition of AI, History of AI, nature of AI problems, examples of AI problems.
Problem solving by search: *Uninformed Search*: Depth First Search (DFS), Breadth First Search (BFS). *Informed Search*: Best First Search, A*. *Local Search*: Hill Climbing. *Problem Reduction Search*: AO*. *Population Based Search*: Ant Colony Optimization, Genetic Algorithm. *Game Playing:* MinMax Algorithm, Alpha-Beta Pruning.

Unit: 2
Knowledge Representation: Types of Knowledge, Knowledge Representation Techniques/schemes: Propositional Logic, Predicate Logic, Semantic nets, Frames. Knowledge representation issues. Rule based systems.

Unit: 3
Reasoning under Uncertainty: Basics of Probability Theory, Probabilistic Reasoning, Bayesian Reasoning, Dempster-Shafer Theory.
Planning: Introduction to Planning, Representation of Planning, Partial-order Planning.

Unit: 4
Learning: Introduction to Learning, Types of Learning: Learning by Induction, Rote Learning, Symbol Based Learning, Identification Trees, Explanation Based Learning, Transformational Analogy, Introduction to Neural Networks, Expert Systems, Current trends in Artificial Intelligence

Suggested books:

1. Artificial Intelligence: A Modern Approach Third Edition Stuart Russell and Peter Norvig, 2010, Pearson Education.

References:

1. Elaine Rich, Kevin Knight, & Shivashankar B Nair, Artificial Intelligence, McGraw Hill, latest edition
2. Introduction to Artificial Intelligence & Expert Systems, Dan W Patterson, PHI., latest edition
3. Artificial intelligence, Patrick Henry Winston, Addition Wesley latest edition

Course Outcomes

1. Display the understanding of the historical perspective of AI and its foundation.
2. Apply basic principles of AI in solutions that require problem solving, inference, knowledge representation and learning.
3. Demonstrate fundamental understanding of various application of AI techniques in Expert systems, Neural Networks.
4. Demonstrate an ability to share in discussion of AI, it's the current trends, limitations, and implications of AI.

Course code	ESC -CSE -308G
Category	Professional Elective Course
Course title	Mobile and wireless communication
Scheme and Credits	L T P Credits 3 0 3
Class work	25 Marks
Exam	75 Marks
Total	100 Marks
Duration of Exam	03 Hours

Course Outcomes

1. Understand the wireless/cellular radio concepts such as frequency reuse, handoff and interference between mobiles and base stations.
2. Identify the techno-political aspects of wireless and mobile communications such as the allocation of the limited wireless spectrum by regulatory agencies.
3. Understand the information theoretical aspects such as channel capacity, propagation effects, modeling the impact of signal bandwidth and motion in mobile systems.
4. Describe the current and future Mobile Communication Systems, GSM, Satellite, Broadcasting, Bluetooth, Wireless LANs, Mobile Adhoc Networks.
5. Describe the mobility support mechanism, WWW and WAPs.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT- 1

Introduction: Application, History, Market Scenario, Reference Model and Overview, Wireless Local Loop and Cellular system.

Wireless Transmission: Frequencies, Signals, Antennae, Signal Propagation, Multiplexing, Modulation, Spread Spectrum.

MAC Layer: Specialized MAC, SDMA, FDMA, TDMA – Fixed TDM, Classical ALOHA, Slotted, ALOHA, CSMA, DAMA, PKMA, Reservation TDMA. Collision Avoidance, Polling, Inhibit Sense Multiple Access, CDMA.

Broadcasting: Unidirectional Distribution Systems, Digital Audio Broadcasting, Digital Video Broadcasting, Convergence of Mobile and Broadcasting Techniques.

UNIT 2

GSM: Mobile Services, Architecture Radio, Interface, Protocol, Localization, Calling Handover, Security, New data services.

Wireless LAN: IEEE 802 11- System and Protocol Architecture, Physical Layer, MAC Layered Management.

Bluetooth: User scenarios, Physical layer, MAC Layer, Networking, Security and Link Management.

UNIT 3

Mobile Network Layer: Mobile IP-Goals, Assumptions, Requirement, Entities, Terminology, IP Packet delivery, Agent Advertisement and Discovery, Registration, Tunneling, Encapsulation, Optimization, Reserve Tunneling, Security, IPv6 , DHCP.

Mobile Adhoc Networks: Routing, Destination Sequence Distance Vector, Dynamic Source Routing, Hierarchical algorithms, Performance Metrics.

Mobile Transport Layer: Traditional TCP, Indirect TCP, Snooping, TCP, Mobile TCP, Fast- retransmission TCP, Transaction oriented TCP.

UNIT 4

Satellite Systems: History, Applications, GEO, LEO, MEO, Routing, Localization, Handover in Satellite System.

Support for Mobility: File System, WWW, HTML, System Architecture.

WAP: Architecture, Wireless Datagram, Protocol, Wireless Transport Layer Security, Wireless Transaction Protocol, Application Environment, Telephony Applications.

References:

1. Jochen Schiller, "MobileCommunication", Pearson Education, latest edition
2. LEE, "Mobile Cellular Telecommunications", McGRAW-Hill, latest edition
3. Theodore S Rappaport, "Wireless Communications", Pearson Education.

Course Outcomes

- Explain the principles and theories of mobile computing technologies.

- Describe infrastructures and technologies of mobile computing technologies.

- List applications in different domains that mobile computing offers to the public, employees, and businesses.

- Describe the possible future of mobile computing technologies and applications.

- Effectively communicate course work through written and oral presentations

	SESSIONAL: 25
L T P	THEORY EXAM: 75
3 0 0	TOTAL : 100

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I
INTRODUCTION TO CLOUD COMPUTING:

Online Social Networks and Applications, Cloud introduction and overview, Different clouds, Risks, Novel applications of cloud computing .

Unit-II
CLOUD COMPUTING ARCHITECTURE:
Requirements, Introduction Cloud computing architecture, On Demand Computing Virtualization at the infrastructure level, Security in Cloud computing environments, CPU Virtualization, A discussion on Hypervisors Storage Virtualization Cloud Computing Defined, The SPI Framework for Cloud Computing, The Traditional Software Model, The Cloud Services Delivery Model Cloud Deployment Models Key Drivers to Adopting the Cloud, The Impact of Cloud Computing on Users, Governance in the Cloud, Barriers to Cloud Computing Adoption in the Enterprise .

Unit-III
SECURITY ISSUES IN CLOUD COMPUTING

Infrastructure Security, Infrastructure Security: The Network Level, The Host Level, The Application Level, Data Security and Storage, Aspects of Data Security, Data Security Mitigation Provider Data and Its Security Identity and Access Management Trust Boundaries and IAM, IAM Challenges, Relevant IAM Standards and Protocols for Cloud Services, IAM Practices in the Cloud, Cloud Authorization Management
SECURITY MANAGEMENT IN THE CLOUD

Security Management Standards, Security Management in the Cloud, Availability Management: SaaS, PaaS, IaaS Privacy Issues Privacy Issues, Data Life Cycle, Key Privacy Concerns in the Cloud, Protecting Privacy, Changes to Privacy Risk Management and Compliance in Relation to Cloud Computing, Legal and Regulatory Implications, U.S. Laws and Regulations, International Laws and Regulations

Unit-IV
AUDIT AND COMPLIANCE

Internal Policy Compliance, Governance, Risk, and Compliance (GRC), Regulatory/External Compliance, Cloud Security Alliance, Auditing the Cloud for Compliance, Security-as-a-Cloud.

DATA INTENSIVE COMPUTING

Map-Reduce Programming Characterizing Data-Intensive Computations, Technologies for Data- Intensive Computing, Storage Systems, Programming Platforms, MapReduce Programming, MapReduce Programming Model, Example Application

COURSE OUTCOMES:

After completion of course, students would be able to:

a. Identify security aspects of each cloud model
b. Develop a risk-management strategy for moving to the Cloud
c. Implement a public cloud instance using a public cloud service provider

REFERENCES

1. **"*Cloud Computing Explained: Implementation Handbook for Enterprises*", John Rhoton, Publication Date: November 2, 2009**
2. **"*Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance (Theory in Practice)*", Tim Mather, ISBN-10: 0596802765,O'Reilly Media, September 2009**

Course code	PCC-CSE-306G				
Category	Professional Course Code				
Course title	Advanced Java				
Scheme and Credits	L	T	P	Credits	Semester 6
	3	0	0	3	
Classwork	25Marks				
Exam	75Marks				
Total	100Marks				
Duration of Exam	03Hours				

Objectives of the course:

1. Programming in the Java programming language,
2. Knowledge of object-oriented paradigm in the Java programming language,
3. The use of Java in a variety of technologies and on different platforms.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT 1

Servlet: Servlet introduction, web terminology, servlet API, servlet Interface, generic servlet, Http servlet, servlet lifecycle, servlet with IDE (eclipse, My eclipse, Net beans), servlet request, servlet collaboration, servlet configuration, context, attribute in servlet, session technique in servlet, event and listener, servlet filter, CRUD, pagination, input output stream, annotation, single thread model, SSI;

JSP: Lifecycle of JSP, JSPAPI, scripting elements, 9Implicit Objects, directive elements,

Exceptions, action elements, expression language, MVC in JSP, JSTL, custom tags, pagination, CRUD,JSTL function, formatting, XML, SQL tags,

UNIT 2

Struts: Introduction, features, models, components, struts2 architecture, action, configuration, interceptors, validation method, aware Interfaces, stuts2withI18N, zero configuration, struts2withtiles, hibernate with struts2, spring with struts2, UI tags;

Mail API: java mail introduction, methods of sending email, sending mail by Gmail, receiving email, sending attachment, receiving attachment, sending html, forwarding, deleting email;

UNIT3

Hibernate(HB): Introduction, architecture, HB with IDE, HB Log4j, inheritance mapping, HB mapping, transaction management, HB query language, HB criteria query language, named query, HB caching, integration, HB lifecycle;

Spring: Introduction, modules, spring with IDE, dependency injection methods, spring AOP, spring Jdbc template, spring ORM, SPEL, MVC tag library, applications, spring remoting, spring OXM, spring web, security models, spring boot, spring with angular;

UNIT 4

Android: Introduction, history & versions, architecture, building blocks, emulator, android widgets, activity and intents, android fragments, android menu, android service, SQLite, XML & JSON, android speech, multimedia, telephony, maps;

Design Pattern: java design pattern, creational, structural, behavioral, J2EE patterns, presentation layers,

Course Outcome:

1. Knowledge of the structure and model of the Java programming language, (knowledge)
2. Use the Java programming language for various programming technologies (understanding)
3. Develop software in the Java programming language,

Suggested Text Books:

1. Patrick Naught on and Herbertz Schidt, "Java-2 the complete Reference",TMH
2. Sierra & bates, "Head First Java", O'Reilly.

Suggested Reference Books:

1. E. Balaguruswamy, "Programming with Java",TMH
2. Horstmann, "Computing Conceptswith Java2 Essentials", John Wiley.
3. Decker & Hirsh field, "Programming.Java", Vikas Publication.

Course code	PROG-CSE-322G
Category	Professional Elective Course
Course title	PROJECT

Scheme and Credits	L	T	P	Credits	
	3	0		3	

Class work	25 Marks
Exam	75 Marks
Total	100 Marks
Duration of Exam	03 Hours

Course code	LC-CSE-326G			
Category	Professional Core Course			
Course title	Artificial Intelligence Lab Using Python			
Scheme and Credits	L	T	P	Credits
		0	3	3
Class work	25 Marks			
Exam	25 Marks			
Total	50 Marks			
Duration of Exam	03 Hours			

List of Practical
1. Write a Program to Implement Breadth First Search using Python.
2. Write a Program to Implement Depth First Search using Python.
3. Write a Program to Implement Tic-Tac-Toe game using Python.
4. Write a Program to Implement 8-Puzzle problem using Python.
5. Write a Program to Implement Water-Jug problem using Python.
6. Write a Program to Implement Travelling Salesman Problem using Python.
7. Write a Program to Implement Tower of Hanoi using Python.
8. Write a Program to Implement Monkey Banana Problem using Python.
9. Write a Program to Implement Missionaries-Cannibals Problems using Python.
10. Write a Program to Implement 8-Queens Problem using Python.

Course code	LC-CSE-328G			
Category	Professional Core Course			
Course title	Advanced JAVA Lab			
Scheme and Credits	L	T	P	Credits
		0	3	3
Class work	25 Marks			
Exam	25 Marks			
Total	50 Marks			
Duration of Exam	03 Hours			

Course code	MC-317G			
Category	Mandatory Course			
Course title	**Constitution of India**			
Scheme and credits	L	T	P	Credits
	2	0	0	0

Course Objectives:

Students will be able to:

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Unit – I

Philosophy of Indian Constitution: Salient features of Indian Constitution, Preamble, and Nature of Indian Constitution, Procedure for amendment of the Constitution.

Unit – II

Federal structure and distribution of legislative and financial powers between the Union and the States

Unit – III

Organs of Governance: President – Qualification and Powers of the President, Governor-Qualification and Powers of Governor, Parliament: Composition, Qualifications and Disqualifications, Judiciary: Appointment, Tenure and Removal of Judges.

Unit – IV

Fundamental Rights: Origin and development of Fundamental rights, Need for fundamental rights. Introduction to Right to equality , Right to freedom, Right against exploitation, Right to freedom of religion, Cultural and Education rights and Fundamental duties.

References:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S.N. Busi, Dr. B.R. Ambedkar framing of Indian Constitution, latest Edition
3. M.P. Jain, Indian Constitution Law, Lexis Nexis, latest edition
4. D.D. Basu, Introduction to Constitution of India, Lexis Nexis, latest edition.

Course Outcomes:

Students will be able to:

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
4. Discuss the passage of the Hindu Code Bill of 1956.

The examination of the regular students will be conducted by the concerned college/Institute internally. Each student will be required to score minimum 40% marks to qualify in the paper. The marks will not be included in determining the percentage of marks obtained for the award of degree. However, these marks will be shown in the detailed marks certificate of the students.

Course code	PEC CSE-311G			
Category	Professional Elective Course			
Course title	Software Engineering			
Scheme and Credits	L	T	P	Credits
	3	0		3
Class work	25 Marks			
Exam	75 Marks			
Total	100 Marks			
Duration of Exam	03 Hours			

Objectives of the course

- Be successful professionals in the field with solid fundamental knowledge of software engineering
- Utilize and exhibit strong communication and interpersonal skills, as well as professional and ethical principles when functioning as members and leaders of multi-disciplinary teams
- Apply their foundations in software engineering to adapt to readily changing environments using the appropriate theory, principles and processes

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit: 1
Introduction: The process, software products, emergence of software engineering, evolving role of software, software life cycle models, Software Characteristics, Applications, Software crisis.
Software project management: Project management concepts, software process and project metrics Project planning, project size estimation metrics, project estimation Techniques, empirical estimation techniques, COCOMO- A Heuristic estimation techniques, staffing level estimation, team structures, staffing, risk analysis and management, project scheduling and tracking

Unit: 2
Requirements Analysis and specification requirements engineering, system modeling and simulation Analysis principles modeling, partitioning Software, prototyping: , Prototyping methods and tools; Specification principles, Representation, the software requirements specification and reviews Analysis Modeling: Data Modeling, Functional modeling and information flow: Data flow diagrams, BehavioralModeling; The mechanics of structured analysis: Creating entity/ relationship diagram, data flow model, control flow model, the control and process specification; The data dictionary; Other classical analysis methods.
System Design: Design concepts and principles: the design process: Design and software quality, design principles; Design concepts: Abstraction, refinement, modularity, software architecture, control hierarchy, structural partitioning, data structure, software procedure, information hiding; Effective modular design: Functional independence, Cohesion, Coupling;

Unit: 3

Architectural Design: Software architecture, Data Design: Data modeling, data structures, databases and the data warehouse, Analyzing alternative Architectural Designs, architectural complexity; Mapping requirements into a software architecture; Transform flow, Transaction flow; Transform mapping: Refining the architectural design.

Testing and maintenance: Software Testing Techniques, software testing fundamentals: objectives, principles, testability; Test case design, white box testing, basis path testing: Control structure testing: Black box testing, testing for specialized environments, architectures and applications. Software Testing Strategies: Verification and validation, Unit testing, Integration testing, Validation testing, alpha and beta testing; System testing: Recovery testing, security testing, stress testing, performance testing; The art of debugging, the debugging process debugging approaches. Software re-engineering, reverse engineering, restructuring, forward engineering.

Unit: 4

Software Reliability and Quality Assurance :Quality concepts, Software quality assurance , SQA activities; Software reviews: cost impact of software defects, defect amplification and removal; formal technical reviews: The review meeting, review reporting and record keeping, review guidelines; Formal approaches to SQA; Statistical software quality assurance; software reliability: Measures of reliability and availability ,The ISO 9000 Quality standards: The ISO approach to quality assurance systems, The ISO 9001 standard, Software Configuration Management. Computer Aided software Engineering: CASE, building blocks, integrated case environments and architecture, repository.

Suggested books:

- Software Engineering – A Practitioner"s Approach, Roger S. Pressman, 1996, MGH.

References:

- Fundamentals of software Engineering, Rajib Mall, PHI Software Engineering by Nasib Singh Gill, Khanna Book Publishing Co (p) Ltd
- Software Engineering by Ian sommerville, Pearson Edu, latest edition, AW,
- Software Engineering – David Gustafson, T.M.H
- Software Engineering Fundamentals Oxford University, Ali Behforooz and Frederick J. Hudson JW&S,
- An Integrated Approach to software engineering by Pankaj jalote, Narosa,

Course Outcomes

1. How to apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment
2. An ability to work in one or more significant application domains
3. Work as an individual and as part of a multidisciplinary team to develop and deliver quality software
4. Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle
5. Demonstrate an ability to use the techniques and tools necessary for engineering practice

Course code	PEC CSE-313G
Category	Professional Elective Course
Course title	System Programming and System Administration
Scheme and Credits	L T P Credits 3 0 3
Class work	25 Marks
Exam	75 Marks
Total	100 Marks
Duration of Exam	03 Hours

Objectives of the course
1. Evolution of the components of system programming.
2. To learn working and different stages of complitaion process.
3. To learn basic of assembler and loading schemes.
4. To learn basics of file structure.
5. To know about filters and pipeline.
6. To learn shell programming

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit: 1
Evolution of Components Systems Programming, Assemblers, Loaders, Linkers, Macros, Compilers. software tools, Text editors, Interpreters and program generators, Debug Monitors, Programming environment.
Compiler: Brief overview of compilation process, Incremental compiler, Assembler: Problem statement, symbol table; Loader schemes, compile and go Loader, general loader schemes, absolute loader, Reallocating loader, Direct linkage Loader, Binders, overlays.

Unit: 2
Theoretical Concept of Unix Operating System: Basic features of operating system; File structure: CPU scheduling; Memory management: swapping, demand paging; file system: block and fragments, inodes, directory structure; User to user communication

Unit: 3
Getting Started with Unix: User names and groups, logging in; Format of Unix commands; Changing your password; Characters with special meaning; Unix documentation; Files and directories; Current directory, looking at the directory contents, absolute and relative pathnames, some Unix directories and files; Looking at the file contents; File permissions; basic operation on files; changing permission modes; Standard files, standard output; Standard input, standard error; filters and pipelines; Processes; finding out about processes; Stopping background process; Unix editor vi.

Unit-4

Shell Programming: Programming in the Borne and C-Shell; Wild cards; Simple shell programs; Shell variables; interactive shell scripts; Advanced features.

System Administration: Definition of system administration; Booting the system; Maintaining user accounts; File systems and special files; Backups and restoration; Role and functions of a system manager. Overview of the Linux operating system

Suggested books:
1. Systems Programming by Donovan, TMH.
2. The unix programming environment by Brain Kernighen& Rob Pike, 1984, PHI & Rob Pike.
3. Design of the Unix operating system by Maurich Bach, 1986, PHI.
4. Introduction to UNIX and LINUX by John Muster, 2003, TMH.

References:

1. Advanced Unix programmer's Guide by Stephen Prato, BPB
2. Unix- Concept and applications by Sumitabha Das, T.M..H

Course Outcomes
1. To understand various file statistics.
2. To work on wildcards.
3.To know about shell programming and AWK utitliy.

Course Code	PEC-CSE-315G			
Category	Elective			
Course title	Digital Image Processing			
Scheme and Credits	L	T	P	Credits
	3	0		3
Class work	25 Marks			
Exam	75 Marks			
Total	100 Marks			
Duration of Exam	03 Hours			

Objectives of the course

- To become familiar with digital image fundamentals
- To get exposed to simple image enhancement techniques in Spatial and Frequency domain.
- To learn concepts of degradation function and restoration techniques.
- To study the image segmentation and representation techniques.
- To become familiar with image compression and recognition method

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit: 1

Introduction to Image Processing: Digital Image representation, Sampling & Quantization, Steps in image Processing, Image acquisition, color image representation.

Unit: 2

Image Transformation & Filtering: Intensity transform functions, histogram processing, Spatial filtering, Fourier transforms and its properties, frequency domain filters, colour models, Pseudo colouring, colour transforms, Basics of Wavelet Transforms.
Image Restoration: Image degradation and restoration process, Noise Models, Noise Filters, degradation function, Inverse Filtering, Homomorphism Filtering

Unit: 3

Image Compression: Coding redundancy, Interpixel redundancy, Psychovisual redundancy, Huffman Coding, Arithmetic coding, Lossy compression techniques, JPEG Compression.

Unit-4

Image Segmentation & Representation: Point, Line and Edge Detection, Thresholding, Edge and Boundary linking, Hough transforms, Region Based Segmentation, Boundary representation, Boundary Descriptors.

Suggested books:
1. Rafael C. Gonzalez, Richard E. Woods,Digital Image Processing Pearson, Third Edition,2010.
2. Anil K. Jain,Fundamentals of Digital Image Processing Pearson, 2002.

References:

1. Kenneth R. Castleman, Digital Image Processing Pearson, latest edition

2. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins,Digital Image Processing using MATLAB Pearson Education, Inc., latest edition

3. D,E. Dudgeon and RM. Mersereau, Multidimensional Digital Signal Processing Prentice Hall Professional Technical Reference, latest edition

4. William K. Pratt,Digital Image Processing John Wiley, New York, latest edition

5. Milan Sonka et al Image processing, analysis and machine vision Brookes/Cole, Vikas Publishing House, latest edition

Course Outcomes

1. Know and understand the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms.

2. Operate on images using the techniques of smoothing, sharpening and enhancement.

3. Understand the restoration concepts and filtering techniques.

4. Learn the basics of segmentation, features extraction, compression and recognition methods for color models

Course code	PEC-CSE310G
Category	Professional Elective Course
Course title	Advance Database Management System
Scheme and Credits	L	T	P	Credits
	3	0		3
Class work	25 Marks
Exam	75 Marks
Total	100 Marks
Duration of Exam	03 Hours

Objective of the course:

1. To understand DBMS Components, Advantages and Disadvantages.
2. Understanding Data modeling: ER, EER, Network, Hierarchical and Relational data models.
3. Understanding normalization, general strategies for query processing, query processor, syntax analyzer, Query decomposition, Heuristic Query optimization.
4. To understand transaction concept, schedules, serializability, locking and concurrency control protocols.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction: Architecture, Advantages, Disadvantages, Data models, relational algebra, SQL, Normal forms.

Query Processing: General strategies for query processing, transformations, expected size, statistics in estimation, query improvement. Query evaluation, view processing, query processor.

Unit-II

Recovery: Reliability, Transactions, recovery in centralized DBMS, reflecting updates, Buffer management logging schemes, disaster recovery.

Concurrency: Introduction, Serializability, Concurrency control, Locking schemes, Timestamp based ordering, Optimistic, Scheduling, Multiversion techniques, Deadlocks.

Unit-III

Parallel and Distributed Databases: Distributed Data Storage – Fragmentation & Replication, Location and Fragment.
Transparency Distributed Query Processing and Optimization, Distributed Transaction Modeling and concurrency Control, Distributed Deadlock, Commit Protocols, Design of Parallel Databases, Parallel Query Evaluation.

Unit-IV

Objected Oriented and Object Relational Databases: Modeling Complex Data Semantics, Specialization, Generalization, Aggregation and Association, Objects, Object Identity, Equality and Object Reference, Architecture of Object Oriented and Object Relational Databases

Suggested Text Book:

1. Elmarsi, Navathe, Somayajulu, Gupta, "Fundamentals of Database Systems", 4th Edition, Pearson Education,2007
2. Garcia, Ullman, Widom, "Database Systems, The complete book", Pearson Education, 2007
3. R. Ramakrishnan, "Database Management Systems", McGraw Hill International Editions, 1998

Suggested References Books:
1. Date, Kannan, Swaminathan, "An Introduction to Database Systems", 8th Edition Pearson Education, 2007
2. Singh S.K., "Database System Concepts, design and application", Pearson Education, 2006.
3. Silberscatz, Korth, Sudarshan, "Database System Concepts", Mcgraw Hill, 6th Edition, 2006
4. W. Kim, "Modern Database Systems", 1995, ACM Press, Addision Wesley,

Course Outcomes:

1. Students will get understanding of DBMS Components, Its advantages and disadvantages.
2. Understanding about various types of Data modeling: ER, EER, Network, Hierarchical and Relational data models.
3. Understanding normalization, general strategies for query processing, query processor, syntax analyzer, Query decomposition, Heuristic Query optimization.
4. Understanding transaction concept, schedules, serializability, locking and concurrency control protocols.

Course code	PEC-CSE-312G
Category	Elective
Course title	Mobile applications development
Scheme and Credits	L T P Credits 3 0 3
Class work	25 Marks
Exam	75 Marks
Total	100 Marks
Duration of Exam	03 Hours

Objectives of the course
- Introduce the students with the various "Next Generation Technologies" in the area of mobile computing
- Assist students understand the various Mobile operating Systems
- Explore the findings using Andriod Technologies

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit: 1
Introduction: Mobile operating system, Operating system structure, Constraints and Restrictions, Hardware configuration with mobile operating system, Features: Multitasking Scheduling, Memory Allocation, File System Interface, Keypad Interface, I/O Interface, Protection and Security, Multimedia features

Unit: 2
Introduction to Mobile development IDE's, Introduction to Worklight basics, Optimization, pages and fragments , Writing a basic program- in Worklight Studio, Client technologies, Client side debugging, Creating adapters, Invoking adapters from Worklight Client application, Common Controls, Using Java in adapters, Programming exercise with Skins, Understanding Apache Cordova.

Unit: 3
Understanding Apple iOS development, Android development, Shell Development, Creating Java ME application, Exploring the Worklight Server, Working with UI frameworks, Authentication, Push notification, SMS Notifications, Globalization.

Unit-4

Android: Introduction to Android, Architecture, memory management, communication protocols, application development methods, deployment.
iOS: Introduction to iOS, Architecture, memory management, communication protocols, application development methods, deployment

Suggested books:

1. Anubhav Pradhan, Anil V Deshpande, " Mobile Apps Development" Edition:
2. Jeff McWherter, Scott Gowell "Professional Mobile Application Development", John Wiley & Sons, 2012.
3. Barry Burd, "Android Application Development All in one for Dummies", Edition: I
4. Teach Yourself Android Application Development In 24 Hours, Edition: I, Publication: SAMS

References:

1. Neal Goldstein, Tony Bove, "iPhone Application Development All-In-One For Dummies", John Wiley & Sons
2. Henry Lee, Eugene Chuvyrov, "Beginning Windows Phone App Development", Apress, latest edition.
3. Jochen Schiller,"Mobile Communications", Addison-Wesley, latest edition
4. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002, ISBN 0471419028.

Course Outcomes

1. Explain the principles and theories of mobile computing technologies.

2. Describe infrastructures and technologies of mobile computing technologies.

3. List applications in different domains that mobile computing offers to the public, employees, and businesses.

4. Describe the possible future of mobile computing technologies and applications.

5. Effectively communicate course work through written and oral presentations

Course code	PEC-CSE-314G			
Category	Professional Elective Course			
Course title	Computer Graphics			
Scheme and Credits	L	T	P	Credits
	3	0		3
Class work	25 Marks			
Exam	75 Marks			
Total	100 Marks			
Duration of Exam	03 Hours			

Objectives of the course:
1. To have basic understanding of the core concepts of Computer Graphics.
2. Understand scan conversion, 2D, 3D – transformation and viewing.
3. To be able to create interactive computer Graphics with understanding of shading, image processing and illumination model.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT1
Introduction to Computer Graphics: What is Computer Graphics, Computer Graphics Applications, Computer Graphics Hardware and software; Two dimensional Graphics Primitives: Points and Lines, Scan Conversion: Point, Line, Circle; Region Filling: Scanline algorithm, Polygon filling algorithm, boundary filled algorithm.

UNIT 2
Two dimensional transformations: Geometric, Coordinate and, composite transformation.
Two Dimensional Viewing: window to view port mapping; Clipping: point, line, polygon, curve and text clipping

UNIT 3
Three-dimensional transformations: Three dimensional graphics concept, Geometric and Coordinate transformations, **Viewing in 3D:** Projection, Taxonomy of projection,
Hidden surface removal: Introduction to hidden surface removal, The Z- buffer algorithm, The painter's algorithm, Scanline algorithm, Sub-division algorithm.

UNIT 4
Representing Curves and Surfaces: Parametric representation of curves: Bezier curves, B-Spline curves. Parametric representation of surfaces; Interpolation method.
Illumination, shading, image manipulation: Illumination models, shading models for polygons, shadows, transparency, image processing.

Suggested Text Books:

1. Computer Graphics Principles and Practices second edition by James D. Foley, Andeies van Dam, Stevan K. Feiner and Johb F. Hughes, 2000, Addision Wesley.
2. Computer Graphics by Donald Hearn and M.Pauline Baker, 2 Edition, 1999, PHI
3. Computer Graphics by Z. Xiang, R. Plastock, 2nd Edition, TMH Education.

References:

1. Procedural Elements for Computer Graphics – David F. Rogers, T.M.H latest Edition
2. Fundamentals of 3-Dimensional Computer Graphics by Alan Watt, Addision Wesley.
3. Computer Graphics: Secrets and Solutions by Corrign John, BPB
4. Graphics, GUI, Games & Multimedia Projects in C by Pilania&Mahendra, Standard Publ.
5. Computer Graphics Secrets and solutions by Corrign John, BPV
 6   Introduction to Computer Graphics by N. Krishanmurthy T.M.H latest edition

Course Outcomes:

1. Understanding of the software, hardware and applications of Computer Graphics.
2. Understanding of Scan conversion, 2D, 3D – transformation and viewing.
3. To be able to implement picture on screen using projection, shading, image processing and illumination model.

PEC-IT-302G   **INFORMATION RETRIEVAL**

B.TECH   SEMESTER V   SESSIONAL: 25
 L   T   P   THEORY EXAM: 75
 3   0   0   TOTAL: 100

Course Objectives:
1. To build an understanding of the fundamental concepts of Information Retrieval
2. To understand the elements of Web Search Engines and Crawlers
3. To familiarize students with the basic taxonomy and terminology of Indices and to understand Heap's Law for estimation and Zipf's law for modeling distribution of terms
4. To understand dictionary compression and posting list compression and to introduce the scoring , tf-idf weighting and vector space model for scoring

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT-I

Information retrieval problem, an inverted index, Processing Boolean queries, The extended Boolean model versus ranked retrieval, an inverted index, Bi-word indexes, Positional indexes, Combination schemes

UNIT-II

Search Engines: Basic Building Blocks and Architecture, Text Acquisition, Text Transformation, Index Creation, User Interaction, Ranking, Evaluation.
 CRAWL AND FEEDS: Crawling the Web, Retrieving Web Pages, The Web
Crawler, Freshness, Focused Crawling, Deep Web, Crawling Documents and Email, Storing the Documents, Detecting Duplicates

UNIT-III

INDEX CONSTRUCTION AND COMPRESSION: Hardware basics, Blocked sort-based indexing, Single-pass in-memory indexing, Distributed indexing, Dynamic indexing
Index compression: Statistical properties of terms in information retrieval, Heaps' law: Estimating the number of terms, Zipf's law: Modeling the distribution of terms, Dictionary compression, Dictionary as a string, Blocked storage, Postings file compression

<div align="center">**UNIT-IV**</div>

SCORING, TERM WEIGHTING AND THE VECTOR SPACE MODEL : Parametric and zone indexes, Weighted zone scoring, Learning weights, The optimal weight, Term frequency and weighting, Inverse document frequency, Tf-idf weighting, The vector space model for scoring , Computing scores in a complete search system.

Course Outcomes:

After taking the course, students will be able to:
a. Understand basic Information Retrieval Systems and learn how Boolean queries are processed.
b. understand the basic concept of Search Engines their architecture and its various functional components and understand the basic concept of Web crawlers and their architecture
c. identify the different types of indices: inverted index, positional index, bi-word index and be able make estimations and model distribution of terms and compressions
d. enumerate various types of indices and also understand the concept of efficient storage of indices and learn tf-idf scoring and vector space model scoring for ranking

REFERENCES

1. **C.D.Manning, P. Raghavan and H.Schutze** *"Introduction to Information Retrieval"*, **Cambridge University Press, Latest Edition**
2. **B.Croft, D.Metzler, T.Strohman, "*Search Engines : Information Retrieval in Practice*", AddisionWesley, Latest Edition**

PEC-IT-304G   **SOFT COMPUTING**

B.TECH SEMESTER VI   SESSIONAL: 25

L   T P   THEORY EXAM: 75

3   0 0   TOTAL :   100

Course Objectives
1.   To introduce soft computing concepts and techniques and foster their abilities in designing appropriate technique for a given scenario.
2. To implement soft computing based solutions for real-world problems.
3.   To give students knowledge of non-traditional technologies and fundamentals of artificial neural networks, fuzzy sets, fuzzy logic, genetic algorithms.
4. To provide students an hand-on experience on MATLAB to implement various strategies.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Detailed contents:

UNIT-I
INTRODUCTION TO SOFT COMPUTING:
Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computational Intelligence: Machine Learning Basics

UNIT-II
FUZZY LOGIC:
Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making.

UNIT-III
NEURAL NETWORKS:
Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance architectures, Advances in Neural networks

UNIT-IV
GENETIC ALGORITHMS:
Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge Acquisition.

        Matlab:
Study of neural network toolbox and fuzzy logic toolbox, Simple implementation of Artificial Neural Network and Fuzzy Logic

Course Outcomes

After completion of course, students would be able to:

a. Identify and describe soft computing techniques and their roles in building intelligent Machines.
b. Apply fuzzy logic and reasoning to handle uncertainty and solve various engineering problems.
c. Apply genetic algorithms to combinatorial optimization problems.
d. Evaluate and compare solutions by various soft computing approaches for a given problem.

REFERENCES:

1. George J. Klir and Bo Yuan, "*Fuzzy Sets and Fuzzy Logic: Theory and Applications*", PHI
2. Satish Kumar, "*Neural Networks: A classroom approach*" Tata McGraw Hill.
3. Haykin S., "*Neural Networks-A Comprehensive Foundations*", PHI
4. Anderson J.A., "*An Introduction to Neural Networks*", PHI
5. M.Ganesh, "*Introduction to Fuzzy sets and Fuzzy Logic*" PHI.
6. N P Padhy and S P Simon, " *Soft Computing with MATLAB Programming*", Oxford University Press

B.TECH SEMESTER VII	SESSIONAL:	25
L T P	THEORY EXAM:	75
3 0 0	TOTAL :	100

Pre-requisites: Internet and web Technology, Computer Networks Course Objectives:

1. Student will be able to learn the basics of IOT.
2. Student will be able to analyse basic protocols of wireless and MAC.
3. Students will get familiar with web of things.
    4.   Students will get basic knowledge of resource management.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Detailed contents:

Unit-I

INTRODUCTION TO IOT

Introduction to IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs ,IoT & M2M Machine to Machine, Difference between IoT and M2M, Software define Network, Challenges in IoT(Design ,Development, Security).

Unit-II

NETWORK AND COMMUNICATION ASPECTS

Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination.

Unit-III

WEB OF THINGS

Web of Things vs Internet of things, two pillars of web, Architecture and standardization of IoT, Unified multitier-WoT architecture, WoT portals and Business intelligence, Cloud of things: Grid/SOA and cloud computing, Cloud middleware, cloud standards

Unit-IV

RESOURCE MANAGEMENT IN IOT

Domain specific applications of IoT, Home automation, Industry applications, Surveillance applications, Other IoT applications Clustering, Synchronization, Software agents.

Course Outcomes:

On successful completion of the course, the student will:

a. Understand the concepts of Internet of Things
b. Analyze basic protocols network
c. Understand the concepts of Web of Things
d. Design IoT applications in different domain and be able to analyze their performance

TEXT/REFERENCE BOOKS:

1. **Vijay Madisetti, Arshdeep Bahga, "*Internet of Things: A Hands-On Approach*"**
2. **Waltenegus Dargie, Christian Poellabauer, "*Fundamentals of Wireless Sensor Networks: Theory and Practice*"**