

**MASTER OF SCIENCE
IN
INFORMATION TECHNOLOGY**

PROGRAMME STRUCTURE AND SYLLABUS

From 2019-2020 Admission Onwards

(UNDER MAHATMA GANDHI UNIVERSITY PGCSS REGULATIONS 2019)



BOARD OF STUDIES IN COMPUTER APPLICATIONS (PG)

MAHATMA GANDHI UNIVERSITY

KOTTAYAM

2019

Board of Studies in Computer Applications (PG)

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1. Aim of the Programme

Master of Science in Information Technology (M.Sc.IT) is a two year post graduate degree programme under semester system. The programme is designed for generating skilled IT post graduate professionals capable of taking leading roles in industry, academia, entrepreneurship and application. The M.Sc. Programme in Information Technology is concerned with the use and application of information technology in the specification, design, development and deployment of software.

2. Eligibility For Admission

The eligibility for admission to M.Sc. Information Technology programme in affiliated institutions under Mahatma Gandhi University is a B.Sc. Degree with Mathematics /Computer Science /Electronics /IT as one of the subjects under part III (Main / Core + subsidiaries/Complementary) with not less than 50% marks **OR** BCA degree with not less than 50% marks. For CBCSS pattern, the eligibility is B.Sc. Degree with Mathematics /Computer Science /Electronics /IT as one of the subjects under part III Core Group (Core + Complementary+ Open Courses) with not less than CGPA of 2.00 out of 4 **OR** B C A with not less than CGPA of 2.00 out of 4**OR** B Tech with not less than 50% marks in mathematics (aggregate of all mathematics papers and a total of 50% for the entire course

3. Medium of instruction

The medium of instruction and examination shall be in English for all courses.

4. Programme Structure and Duration

The duration of the programme shall be 4 semesters. The duration of each semester include 90 working days. Odd semesters from June to October and even semesters from November to March

A student may be permitted to complete the programme, on valid reasons, within a period of 8 continuous semesters from the date of commencement of the first semester of the programme.

The programme shall include two types of courses, Core courses and Elective Courses.

There will be five core courses including one practical course for the first two semesters. In the third semester there are five core courses with one elective course, one practical and one mini project. In the last semester there are two core courses, two electives and one main project. There are two groups of electives and each group contains three courses. Each college has to select one group of electives for the programme. At the end of the programme, there will be a comprehensive viva-voce.

5. Examinations

There shall be University examination for both theory and practical at the end of each semester. Main Project evaluation and Viva -Voce shall be conducted at the end of the programme only. Comprehensive viva-voce in the fourth semester will cover entire courses in the programme. Project evaluation and Viva-Voce shall be conducted by two external examiners and one internal examiner.

End-semester examination of all courses except project will be of three hoursduration.

6. Faculty under which Degree is awarded

Faculty of Science

7. Curriculum Design Abstract

SEMESTER I

- CA500101 - Computational Mathematics
- CA020101 - Advanced Computer Architecture
- CA020102 - Operating System with Shell Programming
- CA500102 - Advanced Java Programming
- CA020103 - Lab I [Java& Shell Programming]

SEMESTER II

- CA500201 - Advanced Data Structure
- CA020201 - Ad Hoc and sensor network
- CA020202 - Cloud Computing
- CA500202 - Database Management system and SQL
- CA020203 - Lab II [DS using Java, SQL]

SEMESTER III

- CA020301 - Web programming using PHP
Elective I
- CA020302 - Mobile Computing
- CA500301 - Software Engineering
- CA020303 - Lab III [PHP]
- CA020304 - Mini Project using Android

SEMESTER IV

- CA020401 - Big Data Analytics
- Elective II
- Elective III
- CA020401 - Main Project
- CA020402 - Course Viva

Elective Group A

- CA800301 - Introduction to Cyber Security
- CA800402 - Applied Cryptography
- CA800403 - Ethical Hacking

Elective Group B

- CA830301 - Artificial Intelligence
- CA830402 - Software Testing

8. Scheme

Semester	Course Code	Type of Course	Teaching Hrs/Week		Credit	Total Credit
			Theory	Practical		
I	CA500101	Core	4		4	19
	CA020101	Core	4		4	
	CA020102	Core	4		4	
	CA500102	Core	3		3	
	CA020103	Core		10	4	
II	CA500201	Core	4		4	19
	CA020201	Core	4		4	
	CA020202	Core	3		3	
	CA500202	Core	4		4	
	CA020203	Core		10	4	
III	CA020301	Core	4		4	20
		Elective I	4		4	
	CA020302	Core	4		4	
	CA500301	Core	4		4	
	CA020303	Core		5	2	
	CA020304	Core		4	2	
IV	CA020401	Core	5		4	22
		ElectiveII	5		4	
		ElectiveIII	5		4	
	CA020402	Project		10	8	
	CA020403	Viva-voce			2	

9. First Semester Courses

CA500101	Computational Mathematics
CA020101	Advanced Computer Architecture
CA020102	Operating System& Shell Programming
CA500102	Advanced Java Programming
CA020103	Lab I [Java &Shell Programming]

CA500101--Computational Mathematics

Module I

Mathematical Logic: Propositional Calculus: Statements and notations, Connectives: negation, conjunction, disjunction, statement formulas and truth tables, conditional and biconditional, Well-formed formulas, tautologies, equivalence of formulas, tautological implication. Normal forms: Disjunctive and conjunctive normal forms.

Predicate calculus: Predicates, statement functions, variables and quantifiers, predicate formulas, free & bound variables, universe of discourse.

Module II

Basic Statistics: Measure of central value: Introduction, types of average- arithmetic mean: calculation of arithmetic mean-discrete series, continuous series. Median: calculation of median-discrete series, continuous series. Mode: calculation of mode- discrete series, continuous series.

Measures of dispersion: Absolute and relative measures of dispersion, Range, Mean deviation: calculation of mean deviation-individual observations, discrete series, and continuous series. Standard deviation: calculation of standard deviation- individual observations, discrete series, continuous series, coefficient of variation.

Module III

Correlation & Regression analysis: introduction, correlation and causation, types of correlation, Karl Pearson's coefficient of correlation-direct method of finding out correlation coefficient, calculation of correlation coefficient when change of scale and origin is made.

Regression: introduction, regression equation of y on x, regression equation of x on y.

Module IV

Theory of Automata: Definition, Description of finite automaton, Transition systems and its properties, Acceptability of a string by a finite automata, Non deterministic finite state machines, Equivalence of DFA and NFA, Minimization of finite automata -construction of minimum automaton. Regular sets and regular grammar: Regular expressions, Transition system containing null moves, construction of finite automata equivalent to a regular expression.

Module V

Fuzzy logic: Introduction, Crisp set an overview, Fuzzy sets basic types, Basic concepts, Characteristics and significance of paradigm shift.

References:

1. J.P. Tremblay & R Manohar- Discrete Mathematical Structures with Applications to Computer Science, McGraw Hill.
2. S. P. Gupta- "Statistical Methods", Sultan Chand & Sons.

3. K.L.P Mishra & N. Chandrasekaran -Theory of Computer Science(Automata ,Languages and Computation) ,Prentice hall of India.
4. George J Klir& Bo Yuan- Fuzzy sets and Fuzzy logic Theory and applications, Prentice hall of India.

CA020101--Advanced Computer Architecture

Module 1

Fundamentals of Computer design –Computer Architecture- Trends in technology and cost – measuring, reporting, and summarizing performance -Quantitative principles of computer design. Instruction set principles and examples - classifying instruction set - memory addressing - type and size of operands - operations in the instruction set - instructions for control flow - encoding an instruction set - the role of compiler

Module 2

Instruction level parallelism (ILP) - over coming data hazards - reducing branch costs – high performance instruction delivery - hardware based speculation - limitation of ILP - ILP software approach - compiler techniques - static branch protection - VLIW approach – H/w support for more ILP at compile time – H/W versus S/W speculation

Module 3

Multiprocessors and thread level parallelism - symmetric shared memory architectures - distributed shared memory - Synchronization - Multithreading.

Module 4

Memory hierarchy design - cache performance - reducing cache misses penalty and miss rate – virtual memory - protection and examples of VM.

Module 5

Storage systems - Types – Buses - RAID - errors and failures - bench marking a storage device - designing an I/O system. Inter connection networks and clusters - interconnection network media – practical issues in interconnecting networks - examples – clusters - designing a cluster

Reference Text:

1. John L. Hennessy & David Patterson, “Computer Architecture A quantitative approach” 3 rd/4th Edition, Morgan Kauffman Publishers.
- 2.Kai Hwang and A.Briggs, “Computer Architecture and parallel Processing” ,International Edition, McGraw – Hill.
3. DezsoSima, Terence Fountain, Peter Kacsuk,“Advanced Computer Architectures” Pearson.

CA020102-- Operating Systems& Shell Programming

Module I

Introduction to operating systems- Functions of operating system - Types of operating systems-Batch Operating System, Multi programming-Time sharing, Real time, distributed operating systems. Operating system operations- dual mode and multimode operation. System structures - Operating system services , System calls , Types of system calls ,Operating system structure-Simple structure, Layered approach.

Module II

Process management - Process concept - Process state , PCB , Process Scheduling - Scheduling queues, Schedulers, Context switch, Operations on processes - creation, termination, Interprocess Communication- Shared memory systems , MessagePassing systems.

.Process Scheduling – Basic Concepts, Scheduling criteria , Scheduling algorithms- FCFS, SJF, Priority scheduling, RR scheduling, Multilevel queue scheduling, Multilevel Feedback queue scheduling .

Module III

Process Synchronization - The critical section problem- Peterson's solution, Synchronization hardware, Mutex Locks, Semaphores, Monitors, Monitor usage

Deadlocks – System model, Deadlock characterisation, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock

Module IV

Memory management- Memory management strategies - Basic hardware , Address binding , Logical Vs Physical address space, Dynamic loading , Dynamic linking and shared libraries , Swapping ,Contiguous memory allocation ,segmentation , Paging - Basic method , Hardware support , Protection ,Shared pages.

Virtual memory management :- Demand paging - Basic concepts, Performance of demand paging, Page Replacement, Page Replacement algorithms - FIFO, Optimal page replacement, LRU page replacement .

Module V

The Linux System - Features , Advantages , Various types of shells available in Linux Linux Commands for files and directories - cd, ls, cp ,rm, mkdir, rmdir, pwd, file , more, less . Filter commands, file processing commands .

Shell programming – Basics of shell programming – shell programming in Bash,conditional and looping statements, case statement , parameter passing and arguments , shell variables, system shell variables, shell keywords , creating shell programs for automating system task .

Reference Text

1. Abraham Silberschatz, Galvin,Gange, Operating System Concepts, - 9th edition ,Wiley Publishers .
2. Milan Milenkovic, Operating Systems, Second Edition .
3. Official Red hat Linux Users Guide- Red hat, Wiley Dreamtech India.
4. Christopher Negus - Red Hat Linux Bible - 2005 Edition,Wiley Dreamtech India.
5. YeswantKanethkar - Unix Shell Programming -First Edition, BPB .

CA500102—Advanced Java Programming

Module I : Object Oriented Programming Concepts and Basics of Java.

Java Programming Environment – JDK, Java Virtual Machine, Bytecode, Features of Java Flow Control Statements – Conditional Statements, Iteration Statements, Jump Statements Arrays –One Dimensional Array, Multi-dimensional Array , Object Oriented Programming Concepts- (Objects and Classes, Encapsulation, Inheritance, Polymorphism) , Type of Inheritance , Method Overloading, Method Overriding, Dynamic Method Despatch

Module II :Input/Output Handling

Constructors- Constructor Overloading , this, super, final, abstract and static Keywords, Interfaces- Defining an Interface, Implementing Interface, Extending Interfaces. String - String Handling Fundamentals, Comparison of String and StringBuffer Class, Special String Operations- Character Extraction, String Comparison, Searching String, Modifying a String, String Copy ,Input and Output Streams – Byte Stream , Character Stream

Module III:Packages; Exception Handling and Thread

Packages – Defining Packages, Built in Packages(java.lang, java.util, java.io, java.net, javax.swing), Importing Packages, Implementation of User Defined Packages, Access Protection in Java, Exception Handling - try, catch, throw, throws and finally Statements,

Java's Built-in Exceptions, Creating User Defined Exceptions. Threads- Thread Lifecycle, Thread Priorities, The Thread Class, Runnable Interface, Creating a Thread – Implementing Runnable, Extending Thread , Inter Thread Communication, Suspending Resuming and Stopping Threads.

Module IV: GUI Programming

Basic Event Handling – Delegation Event Model, Important Event Classes And Listener Interfaces, Handling Mouse and Keyboard Events, Adapter Classes, Swing -Window Fundamentals – Class Hierarchy, Frame, Creating a Simple Window Based Application, ImageIcon, JLabel, JTextField, JTextArea, JButton, JCheckBox, JRadioButton, JList, JComboBox, JTable, JTabbedPane, JScrollPane, Layout Management – The FlowLayout, BorderLayout, GridLayout, CardLayout

Module V : File, Database and Networking

File Management - Reading and Writing Files (FileInputStream and FileOutputStream Classes), Networking Basics- Networking Classes and Interfaces, InetAddress, TCP/IP Client Sockets, URL Connection, TCP/IP ServerSockets, JDBC - The Design of JDBC, JDBC Configuration, Executing SQL Statements- Scrollable and Updatable ResultSets, RowSets, Transactions.

Reference Text

1. Herbert Schildt, Java 2 The Complete Reference, Tata McGraw Hill (5thEdn.)
2. James. P. Cohoon, Programming java5.0, Jack. W. Davison (Tata McGraw Hill)
3. C Thomas Wu, An introduction to Object Oriented Programming with Java, Tata McGraw Hill, (2006)
4. Wigglesworth and McMillan, Java Programming: Advanced Topics, , Cengage Learning India, 3rdEdn.
5. Bernard Van Haecke, JDBC:Java Database Connectivity, , IDG Books India (2000)

CA020103 – Lab I Advanced Java Programming

1. Basic Concepts and File Handling
 - 1.1. Inheritance, Polymorphism
 - 1.2. Constructors
 - 1.3. Interface
 - 1.4. Package
 - 1.5. One Dimensional and Two Dimensional Array Manipulation
 - 1.6. String Handling (Character Extraction, String Comparison, Searching String, Modifying a String, String Copy)

- 1.7. Exception (Built-in and User Defined)
- 1.8. Thread (Using Runnable Interface and Thread Class)
- 1.9. File management (File reading, Writing, Appending and Content Replacing)
2. GUI, Database and Networking
 - 2.1. Event Handling (Keyboard and Mouse Events)
 - 2.2. Working with Swing (ImageIcon, JTextField, JTextArea, JButton, JCheckBox, JRadioButton, JComboBox, JList, JTable)
 - 2.3. Layout Management (The FlowLayout, BorderLayout, GridLayout, CardLayout)
 - 2.4. Simple Programs of Database Connectivity

Shell Programming

1. Implement Basic Linux commands for files and directories - cd, ls, cp ,rm, mkdir, rmdir, pwd, file , more, less
2. Implement Filter commands, file processing commands.
3. Shell programming using conditional and looping statements
4. Shell programming using case-esac statement
5. Shell programs for automating system administration and routine tasks.

10. Second Semester Courses

CA500201	Advanced Data Structures
CA020201	Ad Hoc and sensor network
CA020202	Cloud Computing
CA500202	Database Management system and SQL
CA020203	Lab II [DS using Java, SQL]

CA500201-- Advanced Data Structures

Module I

Concept of data structures, types of data structures, examples.

Introduction to algorithms, Performance analysis-Space complexity, Time complexity, Amortised complexity, Asymptotic notations, Performance measurement; Various algorithm designing techniques-Divide and conquer, Greedy method, Dynamic programming, Backtracking, Branch and bound, Np -hard and Np -completeness problems.

Module II

Arrays: Organization, Representation and implementation of arrays, examples. Implementation of Stacks and Queues, Circular Queues, Priority Queues, Double ended queues, Applications of stacks and queues.

Sorting and Searching techniques: Linear and Binary search, Selection sort, Merge sort, Simple insertion sort, Quick sort, Shell sort, Radix sort.

Module III

Lists: Representation and implementation of singly linked list, Circular linked lists, doubly linked list, Linked list representation of stacks and queues, examples.

Dynamic storage management. Boundary tag system. Garbage collection and compaction.

Module IV

Trees: Representation and Implementation, Binary trees, insertion and deletion of nodes in binary tree, binary tree traversals, Binary search trees, Threaded Binary trees, Balanced trees (AVL trees), B- trees- Insertion and Deletion of nodes, Tree search

Module V

Graphs: Directed Graphs, Shortest Path Problem, Undirected Graph, Spanning Trees, Techniques for graphs –Breadth First Search (BFS) and traversal, Depth First Search (DFS) and traversal

Hashing: Static hashing, hash tables, hash functions, overflow handling.

Reference Text

1. Robert Lafore, Data structures and Algorithms in Java, Pearson Publications
2. Clifford A Shaffer , Data Structures and Algorithm analysis in Java

3. Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, Computer Algorithms/C++, University press publications
4. G S Baluja, Data structures Through C++
5. Ellis Horowitz and SartajSahni , Fundamentals of Data structure

CA020201--Ad Hoc and Sensor Networks

Module I Introduction

Fundamentals of wireless communication technology – the electromagnetic spectrum – radio propagation mechanisms – characteristics of the wireless channel -mobile ad hoc networks (MANETS) and wireless sensor networks (WSNs): concepts and architectures. Applications of ad hoc and sensor networks. Design challenges in ad hoc and sensor networks.

Module II Mac Protocols For Ad Hoc Wireless Networks

Issues in designing a MAC Protocol- Classification of MAC Protocols- Contention based protocols Contention based protocols with Reservation Mechanisms- Contention based protocols with Scheduling Mechanisms – Multi channel MAC-IEEE 802.11

Module III Routing Protocols And Transport Layer In Ad Hoc Wireless Networks

Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing, reactive routing (on-demand), hybrid routing- Classification of Transport Layer solutions-TCP over Ad hoc wireless Networks.

Module IV Wireless Sensor Networks (WSNs) And Mac Protocols

Single node architecture: hardware and software components of a sensor node - WSN Network architecture: typical network architectures-data relaying and aggregation strategies - MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA based MAC- IEEE 802.15.4.

Module V WSN Routing, Localization & Qos

Issues in WSN routing – OLSR- Localization – Indoor and Sensor Network Localization-absolute and relative localization, triangulation-QOS in WSN-Energy Efficient Design-Synchronization-Transport Layer issues.

Reference Text

1. C. Siva Ram Murthy, and B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols ", Prentice Hall Professional Technical Reference, 2008.
2. Carlos De MoraisCordeiro, Dharma Prakash Agrawal “Ad Hoc & Sensor Networks: Theory and Applications”, World Scientific Publishing Company, 2006.

3. Feng Zhao and Leonides Guibas, "Wireless Sensor Networks", Elsevier Publication - 2002.
4. Holger Karl and Andreas Willig "Protocols and Architectures for Wireless Sensor Networks", Wiley, 2005

CA020202 – Cloud Computing

Module I Cloud Computing Basics

Cloud Computing Basics - cloud computing Overview – Cloud components, Infrastructure, Services -, Applications – Storage, Database services -, Intranets and the cloud – components, Hypervisor applications - First Movers in the Cloud Your Organization and Cloud Computing – When you can use Cloud computing, Benefits, Limitations, Security Concerns, Regulatory Issues

Module II The Business case for going to the cloud

Cloud Computing with the Titans – Google, EMC, NetApp, Microsoft, Amazon, Salesforce.com, IBM. The Business case for going to the Cloud - Cloud Computing services- Infrastructure as a Service, Platform as a Service, Software as a Service, Software plus services, How applications help your business, Deleting your data center

Module III Cloud computing- Hardware and Infrastructure

Cloud Computing Technology :Hardware and Infrastructure – Clients – Mobile, thin, Thick - Security- Data leakage, Offloading work, Logging, Forensic, Development, Auditing Network – Basic public Internet, The accelerated Internet, Optimized Internet overlays, Cloud providers, cloud consumers, Services. Accessing the Cloud – Platforms – Web Application framework, Web hosting service, Proprietary methods - , Web Applications, Web APIs- What are APIs, How APIs work, API Creators -, Web Browsers

Module IV Cloud storage

Cloud Storage – Overview-The Basics, storage as a service, Providers, security, Reliability, advantages, cautions, Outages, Theft-, Cloud storage providers, Standards- Application – Communication, Security -, Client – HTML, Dynamic HTML, JavaScript -, Infrastructure – Virtualization, OVF -, Service – Data, Web service

Module V Developing Applications

Developing Applications-Google, Microsoft, Intuit QuickBase, Cast Iron cloud, Bungee connect, Development, Trouble shooting, Application Management Local clouds and Thin

Clients Virtualization in your Organization- why virtualize, How to virtualize, concerns, security-, Server solutions- Microsoft Hyper-V, VMware, VMware Infrastructure

Reference Text

1. Anthony T Velte, Toby J Velte and Robert Elsenpeter, " Cloud Computing –A Practical Approach", Tata McGraw Hill Education Pvt Ltd, 2010
2. Judith Hurwitz, Robin Bloor, Marcia Kaufman and Fern Halper, "Cloud Computing for Dummies". Wiley- India edition, 2010
3. Syed A. Ahson and Mohammed Ilyas, "Cloud Computing and Software Services : Theory and Techniques", CRC Press, Taylor and Francis Group, 2010

CA500202--Database Management System and SQL

Module I

Database, need for DBMS, users, DBMS architecture, data models, views of data, data independence, database languages, Relational Model-Basic concepts, keys, integrity constraints, ER model-basic concepts, ER diagram, weak entity set, ER to Relational, relationships, generalization, aggregation, specialization

Module II

Codd's rules, Relational model concepts, Relational algebra- Select, Project, Join, Relational calculus-tuple relational calculus and domain relational calculus, Specifying constraints management systems, Anomalies in a database, Functional dependencies, Normalization-First, Second, Third, Boyce Codd normal forms, multi-valued dependency and Fourth normal form, Join dependency and Fifth normal form.

Relational database query languages-Basics of SQL, Data definition in SQL- Data types, Creation, Insertion, Viewing, Updation, Deletion of tables, Modifying the structure of the tables, Renaming, Dropping of tables, Data constraints-I/O constraints, ALTER TABLE command.

Module III

Database manipulation in SQL- Computations done on the table- Select command, Logical operators, Range searching, Pattern matching, Grouping data from tables in SQL, GROUP BY, HAVING clauses, Joins-Joining multiple tables, Joining tables to itself, DELETE, UPDATE, Views-Creation, Renaming the column of a view, Destroys view- Program with SQL, Security-locks, Types of locks, Levels of locks, Cursors - working with cursors, error handling, Developing stored procedures,-Creation, Statement blocks, Conditional execution, Repeated execution, Cursor-based repetition, Handling Error conditions, Implementing triggers, Creating triggers, Multiple trigger interaction.

Module IV

Concept of transaction, ACID properties, serializability, states of transaction, Concurrency control, Locking techniques, Time stamp based protocols, Granularity of data items,

Deadlock, Failure classifications, storage structure, Recovery & atomicity, Log base recovery, Recovery with concurrent transactions, Database backup & recovery, Remote Backup System, Database security issues

Module V

Object Oriented Database Management Systems (OODBMS) - concepts, need for OODBMS, composite objects, issues in OODBMSs, advantages and disadvantages of OODBMS. Distributed databases - motivation - distributed database concepts, types of distribution, architecture of distributed databases, the design of distributed databases, distributed transactions, commit protocols for distributed databases

Reference Text

1. Elmasri and Navathe, Fundamentals of Database Systems, 5th Edition, Pearson
2. Abraham Silbersehatz, Henry F. Korth and S.Sudarshan, Database System Concepts, 6 th Edition, Tata McGraw-Hill.
3. James R. Groff and Paul N. Weinberg The complete reference SQL Second edition, Tata McGraw Hill

CA020203-Lab-II-DS & SQL

Advanced Data Structures (Using Java)

1. Array implementation – Insertion of new element into a specified position, Deletion of an element from the specified position within the array
2. Stack implementation – PUSH, POP and Traverse
3. Queue implementation – Insertion, deletion and Traverse
4. Circular Queue implementation – Insertion, deletion and Traverse
5. Deque (Double ended queue) implementation – Insertion, deletion and Traverse
6. INFIX to POSTFIX Conversion
7. INFIX to PREFIX conversion
8. POSTFIX evaluation
9. Searching - Linear and Binary search using arrays
10. Sorting – Selection sort, Merge sort, Simple insertion sort, Quick sort, Shell sort, Radix sort
11. Lists implementation - Singly linked list, Circular linked list, Doubly linked list
12. Dynamic array implementation- Linked list representation and implementation of stack and queue operations

13. Creation of binary tree, counting no. of nodes and display the nodes in a tree
14. Searching a node in a binary tree
15. Insertion and deletion of nodes in a B-Tree
16. Graphs – Implementation of BFS and DFS

SQL

1. Creating database tables and using data types (create table, modify table, drop table).
2. Data Manipulation (adding data with INSERT, modify data with UPDATE, deleting records with DELETE).
3. Implementing the Constraints (NULL and NOT NULL, primary key and foreign key constraint, unique, check and default constraint).
4. Retrieving Data Using SELECT (simple SELECT, WHERE, IN, BETWEEN, ORDERED BY, DISTINCT and GROUP BY).
5. Aggregate Functions (AVG, COUNT, MAX, MIN, SUM).
6. String functions.
7. Date and Time Functions.
8. Use of union, intersection, set difference.
9. Implement Nested Queries & JOIN operation.
10. Performing different operations on a view.
11. Stored Procedure Programming – Simple Procedures – decision making – Loops – Error handlers – Cursors – Functions - Triggers – Calling Stored Procedure from Triggers.

11. Third Semester Courses

CA020301	Web programming using PHP
	Elective I
CA020302	Mobile Computing
CA500301	Software Engineering
CA020303	Lab III [PHP]
CA020304	Mini Project -Android

CA020301 Web Programming using PHP

Module I: Introduction

Internet Standards – Introduction to WWW – WWW Architecture – SMTP – POP3 – File Transfer Protocol - Overview of HTTP, HTTP request – response — Generation of dynamic web pages. Client side Scripting Vs Server side scripting HTML Introduction to HTML, HTML Tags, Creating Forms, Creating tables, Managing home page, Ethics in Web Programming.

Module II: CSS and Javascript

Introduction to CSS, Three ways to use CSS, CSS Properties, Designing website, Working with Templates Introduction to Javascript, Three ways to use Javascript, Working with events, Client-side Validation

Module III: PHP Basics

PHP Basics- Syntax, Operators, Variables, Constants, Control Structures, Language Constructs and Functions. Functions- Syntax, Arguments, Variables, References, Returns, Variable Scope Arrays- Enumerated Arrays, Associative Arrays, Array Iteration, Multi-Dimensional Arrays, Array Functions, SPL Object Oriented Programming- Instantiation, Modifiers/Inheritance, Interfaces, Exceptions, Static Methods and Properties, Autoload, Reflection, Type Hinting, Class Constants.

Module IV: Strings and Patterns

Strings and Patterns- Quoting, Matching, Extracting, Searching, Replacing, Formatting Web Features- Sessions, Forms, GET and POST data, Cookies, HTTP Headers Databases and SQL - SQL, Joins, Analyzing Queries, Prepared Statements, Transactions. Streams and Network Programming- Files, Reading, Writing, File System Functions, Streams

Module V: Case study on latest framework

Introduction to Model, View and Controllers, Architecture of Framework, Application development using framework

Reference Text

1. Harvey Deitel and Abbey Deitel, “Internet and World Wide Web - How To Program”, Fifth Edition, Pearson Education, 2011.

2. Achyut S Godbole and AtulKahate, “Web Technologies”, Second Edition, Tata McGraw Hill, 2012.
3. Eli Orr and Yehuda Zadik, “Programming with CodeIgniter MVC”, Packt Publishing, 2013
4. Thomas A Powell, Fritz Schneider, “JavaScript: The Complete Reference”, Third Edition, Tata McGraw Hill, 2013.
5. Professional PHP 6 EdcLecky –Thompson, Steven D. Nowicki, Thomas Myer Wrox Publishers
6. PHP6 and MySQL Bible – Steve Suehring, Tim Converse and Joyce Park, Wiley India Pvt.Ltd
7. Adam Griffiths , CodeIgniter 1.7 Professional Development, Packt Publishing,2010

CA020302 Mobile Computing

Module I

Introduction

Mobile computing vs wireless network, Mobile computing Applications, Characteristics of Mobile computing, Structure of Mobile computing Application. MAC protocols- wireless MAC issues, Fixed Assignment schemes, Random assignment schemes, Reservation based schemes.

Module II

Mobile Internet protocol and Transport layer

Overview of mobile IP- Features of mobile IP, Key mechanism in mobile IP route optimization, Overview of TCP/IP- Architecture of TCP/IP, Adaptation of TCP window, Improvement in TCP performance.

Module III

Mobile Telecommunication system

Global system for Mobile communication (GSM), General Packet Radio Service (GPRS), Universal Mobile Telecommunication System (UMTS).

Module IV

Mobile Adhoc Network

Ad-Hoc basic concepts, Characteristics, Applications, Design issues, routing, Essential of traditional routing protocol, Popular routing protocols, Vehicular AdHoc network VANET, MANET vs VANET, security.

Module V

Mobile platforms and applications

Mobile device operating system, special constraints and requirements, commercial mobile operating system, software development kit- iOS, Android, BlackBerry, windows phone, M-commerce, structure, pros & Cons, Mobile payment system, Security issues.

Reference Text

1. Raj Kamal, Mobile Computing, Second Edition, Oxford University press
2. Ashoke K Talukder, Hasan Ahamed, Mobile Computing Technology- Application and service creation, Second edition, McGraw Hill Education.
3. Jochen Schiller, Mobile Communication, Pearson Education Asia

CA500301--Software Engineering

Module I

Introduction-Software engineering, Software process, SE practices, Process models-Generic process models, Prescriptive process model, Specialised process model, The unified process model.

Module II

Agile Development-Agility, Agility and cost of change, Agile process, Extreme programming, Adaptive software development, Scrum, Dynamic system development method, Feature driven development, Agile Modeling, Agile Unified Process.

Introduction to UML: Class Diagram, Deployment Diagram, Use-Case Diagram, Sequence Diagram, Communication Diagram, Activity Diagram, State Diagram.

Module III

Understanding Requirements-Requirement engineering, Building the Requirement model- Requirement modeling approaches-Scenario based modelling, UML Model that supplement the Use Case, Data modelling concepts Class Based modeling -Class responsibility collaborator modelling, Flow oriented modelling, Creating a behavioural model.

Module IV

Software Design-Design concepts-The Design Model, Architectural Design- Architectural styles and design, Architectural mapping using data flow, Component level design-Design guidelines, Conducting component level design, Component based development, User Interface Design-Golden rules, Interface design steps.

Testing- Software testing strategy-A Strategic Approach to software testing. Testing conventional applications-White box testing, Black box testing, Testing object-oriented applications-Object-oriented testing methods.

Module V

Software project management-Software measurement, Metrics for software quality, Software project estimation-Decomposition technique ,Empirical estimation model-The COCOMO11 Model. Project scheduling-basic principles-Defining a task set, Defining a task network, scheduling .Risk management-Software Risks, Risk identification, Risk projection, Risk refinement, THE RMMM PLAN.

Reference Text

1. Roger S. Pressman, “Software Engineering: A Practitioner’s Approach” .McGrawHill International Edition. 7th Edition.
2. Carlo Ghezzi, Mehdi Jazayeri. Dino Mandrioli : “Fundamentals of software Engineering” , Second Edition.
3. Richard Fairley : Software Engineering Concepts”, Tata McGraw Hill Edition 1997.
4. Martin I. Shooman : “Software Engineering – Design Reliability and Management”,McGraw Hill International Edition.

CA020303—Lab III PHP

CA020304—Mini Project using Android

12. Fourth Semester Courses

CA020401	Big Data Analytics
	Elective II
	Elective III
CA020402	Project
CA020403	Viva-voce

CA020401 Big Data Analytics

Module I

Introduction to big data: Data, Characteristics of data and Types of digital data: Unstructured, Semi-structured and Structured, Sources of data, Working with unstructured data, Evolution and Definition of big data, Characteristics and Need of big data, Challenges of big data, Data environment versus big data environment

Module II

Big data analytics: Overview of business intelligence, Data science and Analytics, Meaning and Characteristics of big data analytics, Need of big data analytics, Classification of analytics, Challenges to big data analytics, Importance of big data analytics, Basic terminologies in big data environment

Module III

Big data technologies and Databases: Introduction to NoSQL, Uses, Features and Types, Need, Advantages, Disadvantages and Application of NoSQL, Overview of NewSQL, Comparing SQL, NoSQL and NewSQL, Introduction to MongoDB and its needs, Characteristics of MongoDB, Introduction of Apache Cassandra and its needs, Characteristics of Cassandra

Module IV

Hadoop foundation for analytics: History, Needs, Features, Key advantage and Versions of Hadoop, Essential of Hadoop ecosystems, RDBMS versus Hadoop, Key aspects and Components of Hadoop, Hadoop architectures

Module V

Hadoop MapReduce and YARN framework: Introduction to MapReduce, Processing data with Hadoop using MapReduce, Introduction to YARN, Components, Need and Challenges of YARN, Dissecting YARN, MapReduce application, Data serialization and Working with common serialization formats, Big data serialization formats

Reference Text

1. Seema Acharya and SubhashiniChellappan, “Big Data and Analytics”, Wiley India Pvt. Ltd., 2016
2. Judith Hurwitz, Alan Nugent, Dr. Fern Halper and Marcia Kaufman “Big Data” by Wiley Publications, 2014.
3. SoumendraMohanty, MadhuJagadeesh and Harsha Srivatsa Big Data Imperatives : Enterprise Big Data Warehouse, BI Implementations and Analytics,Apress Media, Springer Science + Business Media New York, 2013
4. AnandRajaraman, Jure Leskovec, Jeffery D. Ullman Mining of Massive Datasets”, Springer, July 2013.
5. Tom White, Hadoop: The definitive Guide”, O'Reilly Media, 2010.

13. Electives

Group A

CA800301-Introduction to Cyber Security

Module 1

What Is Computer Security?, Values of Assets, Threats, Confidentiality, Integrity, Availability,, Types of Threats, Types of Attackers, Harm, Risk and Common Sense, Method–Opportunity–Motive, Controls, Authentication, Identification Versus Authentication, Authentication Based on Phrases and Facts: Something You Know, Authentication Based on Biometrics: Something You Are, Authentication Based on Tokens: Something You Have.

Module 2

Access Control, Access Policies, Implementing Access Control, Procedure-Oriented Access Control, Role-Based Access Control.Cryptography, Problems Addressed by, Encryption, Terminology.Malicious Code—Malware, Malware—Viruses, Trojan Horses, and Worms, Technical Details: Malicious Code.Countermeasures for Users.Email Attacks, Fake Email, Fake Email Messages as Spam, Fake (Inaccurate) Email Header Data Phishing, Protecting Against Email Attacks.

Module 3

Security in Operating Systems, Security Features of Ordinary Operating Systems, Protected Objects, Operating System Tools to Implement Security, Functions, Security in the Design of Operating Systems ,Simplicity of Design, Layered Design, Kernelized Design Reference Monitor, Correctness and Completeness, Secure Design Principles Trusted Systems, Trusted System Functions.

Module 4

Threats to Network Communications Interception: Eavesdropping and Wiretapping, Modification, Fabrication: Data Corruption, Interruption: Loss of Service, Port Scanning. Denial of Service, How Service Is Denied, Flooding Attacks in Detail, Distributed Denial-of-Service, Scripted Denial-of-Service Attacks ,Bots, Botnets, Firewalls, What Is a Firewall?, Design of Firewalls Types of Firewalls, Intrusion Detection Systems, Types of IDSs.

Module 5

Security Requirements of Databases, Integrity of the Database, Element Integrity, Auditability, Access Control, User Authentication, Availability, Integrity/Confidentiality/Availability.

Information Technology Act 2000, Cyber Crimes- Computer Crime, Nature of Crimes, Penalty for damage to computer, Computer system, Tampering with Computer source documents, Hacking, Computer related offences.

Reference Text

- 1.Charles P. Pfleeger ,Shari Lawrence Pfleeger ,Jonathan Margulies - Security in Computing, Fifth Edition
- 2.Barkhs and U. Rama Mohan, “Cyber Law Crimes”, Asia Law House, New Edition
3. Sood,“Cyber Laws Simplified”, Mc Graw Hill

CA800402 – Cryptography

Module 1

Classical Encryption Techniques-Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Steganography. Traditional Block Cipher Structure, The Data Encryption Standard, The Strength of DES, Block Cipher Design Principles.

Module 2

Advanced Encryption Standard-AES Structure, AES Transformation Functions, AES Key Expansion, AES Implementation. Multiple Encryption and Triple DES. Principles of Pseudorandom Number Generation, Pseudorandom Number Generators, Stream Ciphers, RC4, True Random Number Generators.

Module 3

Principles of Public-Key Cryptosystems, The RSA Algorithm, Diffie-Hellman Key Exchange, Cryptographic Hash Functions, Applications of Cryptographic Hash Functions, Secure Hash Algorithm (SHA).

Module 4

Message Authentication Codes, Message Authentication Requirements, Message Authentication Functions, Requirements for Message Authentication Codes, MACs Based on Hash Functions: HMAC.

Module5

Key Management and Distribution, Symmetric Key Distribution Using Symmetric Encryption, Symmetric Key Distribution Using Asymmetric Encryption, Distribution of Public Keys, X.509 Certificates, Public-Key Infrastructure, Digital Signatures- Digital Signatures.

Reference Text

1. Cryptography and Network Security *Principles and Practice* Sixth Edition William Stallings 2014.
2. Bruce Schneier, Applied Cryptography, Second edition, Wiley publications, 2006

CA800403- Ethical Hacking

Module 1

Ethics of Ethical Hacking, Ethical Hacking and the Legal System, Proper and Ethical Disclosure, Social Engineering Attacks, Physical Penetration Attacks, Insider Attacks.

Module 2

Vulnerability Analysis- Passive Analysis, Advanced Static Analysis with IDA Pro, Advanced Reverse Engineering, Client-Side Browser Exploits, From Vulnerability to Exploit.

Module 3

Hacking windows – Network hacking – Web hacking – Password hacking. A study on various attacks – Input validation attacks – SQL injection attacks – Buffer overflow attacks - Privacy attacks.

Module 4

TCP / IP – Checksums – IP Spoofing port scanning, DNS Spoofing. Dos attacks – SYN attacks, Smurf attacks, UDP flooding, DDOS – Models. Firewalls – Packet filter firewalls, Packet Inspection firewalls – Application Proxy Firewalls. Batch File Programming.

Module 5

Basic Linux Exploits, Advanced Linux Exploits, Collecting Malware and Initial Analysis, Hacking Malware.

Reference Text

1. Ankit Fadia“ Ethical Hacking” 2nd Edition Macmillan India Ltd
2. Gray Hat Hacking The Ethical Hacker’s Handbook ,Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, Gideon Lenkey, and Terron Williams, Third Edition.

Group B

CA830301 Artificial Intelligence

Module I: Introduction to Artificial Intelligence

Introduction to Artificial Intelligence – Knowledge Representation Schemes – Production and Non Production Systems – Expert System Architecture, Ethical issues in AI

Module II: General concepts in knowledge Acquisition

General concepts in knowledge Acquisition – Types of learning, Difficulty in knowledge Acquisition, General Learning model. Early work in Machine Learning – Analogical and Explanation based learning – Analogical Reasoning and Learning – Examples, Explanation based learning.

Module III: Neural Networks

Artificial Neural Network – Types of ANN – Learning in ANN- Back Propagation – Bayesian Networks – Genetic Algorithms – Applications of Neural Networks

Module IV: Natural Language processing

Natural Language Processing – Overview of Linguistics – Grammars and Languages - Parsing- Basic Parsing Techniques – Pattern Recognition – Recognition and Classification Process

Module V: Computer Vision

Introduction to Computer Vision – Computer Vision Vs Image Processing – Tools: Open CV

Reference Text

1. D. W. Patterson, Introduction to Artificial Intelligence and Expert system, Prentice Hall of India
2. Joseph Howse, Open CV Computer Vision with Python
3. Elaine Rich, Artificial Intelligence, Mc Graw Hill.
4. Nilson N. J, Principles of Artificial Intelligence, Springer Verlag.
5. Charvanak. E and Mc dermoit D, Introduction to Artificial Intelligence, Addison Wesley

CA830402 Software Testing**Module I:** Introduction to Software Testing

Software Testing Definition, Why Should we Test, What should be tested, Approaches to Testing, Essentials of Software Testing, Important features of Testing Process, Categories of Defects, Concepts of Fault, Error, Bug and Failure, Introduction to Test, Test Case and Test Suite, Importance of Software Quality and Reliability, Test Strategy and Policy, Developing Testing Methodology, Attitude towards testing.

Module II: Software Verification and Validation

Introduction to Software verification, Software verification Methods, SRS Document Verification, SDD Document Verification, Source Code Review, User Documentation Verification, Software Project Audit, Introduction to software validation, Levels of Validation, Prioritization/Slice based Testing, Acceptance Testing, Management of Verification and Validation, Comparison of Verification and Validation, V Test Model/Software Lifecycle Model.

Module III: Testing Techniques and Tools

Levels of Testing, Acceptance Testing, Acceptance Testing Criteria, Preface to Alpha, Beta and Gamma Testing, Customer responsibility in Acceptance Testing, Developing Acceptance Test Plan, Executing Acceptance Test Plan, Testing Tools, Features of Testing Tools, Guidelines for selecting Testing Tool, Tools and Skills of Software Tester, Static and Dynamic Testing Tools, Advantages and disadvantages of Testing tools, Testing using Automated Tools.

Module IV: Object Oriented and Web Application Testing

Preface to Object Oriented Testing, Path Testing, State Based Testing, Class Testing, Issues related to class testing, Web Testing, Functional Testing, User Interface Testing, Usability

Testing, Configuration and Compatibility Testing Guidelines, Browser Testing, Security Testing, Performance Testing, Database Testing, Post Deployment Testing.

Module V: Automated Test Data Generation and Test Process Management

Introduction, Test Adequacy Criteria, Static and Dynamic Test Data Generation, Approaches to Test Data Generation: Random Testing, Symbolic Execution, Test Data Generation using Genetic Algorithm: Initial Population, Crossover and Mutation, Fitness Function, Selection, Algorithm for Generating Test Data, Test Data Generation Tools, Test Process Improvement: Problems concerning Test Process, Need for Test Process Improvement, Test Process Maturity, Test Process Improvement Model and Stages.

Reference Text

1. Yogesh Singh, Software Testing, Cambridge University Press Publication, 2012.
2. M. G Limaye, Software Testing Principles, Techniques and Tools, Tata McGraw-Hill Publications, 2009.
3. Srinivasan Desikan, Gopaldaswamy Ramesh, Software Testing: Principles and Practices, Pearson Education, 2007.
4. Naresh Chauhan, "Software Testing Principles and Practices" Oxford University Press, New Delhi, 2010.

CA830403 Visual Programming Using C#

Module 1

The C# language - Introduction to C# program, Variables and expressions, Flow control, More about variables, Functions, Debugging and error Handling.

Introduction to Object Oriented - Programming, Defining classes, Defining class members, Additional OOP techniques.

Module 2

Windows Programming – Basic Windows Programming, Advanced Windows forms features- Menus and toolbars, SDI and MDI Applications, Building MDI Applications.

Deploying Windows Applications – Deployment overview, Clickonce Deployment-creating the clickonce deployment, installing the application with clickonce.

Module 3

Basic web programming- ASP.NET web programming, Server Controls, State management, Web services -web services architecture, creating a web service, creating a simple asp.net web service, implementing a windows client, implementing an asp.net client.

Deploying web applications -IIS, IIS Configuration, copying a website, publishing a web application, Windows Installer, Installing the web application.

Module 4

Data Access – File system Data, XML- XML Documents, Using XML in your application, Data Access with ADO.NET- Overview of ADO.Net classes and objects, Reading data with Data Reader and DataSet, Updating the database, Accessing multiple tables in a DataSet, XML and ADO.Net, SQL support in ADO.NET.

Working with files – Overview, Streams, the classes for input and output,Monitoring the file structure.

Module 5

Additional Techniques - .NET Assemblies, Attributes.

Introduction to GDI+ - Overview of graphical drawing, drawing lines using the Pen Class, Drawing shapes using the Brush Class, Drawing text using the Font Class, Drawing using Images, Advanced capabilities of GDI+.

Reference Text

1. Karli Watson, Christian Nagel, Jacob Hammer Pederson, Jon D Reid, Morgan Skinner, Eric White Beginning Visual C# 2010, Wrox Publications.
2. Karli Watson, Christian Nagel, Jacob Hammer Pederson, Jon D Reid, Morgan Skinner, Eric White Beginning Visual C#, Wrox Publications.

14. Common Courses for M.Sc. CS & M.Sc. IT

Semester	Course Code
I	CA500101 CA500102
II	CA500201 CA500202

III	CA500301
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15. Common Elective Group for M.Sc. CS & M.Sc.IT

Elective Code
CA800301
CA800402
CA800403

16. Model Question Papers

M.ScIT Degree (C.S.S) Examination,

First Semester

CA500101--COMPUTATIONAL MATHEMATICS

(2019 admission onwards)

Time : Three hours

Maximum Weight : 30

Section-A

(Answer any **eight** questions-Each question carries a weight of **1**)

1. What are connectives? Give examples.
2. What is universe of discourse?
3. Define a tautology? Give an example.
4. What is a mode? Give an example.
5. What is a range?
6. What are the different types of correlations?
7. What are regular expressions? Give an example.

8. Define a transition system.
9. What are fuzzy sets?
10. Define normal of a fuzzy set?

Section-B

(Answer any **six** questions-Each question carries a weight of **2**)

11. Show that $A \rightarrow (P \vee C) \Leftrightarrow (A \wedge \sim P) \rightarrow C$
12. What are quantifiers? Discuss Universal and Existential quantifiers with examples.
13. From the following data calculate arithmetic mean by direct method:

Marks	:	0-10	10-20	20-30	30-40	40-50	50-60
No. of Students	:	5	10	25	30	20	10

14. From the following data obtain the regression equation Y on X.

X	6	2	10	4	8
Y	9	11	5	8	7

15. Describe the method for the minimization of finite automata.
16. Discuss the features of finite automata.
17. Differentiate ordinary sets and fuzzy sets?
18. Describe various types of fuzzy sets.

Section-C

(Answer any **two** questions-Each question carries a weight of **5**)

19. Distinguish conjunctive and disjunctive normal forms.

Find the CNF of $\sim(P \vee Q) \leftrightarrow (P \wedge Q)$

20. Calculate the mean deviation and its coefficient from the following data:

Class	Frequency	Class	Frequency
0-10	5	40-50	20
10-20	8	50-60	14
20-30	12	60-70	12
30-40	15	70-80	6

21. Calculate Karl Pearson's coefficient of correlation from the following data.

Roll no. of students	:	1	2	3	4	5
Marks in accountancy	:	48	35	17	23	47
Marks in statistics	:	45	20	40	25	45

22. How can you construct a finite automata equivalent to a regular expression? Give an

example.

M.Sc.ITDegree (C.S.S) Examination,
CA500102 - Advanced Java Programming
(2019 admissions onwards)

Time: Three hours

Max. Weight: 30

Section- A

(Answer any **eight** questions. Each question carries a weight of 1)

1. What are the features of Java?
2. What are the different conditional statements in java?
3. What is the use of 'this' keyword?
4. Describe constructor overloading with an example?
5. What is a built-in package? Describe the use of any two built-in packages.
6. Describe access protection in java.
7. Describe delegation event model.
8. Describe mouse event handling.
9. What is a ServerSocket in Java?
10. What are the different methods in the InetAddress class?

(8 x 1 = 8)

Section B

(Answer any **six** questions. Each question carries a weight of 2)

11. Explain different types of inheritance in Java with suitable example.
12. Distinguish method overloading and method overriding.
13. Differentiate between String and String Buffer class.
14. What is an interface in Java? Implement multiple inheritance using interface in Java.

15. Distinguish throw and throws statements.
16. Describe two different ways to create a thread in java?
17. Write short note on Frame.
18. What is the use of JDBC Driver Managerclass?

(6 x 2 = 12)

Section C

(Answer any **two** questions. Each question carries a weight of 5.)

19. Explain input/output streams in Java. Write a java program to read a matrix from the user and check whether the matrix is a diagonal matrix or not.
20. Explain Thread lifecycle and inter thread communication in Java.
21. What are the different methods in ImageIcon and JButton class? Explain layout management with suitable examples.
22. Explain JDBC configuration. What are the different types of Result Set? How to rollback a JDBC transaction? (2 X 5 10)

M.Sc.IT Degree (C.S.S) Examination,

Second Semester

CA500202- Database Management system with SQL

(2019 admissions onwards)

Time: Three hours

Max. Weight: 30

Section- A

(Answer any **eight** questions. Each question carries a weight of 1)

1. Define Database and explain its needs.
2. Explain database languages.
3. What are Codd's rules.
4. Define Generalization, aggregation and specialization
5. What you mean by data independence.
6. Define ACID properties.
7. Define OODBMS.
8. What are the states of transaction.
9. Write a note on triggers in SQL.

10. List the SQL data types.

(8 x 1 = 8)

Section B

(Answer any **six** questions. Each question carries a weight of 2)

11. With a neat diagram, explain the DBMS architecture in detail.

12. Explain join operations on tables with examples.

13. What you mean by stored procedures, give an example.

14. Write a short note on anomalies in a database.

15. Explain deadlock with example.

16. Why we need OODBMS, explain with its advantages.

17. What are the failure classifications in database.

18. Explain domain relational calculus.

(6 x 2 = 12)

Section C

(Answer any **two** questions. Each question carries a weight of 5.)

19. Define Normalization, explain different forms of normalization.

20. What are the Relational algebra operations in SQL? Write SQL statement for each operation.

21. Explain two phase locking. How does it guarantee serializability.

22. Write a note on distributed databases.

(2 x 5 = 10)

M.Sc.IT Degree (C.S.S) Examination,

Third Semester

CA500301 SOFTWARE ENGINEERING

(2019 admissions onwards)

Time: Three hours

Max. Weight: 30

Section- A

(Answer any **eight** questions. Each question carries a weight of 1)

1. What are the objectives of Software Engineering?
2. What is unified process?
3. What is Agility?
4. What is use case?
5. What is a DFD?
6. What is Data Modelling?
7. What is cohesion?
8. What is System Testing?
9. What is Basis path testing?
10. What is a risk ?

(8 x 1 = 8)

Section B

(Answer any **six** questions. Each question carries a weight of 2)

11. Compare prototyping and spiral model.
12. Write a note on Scrum.
13. Discuss the use of sequence diagram with an example.
14. Explain requirement engineering.
15. Discuss various design concepts for software development.
16. Explain component based development.
17. Explain the testing methods for object oriented applications.
18. How do you estimate the cost of a software?

(6 x 2 = 12)

Section C

(Answer any **two** questions. Each question carries a weight of 5)

19. Describe linear sequential model for software development
20. Explain sequence diagram with an example.
21. Describe class based modelling
22. Explain the methods for project scheduling.

(2 x 5 = 10)

M.Sc.IT Degree (C.S.S) Examination

CA800301 - Introduction to Cyber Security (Elective)

(2019 admissions onwards)

Time: Three hours

Max. Weight: 30

Section- A

(Answer any **eight** questions. Each question carries a weight of 1)

1. What is computer security?
2. What is biometrics?
3. Define access control.
4. What is VIRUS.
5. What you mean by protected objects?
6. What is trusted system?
7. What is DOS?
8. What is botnet?
9. Define is CIA.
10. What you mean by element integrity?

(8 x 1 = 8)

Section B

(Answer any **six** questions. Each question carries a weight of 2)

11. Write a note on threats.
12. Give a brief about cryptography.
13. Explain layered design of OS.
14. Write a note on email attacks.
15. What are threats to network communication?
16. Write note on IDS.
17. Explain security requirements of database.
18. What you mean by computer related offences?

(6 x 2 = 12)

Section C

(Answer any **two** questions. Each question carries a weight of 5.)

19. Explain authentication.
20. Explain malicious code.
21. Explain firewall.
22. Write overview of IT Act 2000.

(2 x 5 = 10)

M.Sc.IT Degree (CSS) Examination
CA800402 – CRYPTOGRAPHY(Elective)
(2019 admissions onwards)

Time: Three hours

Max. Weight: 30

Section- A

(Answer any **eight** questions. Each question carries a weight of 1)

1. What is cryptography?
2. What is steganography?
3. Define stream cipher.
4. What is PRNG?
5. What you mean by digest?
6. What is SHA?
7. Define MAC.
8. What is HMAC?
9. What you mean by public key infrastructure?
10. What is digital signature?

(8 x 1 = 8)

Section B

(Answer any **six** questions. Each question carries a weight of 2)

11. What are classical encryption techniques?
12. Compare symmetric vs asymmetric cryptography.
13. What is Triple DES?
14. Write a note on RC4
15. Explain diffie-hellman key exchange.

16. Write a note on Requirements for Message Authentication Codes.
17. Explain public key infrastructure.
18. Write a note on X.509.

(6 x 2 = 12)

Section C

(Answer any **two** questions. Each question carries a weight of 5.)

19. Explain DES.
20. Explain AES.
21. Explain RSA with example.
22. Write a note on key distribution using symmetric and asymmetric encryption.

(2 x 5 = 10)

**M.Sc.IT Degree (C.S.S) Examination,
CA800403 - ETHICAL HACKING (Elective)
(2019 admissions onwards)**

Time: Three hours

Max. Weight: 30

Section- A

(Answer any **eight** questions. Each question carries a weight of 1)

1. What is vulnerability?
2. What is DMCA?
3. What is Source code analysis?
4. What is debuggers?
5. What you mean by network?
6. What you mean by an attack?
7. What is TCP?
8. Define DOS.
9. What is malware?
10. What is local buffer?

(8 x 1 = 8)

Section B

(Answer any **six** questions. Each question carries a weight of 2)

11. Explain physical penetration attacks.
12. What is OIS?
13. Explain input validation attack.
14. What is IDA.
15. What you mean by buffer overflow?
16. What is spoofing?
17. Explain firewall?
18. What is SQL injection ?

(6 x 2 = 12)

Section C

(Answer any **two** questions. Each question carries a weight of 5.)

19. Explain social engineering attacks.
20. Write a note on passive analysis
21. Explain network hacking.
22. Explain malware hacking.

(2 x 5 = 10)

M.Sc.IT Degree Examination(CSS)

CA830402 SOFTWARE TESTING (Elective)

(2019 admission onwards)

Time: 3 Hours

Max Weight : 30

Section A

(Answer any 8 questions. Each question carries weight of 1)

1. Define Fault.
2. What are Test Cases?
3. Define Software Verification.
4. What do you mean by V Test Model?
5. Define Alpha Testing.
6. What are Automated Testing Tools?
7. Define State Based Testing?
8. What is the need for performing security testing?
9. What do you mean by crossover?
10. Point out few problems concerning test process?

(8x1=8)

Section B

(Answer any 6 questions. Each question carries weight of 2)

11. Explain the term software testing. What all should be tested in a software?
12. Briefly discuss about the terms Error, Bug and Failure.
13. Briefly explain various software verification methods.
14. Discuss on the concepts of Acceptance Testing.
15. Explain the advantages and disadvantages of software testing tools.
16. Briefly explain object oriented testing.
17. Explain the Test Adequacy Criteria.
18. Discuss on the concept of Browser Testing.

(6x2=12)

Section C

(Answer any 2 questions. Each question carries weight of 5)

19. Explain in detail the Software Life Cycle Model.
20. Explain in detail about Software testing Techniques and Tools.
21. Discuss in detail on Test Data Generation using Genetic Algorithm.
22. Discuss on SRS and SDD document verifications.

(2x5=10)

M.Sc. IT Degree (C.S.S) Examination,
CA830403- Visual Programming using C#
(2019 admissions onwards)

Time: Three hours

Max. Weight: 30

Section- A

(Answer any **eight** questions. Each question carries a weight of 1)

1. What do you mean by CLR?
2. Explain manifest and metadata in context of .Net assemblies.
3. What is the need of using namespace in a class? Explain with example.
4. Differentiate between the methods get and post.
5. Briefly explain the steps to create a web service using visual studio.net IDE.
6. What is boxing and unboxing? Explain with example.
7. What is the difference between interface and abstract class. Explain.
8. Differentiate between DataReader and DataSet.
9. Explain jagged array with example.
10. Write a C# program to reverse a number and find the sum of digits of a number.

(8 x 1 = 8)

Section B

(Answer any **six** questions. Each question carries a weight of 2)

11. Explain .Net architecture in detail.
12. How does C# support multiple inheritance? Explain with the help of example.
13. What is an exception? Describe the tasks involved in handling exceptions.
14. What is the use of Binary Reader and Binary Writer? Explain with example.
15. Explain the role of XML web service.
16. Create a delegate with two int parameters and a return type. Create a class with two delegate

methods multiply and divide. Write a program to implement the delegate.

17. Explain the features and application domains of SOAP.

18. What are the new features in GDI +? Explain. Differentiate GDI and GDI +?

(6 x 2 = 12)

Section C

(Answer any **two** questions. Each question carries a weight of 5.)

19. Explain various looping and branching statements in C#.

20. Explain the Web method in web services and describe the various ways of implementing web services.

21. Write a menu driven program to draw pie, polygon, ellipse and filled Rectangle.

22. Consider an EMPLOYEE database table with the structure empname ,dept, basicpay .

Write a C# program to display the contents of the database table to a datagrid.

(2 x 5 = 10)