ANDHRA KESARI UNIVERSITY

UNIVERSITY COLLEGE OF ARTS, COMMERCE & LAW ONGOLE, PRAKASAM-523001, ANDHRA PRADESH

M.Sc. Computer Science

Revised syllabus: 2023-24

(Revised Scheme of Instruction and Examination, Syllabus etc.,with effect from the Academic Year 2023-24)

Program Structure and Syllabus of

M.Sc. I & II Years

Dr. V.Vijaya Kumar, Chairperson BoS Dept of Computer Sciences, AKU Ongole, AP
Former professor of JNT University Hyderabad and Rayalaseema University Kurnool
Dean School of Engineering & Professor Department of CSE, Anurag University,

AK UNIVERSITY M.Sc. Course Structure

M.Sc.I YEAR I SEMESTER

S. No	Course Code	Category	Course	Max Marks		Hours per week			Credits
				I	E	L	T	P	
1	MS101	PC	Python Programming	30	70	2	1	0	3
2	MS102	PC	Database Management Systems	30	70	2	1	0	3
3	MS103	PC	Computer Networks	30	70	4	0	0	4
4	MS104	PC	Artificial Intelligence	30	70	3	1	0	4
5	MS105	HS	Communication skills-Lab	100	-	0	0	4	2
6	MS106	PC-Lab	Python Programming Lab	30	70	0	0	4	2
7	MS107	PC-Lab	Database Management Systems Lab	30	70	0	0	4	2
8	MS108		Free Certification Course from Microsoft/Amazon/IBM/Google (Mandatory Course-No Credit) *	-	-	0	0	0	0
			TOTAL	280	420	13	3	12	20

M.Sc. I YEAR II SEMESTER

S. No	Course Code	Category	Course	Max Marks		Hours per week			Credits
				I	E	L	T	P	
1	MS201	PC	Core Java Programming	30	70	2	1	0	3
2	MS202	PC	Data Structures	30	70	2	1	0	3
3	MS203	PC	Big Data Frameworks	30	70	4	0	0	4
4	MS204 A/B/C	PE-1	Cyber Security Fundamentals/ Software Engineering/Data Science	30	70	3	1	0	4
5	MS205	HS	Digital Well Being	100	-	2	0	0	2
‘6	MS206	PC-Lab	Core Java Programming Lab	30	70	0	0	4	2
7	MS207	PC-Lab	Data Structures Lab	30	70	0	0	4	2
8	MS208	MC	Free Certification Course from Microsoft/Amazon/IBM/Google(Mandatory Course-No Credit) *	-	-	0	0	0	0
			TOTAL	280	420	13	3	8	20

*Students must be completed certification course both 1st & 2nd semester

PC : Program Course: MC Mandatory Course HS: Humanities : PE : Professional Elective

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M.Sc. II YEAR I SEMESTER

S. No	Course Code	Category	Course	Max Marks		Hours per week			Credits
				I	E	L	T	P	
1	MS301	PC	Advanced Java Programming	30	70	2	1	0	3
2	MS302	PC	Machine Learning	30	70	2	1	0	3
3	MS303	PC	R Programming	30	70	4	0	0	4
4	MS304 A/B/C /D	PE-I	Operating Systems (OS)/Cyber Law/Computer Vision/Data Analytics	30	70	3	1	0	4
5	MS305	PC-Lab	Advanced Java Programming Lab	30	70	0	0	4	2
6	MS306	PC-Lab	Machine Learning lab	30	70	0	0	4	2
7	MS307	PC-Lab	R- Programming-Lab	100	-	-	-	-	2
			TOTAL	280	420	11	3	8	20

M.Sc. II YEAR II SEMESTER

S. No	Course Code	Category	Course	Max Marks		Hours per week			Credits
				I	E	L	T	P	
1	MS401	PC	Data Mining	30	70	2	1	0	4
4	MS402 A/B/C	PE-II	Cloud Computing/Digital Forensic/Distributed Computing	30	70	3	1	0	4
5	MS403 A/B/C	PE-III	Deep Learning /NoSQL Data bases/ Internet of Things(IOT	30	70	2	0	0	4
6	MS404	PC	Project	100	-	-	-	-	12
			TOTAL	280	420	13	3	8	20

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Python Programming					M.Sc. 1st year 1st semester			
Code	Category	Hours / Week			Credits			
MS101	PC	L	T	P	C	Internal	End Exam	Total
		2	1	0	3	-	-	100

Course Objectives

1. Understand the basics and function of Python Programming Language.
2. Understand the string operation and sequences used in Python Programming Languages.
3. Understand the modules and packages in Python Programming Language.
4. Understand File operations in Python Programming Language

Course Outcomes

At the end of course , students will be able to:

1. Apply control structures, functions and packages in Problem Solving. (L3)
2. Analyze various String handling functions and data structures(L4)
3. Model the object-oriented problems with classes and objects (L4)
4. Solve the problems by using Inheritance and polymorphism (L3)
5. Illustrate programs on Exception Handling and various packages(L3)

UNIT I

Problem Solving: Definition and Steps, Problem Analysis Chart, Developing an Algorithm, Flowchart and Pseudo-code. Introduction to python - Interactive and Script Mode - Indentation - Comments - Variables - Reserved Words - Data Types - Operators and their precedence - Expressions - Built-in Functions - Importing from Packages.

UNIT II

Control Structures

Decision Making and Branching: if, if-else, nested if, multi-way if-elif statements - Looping: while loop, for loop - else clauses in loops, nested loops - break, continue and pass statements.

Functions and Modules:

Declaration and Definition Function Calling, More on Defining Functions, Recursive Functions, Modules, Packages in Python, Doc Strings.

UNIT III

Collection Lists: Create, Access, Slicing, Negative indices, List methods, List comprehensions - Tuples: Create, Indexing and slicing, Operations on tuples - Dictionary: Create, add, and replace values, Operations on dictionaries - Sets: Creation and operations.

Strings and Regular Expressions:String Operations, Built-in String Methods and Functions, Comparing Strings, function in Regular Expression.

UNIT IV

Functions and Files

Functions – Parameters and Arguments: Positional arguments, Keyword arguments, Parameters with default values – Local and Global scope of variables – Functions with Arbitrary arguments – Recursive Functions – Lambda Function. Files: Create, Open, Read, Write, Append and Close – tell and seek methods.

UNIT V

Python NumPy: NumPy ND array, Data Types, Functions of NumPy Array, NumPy Array Indexing, Mathematical Functions on Arrays in NumPy

Python Pandas: Pandas Features, Dataset in Pandas, Data Frames, Manipulating the Datasets, Describing a Dataset, group by Function, Filtering, Missing Values in Pandas, Concatenating Data Frames. Import data from csv file.

Introduction to Matplotlib :, Plot, Scatterplot, Introduction to Tkinter ,Date and Time Packages

Text Book

1. Ashok Namdev Kamthane, Amit Ashok Kamthane, programming and problem solving with python, 2nd edition, McGrahill, 2020.
2. ReemaThareja,Python Programming using Problem Solving Approach, First Edition,Oxford Higher Eduction,2017
3. James Payne, Beginning Python using Python 2.6 and Python 3,1st Edition

Reference Books

1. Charles Dierach, Introduction to Computer Science using Python,2013
2. https://www.programiz.com/python-programming
3. https://www.javatpoint.com/python-tutorial
4. https://www.geeksforgeeks.org/python-programming-language.

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Database Management Systems						M.Sc. 1st year 1st semester		
Code	Category	Hours / Week			Credits	Marks		
MS102	PC	L	T	P	C	Internal	End Exam	Total
		2	1	0	3	-	-	100

Course Objectives

Course Objectives of Database Management Systems are to:

1. Discuss Database management systems, databases and its applications.
2. Familiarize the students with a good formal foundation on the relational model.
3. Outline the various systematic database design approaches.
4. Describe the concepts of transactions and transaction processing and the issues, techniques related to concurrency and recovery manager.
5. Explore the File organizations, indexing and hashing mechanisms.

Course Outcomes

At the end of this Database Management Systems course, students will be able to:

1. Model Entity-Relationship diagrams for enterprise level databases.
2. Formulate Queries using SQL and Relational Formal Query Languages.
3. Apply different normal forms to design the Database.
4. Summarize concurrency control protocols and recovery algorithms.
5. Identify suitable Indices and Hashing mechanisms for effective storage and retrieval of Data.

UNIT I

Introduction to Database System Concepts: Database-System Applications, Purpose of Database Systems, View of Data, Database Language, Database Design, Database Architecture, Database Users and Administrators.

Introduction to the Relation Models and Database Design using ER Model: Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations, Overview of the Design Process, The Entity-Relationship Model, Constraints, Entity-Relationship Diagrams- Unary, Binary, ternary, Aggregation.

UNIT II

Introduction to SQL: Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Aggregate Functions, Nested Sub queries.
Formal Relational Query Languages: The Relational Algebra, Tuple Relational Calculus.

UNIT III

Relational Database Design: Features of Good Relational Designs, Atomic Domains and First Normal Form, Functional Dependencies, Closure set of Functional dependencies, Procedure for Computing F^+, Boyce Codd Normal form, BCNF Decomposition Algorithm, Third Normal Form, Third Normal Form Decomposition Algorithm.
Transactions: Transaction Concept, A Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Serializability.

UNIT IV

Concurrency Control: Lock-Based Protocols, Deadlock Handling, Multiple Granularity, Timestamp-Based Protocols, Validation-Based Protocols.
Recovery System: Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, ARIES, Remote Backup Systems.

UNIT V

File Organization: Fixed and variable length records, Sequential file organization, Data Dictionary, Buffer manager.
Indexing and Hashing: Basic Concepts, Ordered Indices, B+-Tree Index Files, B+-Tree Extensions, Multiple-Key Access, Static Hashing, Extendible Hashing, Comparison of Ordered Indexing and Hashing, Bitmap Indices.

Text Book

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, Sixth Edition, Tata McGraw-Hill 2006.

Reference Books

1. Raghu Rama Kirshna, Johannes Gehrke, Database Management System, Third Edition, TATA MC Graw Hill, 2003.

2. C J Date, AKannan, S Swamynathan, An Introduction to Database Systems, Eight Edition, Pearson 2006
3. P Raja Sekhar Reddy, A Mallikarjuna Reddy, Foundations of Database Management Systems, Lambert Academic Publishing, 2020 (e-Book)
4. https://www.pdfdrive.com/fundamentals-of-database-systems-pdf-e51477130.html

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Computer Networks

Computer Networks						M.Sc. 1st year 1st semester		
Code	Category	Hours / Week			Credits	Marks		
MS103	PC	L	T	P	C	Internal	End Exam	Total
		4	0	0	4	-	-	100

Course Objectives

Course Objectives of Computer Networks are to:

1. Elaborate the fundamental concepts of computer networks and network models
2. Interpret the error and flow control mechanisms in the data link layer
3. Explore the knowledge of various routing algorithms
4. Describe the transport layer functionalities
5. Illustrate different application layer functionalities

Course Outcomes

At the end of this Computer Networks course, students will be able to:

1. Illustrate the functionalities of various network models and Data Link Layer
2. Analyze error and flow control mechanisms in the data link layer
3. Examine various Routing Protocols
4. Compare various congestion control mechanisms to improve the QoS of networking
5. Identify the suitable Application layer protocols for specific applications

UNIT I

Introduction: Physical Structures, Network Models-Layered Tasks, OSI model, TCP/IP protocol Suite, Addressing.
Data Link Layer: Introduction, Hamming Distance, Cyclic Redundancy Check, Checksum.

UNIT II

Data Link Control: Framing, Flow and Error Control, Noiseless Channels, Noisy Channels, HDLC.
Multiple Access: Random Access, Controlled Access, Channelization.

UNIT III

Network Layer: IPV4 and IPV6 address space, Classful and classless Addressing, IPV4 and IPV6 datagram

format, Transition from IPv4 to IPv6, Delivery, Forwarding and Routing, Routing protocols: Distance Vector Routing, Link State Routing, Path Vector Routing.

UNIT IV

Transport Layer: Process-to-Process delivery, Transmission control protocol, User datagram protocol, Data traffic, Congestion Control, Quality of Service, Techniques to improve QoS.

UNIT V

Application Layer: Domain Name Space, Distribution of Name Space, DNS in the Internet, Resolution, DNS Messages, Electronic mail, File Transfer Protocol.

Text Book

1. Behrouz A Forouzan," Data Communications and Networking", 4th Edition, McGraw-Hill, 2007.

Reference Books

1. Andrew S. Tanenbaum, Computer Networks, Third Edition, Prentice Hall, 2012.
2. William Stallings, Data and Computer Communications, Eight Editions. Pearson Publishers, 2008.
   http://highered.mheducation.com/sites/0072967757/student_view0/index.html

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Artificial Intelligence

Artificial Intelligence						M.Sc. 1st year 1st semester		
Code	Category	Hours / Week			Credits			
MS104	Professional Elective-I	L	T	P	C	Internal	End Exam	Total
		3	1	0	4	-	-	100

Course Objectives

Course Objectives of Artificial Intelligence are to:

1. Summarize overview of artificial concepts
2. Discuss uniform search and informed search
3. Demonstrate how to solve the zero sum gain problem
4. Describe the logic in artificial intelligence and knowledge representation
5. Elaborate notion of different production and expert systems in AI

Course Outcomes

At the end of the Artificial Intelligence course, students will be able to:

1. Describe the concepts and applications of artificial intelligence
2. Compare uniform search and informed search algorithms
3. Solve problems using Zero Sum Game algorithms
4. Represent logic for given problems using facts and rules
5. Summarize functionalities of production and expert systems

UNIT I

Overview of Artificial Intelligence: Introduction. The Turing Test, Strong AI Versus Weak AI, Identifying Problems Suitable for AI, Applications and Methods, Early History of AI, Recent History of AI to the Present, AI in the New Millennium

UNIT II

Uninformed Search: Introduction: Search in Intelligent Systems, State-Space Graphs, Generate-and-Test Paradigm, Blind Search Algorithms, Implementing and Comparing Blind Search Algorithms
Informed Search: Introduction, Heuristics, Informed Search Algorithms – Finding Any Solution, The Best-First Search, The Beam Search, Additional Metrics for Search Algorithms, Informed Search – Finding an Optimal Solution.

UNIT III

Search Using Games: Introduction, Game Trees and Minimax Evaluation, Minimax with Alpha-Beta Pruning, Variations and Improvements to Minimax, Games of Chance and the Expect minimax Algorithm

UNIT IV

Logic in Artificial Intelligence: Introduction, Logic and Representation, Propositional Logic, Predicate Logic – Introduction, Several Other Logics, Uncertainty and Probability
Knowledge Representation: Introduction, Graphical Sketches and the Human Window, Graphs and the Bridges of Königsberg Problem, Search Trees, Representational Choices, Production Systems, Object Orientation, Frames, Semantic Networks

UNIT V

Production Systems: Introduction, Background, Production Systems and Inference Methods, Production Systems and Cellular Automata, Stochastic Processes and Markov Chains, Basic Features and Examples of Expert Systems

Text Book

1. Stephen Lucci, Danny Kopec, Artificial Intelligence in the 21st Century-A Living Introduction, Mercury Learning and Information, Second Edition, 2016

Reference Books

1. Russell, Norvig: Artificial Intelligence, A Modern Approach, Pearson Education, Second Edition, 2004
2. Rich, Knight, Nair: Artificial Intelligence, Tata McGraw Hill, Third Edition, 2009
3. Saroj Kaushik. Artificial Intelligence. Cengage Learning, 2011

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Communication Skills- Lab

Communication Skills-1						M.Sc. 1st year 1st semester		
Code	Category	Hours / Week			Credits	Marks		
MS105	HS-Lab	L	T	P	C	Internal	End Exam	Total
		0	0	4	2	-	-	100

Introduction

The course aims at preparing the students with the tools needed for successful communication at the professional front. It is designed to improve students' academic and professional skills which the employers are currently looking for.

Course Objective

To prepare the students to use the language effectively in all professional pursuits

Course Outcomes

At the end of this Computer Networks course, students will be able to:

1. Analyze the language use in communicative process
2. Describe the process and product
3. Interpret the ideas in group activities
4. Apply different approaches to comprehend the written text
5. Write any technical and official correspondence within the framework

UNIT I

Essentials of Communication:
Essentials of Grammar-Rudiments of Communications Skills (Listening, Speaking, Reading, and Writing)-Applied Grammar and Usage- Non-Verbal Communication.

UNIT II

Listening Skills:
Art of Listening- Developing Effective Listening Skills-Process of Listening, Intensive & Extensive Listening Podcasts, Vodcasts (ICT enabled) - Five steps to Active Listening-Effective and Ineffective Listening Skills-Listening & Note-taking

UNIT III

Speaking Skills:

Dynamics of Effective Speaking -Group Discussion-Simulated Presentations, Process & Product

Descriptions- Proxemics, Paralinguistic Features

UNIT IV

Reading Skills:
The Art of Effective Reading- Basic steps to Effective Reading-Extensive and Intensive Reading - Approaches to Efficient Reading-Reading Comprehension

UNIT V

Writing Skills:
Art of Condensation-Descriptive Writing Techniques-Writing & Answering Memos, Circulars -Inter & Intra Official Communication -Writing Minutes of Meeting-Netiquette - E-mail & Blog Writing - Note-making

Text Book

1. Kumar, Sanjay and Pushpa Lata, Communication Skills, Second edition, Oxford University Press, 2015.

Reference Books

1. Adair, John. The Effective Communicator. Jaico Publishing House.1995.
2. Adler, B. Ronald. Communicating at Work (Seventh edition.) McGraw Hill.2004.
3. Aruna, Koneru. Professional Communication. McGraw Hill.2017.
4. Ibbotson, Mark. Cambridge English for Engineering Professionals. Cambridge University.2008.
5. Oxford English for Careers. Oxford University Press.

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Python Programming Lab

Python Programming Lab						M.Sc. 1st year 1st semester		
Code	Category	Hours / Week			Credits			
MS106	PC-Lab	L	T	P	C	Internal	End Exam	Total
		0	0	4	2	-	-	100

Course Outcomes

At the end of this Python Programming Lab course, students will be able to:

1. Develop programs on data types, operators and expressions
2. Apply the data structures in real time scenarios
3. Write programs on strings and functions
4. Implement programs on class and related concepts
5. Solve various exception handling programs and implement the packages

Week 1

Installation and Environment set up of Python & Programs on Data types

Week 2

Programs on Standard I/O, Operators and Expressions

Week 3

Programs on Functions

Week 4

Programs on lists and Tuples

Week 5

Programs on Dictionaries

Week 6

Programs on Strings and string operations

Week 7

Programs on Regular Expressions

Week 8

Programs on class & object, static and instance method implementation

Week 9

Programs on Inheritance and Polymorphism

Week 10

Programs on Stacks and Queues

Week 11

Programs on Exception Handling, Database Connectivity, Executing queries

Week 12

Demonstration of Numpy Package

Week 13

Demonstration of Pandas Package

Week 14

Demonstration of Matplotlib Package and Tkinter Package

Week 15

Demonstration of Date and Time Packages

Note: The above experiments are for indicative purposes only. However, the concerned faculty member can add a few more experiments in addition to the existing. In such cases the concerned faculty member should get the syllabus approved by the BoS.

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Database Management Systems Lab

Database Management Systems Lab						M.Sc. 1st year 1st semester		
Code	Category	Hours / Week			Credits	Marks		
		L	T	P	C	Internal	End Exam	Total
MS107	PC-Lab	0	0	4	2	-	-	100

Course Outcomes

At the end of this Lab course, students will be able to:

1. Apply different types of SQL commands to create, manipulate and access data from the database.
2. Construct a database by using various integrity constraints.
3. Develop basic PL/SQL programs.
4. Implement PL/SQL Programs using procedures, functions and cursors.
5. Create a trigger for a given problem.

List of Experiments

Week 1

1. Database user creation, Data definition Language commands, Data Manipulation commands, Data Control Language Commands, Transaction Control Language commands.

Week 2

1. Database Schema for a customer-sale scenario

Customer (Cust id: integer, cust_name: string)
Item (item_id: integer,item_name: string, price: integer)
Sale (bill_no: integer, bill_data: date, cust_id: integer, item_id: integer, qty_sold: integer)
For the above schema, perform the following–

a. Create the tables with the appropriate integrity constraints
b. Insert around 10 records in each of the tables
c. List all the bills for the current date with the customer names and item numbers
d. List the total Bill details with the quantity sold, price of the item and the final amount
e. List the details of the customer who have bought a product which has a price>200
f. Give a count of how many products have been bought by each customer
g. Give a list of products bought by a customer having cust_id as 5
h. List the item details which are sold as of today
i. Create a view which lists out the bill_no, bill_date, cust_id, item_id, price, qty_sold, amount
j. Create a view which lists the daily sales date wise for the last one week

Week 3

2. Database Schema for a Student Library scenario

Student (Stud_no : integer,Stud_name: string)
Membership (Mem_no: integer,Stud_no: integer)

Book (book_no: integer, book_name:string, author: string)
Iss_rec(iss_no:integer, iss_date: date, Mem_no: integer, book_no: integer)

For the above schema, perform the following:

a. Create the tables with the appropriate integrity constraints
b. Insert around 10 records in each of the tables
c. List all the student names with their membership numbers
d. List all the issues for the current date with student and Book names
e. List the details of students who borrowed book whose author is CJDATE
f. Give a count of how many books have been bought by each student
g. Give a list of books taken by student with stud_no as 5
h. List the book details which are issued as of today
i. Create a view which lists out the iss_no, iss _date, stud_name, book name
j. Create a view which lists the daily issues-date wise for the last one week

Week 4

3. Database Schema for a Employee-pay scenario

employee (emp_id : integer,emp_name: string)
Department (dept_id: integer,dept_name:string)
Paydetails (emp_id : integer,dept_id: integer, basic: integer, deductions: integer, additions: integer, DOJ: date)
Payroll (emp_id : integer, pay_date: date)

For the above schema, perform the following:
Create the tables with the appropriate integrity constraints

a. Insert around 10 records in each of the tables
b. List the employee details department wise
c. List all the employee names who joined after particular date
d. List the details of employees whose basic salary is between 10,000 and 20,000
e. Give a count of how many employees are working in each department
f. Give a name of the employees whose netsalary>10,000
g. List the details for an employee_id=5
h. Create a view which lists out the emp_name, department, basic, deductions, netsalary
i. Create a view which lists the emp_name and his netsalary

Week 5

4. Database Schema for a Video Library scenario

Customer (cust_no: integer,cust_name: string)
Membership (Mem_no: integer, cust_no: integer)
Cassette (cass_no:integer, cass_name:string, Language: String)
Iss_rec(iss_no: integer, iss_date: date, mem_no: integer, cass_no: integer)
For the above schema, perform the following–

a. Create the tables with the appropriate integrity constraints

b. Insert around 10 records in each of the tables
c. List all the customer names with their membership numbers
d. List all the issues for the current date with the customer names and cassette names
e. List the details of the customer who has borrowed the cassette whose title is " The Legend"
f. Give a count of how many cassettes have been borrowed by each customer
g. Give a list of books which has been taken by the student with mem_no as 5
h. List the cassettes issues for today
i. Create a view which lists outs the iss_no, iss_date, cust_name, cass_name
j. Create a view which lists issues-date wise for the last one week

Week 6

5. Database Schema for a student-Lab scenario

Class (class_no: string,descrip: string)
Student (stud_no: integer, stud_name: string, class_no: string)
Lab (mach_no: integer, Lab_no: integer, description: String)
Allotment (Stud_no: Integer, mach_no: integer, dayof week: string)

For the above schema, perform the following:

a. Create the tables with the appropriate integrity constraints
b. Insert around 10 records in each of the tables
c. List all the machine allotments with the student names, lab and machine numbers
d. List the total number of lab allotments day wise
e. Give a count of how many machines have been allocated to the 'CSIT' class
f. Give a machine allotment etails of the stud_no 5 with his personal and class details
g. Count for how many machines have been allocatedinLab_no1 for the day of the week as "Monday"
h. How many students class wise have allocated machines in the labs
i. Create a view which lists out the stud_no, stud_name, mach_no, lab_no, dayofweek
j. Create a view which lists the machine allotment details for "Thursday".

Week 7

6. Write a program to find the largest number from the given three numbers.
7. Simple programs using loop, while and for iterative control statements.
8. Write a program to check whether the given number is Armstrong or not
9. Write a program to generate all prime numbers below 100.

Week 8

10. Write a program to demonstrate the GOTO statement.
11. Write a program to demonstrate %type and %row type attributes

Week 9

12. Write a program to demonstrate predefined exceptions
13. Write a program to demonstrate user defined exceptions
14. Create a cursor, which displays all employee numbers and names from the EMP table.

Week 10

15. Create a cursor, which update the salaries of all employees who works in deptno 10.
16. Create a cursor, which displays names of employees having salary > 50000.

Week 11

17. Create a procedure to find reverse of a given number
18. Create a procedure to update the salaries of all employees whose salary is between 25000 to 50000

Week 12

19. Create a procedure to demonstrate IN, OUT and INOUT parameters
20. Create a function to check whether a given string is palindrome or not.

Week 13

21. Create a function to find the sum of salaries of all employees working in depart number 10.
22. Create a trigger before/after update on the employee table for each row/statement.

Week 14

23. Create a trigger before/after delete on the employee table for each row/statement.
24. Create a trigger before/after insert on the employee table for each row/statement.

Week 15

Review

Text Book

1. Ivan Bayross, SQL, PL/SQL, The programming Language of Oracle, 3rd Revised Edition, BPB Publications, 2008.

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M.Sc. 1st year 1st semester

MS108: Free Certification Course from Microsoft/Amazon/IBM/Google

Note: Students are evaluated based on the certification course they have undergone during the semester. The courses need to be registered under the university recognized organizations and domains. This is a mandatory course.

Dr. V.Vijaya Kumar, Chairperson BoS Dept of Computer Sciences, AKU Ongole, AP
Former professor of JNT University Hyderabad and Rayalaseema University Kurnool
Dean School of Engineering & Professor Department of CSE, Anurag University,

Core Java Programming

Core Java Programming						M.Sc. 1st year 2nd semester		
Code	Category	Hours / Week			Credits	Marks		
MS201	PC	L	T	P	C	Internal	End Exam	Total
		2	1	0	3			100

Course Objectives

Course Objectives of Object-Oriented Programming are to:

1. Impart knowledge of core language features of Java
2. Appraise the concepts of Inheritance and Packages
3. Elaborate the use of Exceptions and collection frameworks in Java
4. Familiarize Event Handling and Applets
5. Emphasize GUI based application development

Course Outcomes

At the end of this Object-Oriented Programming course, students will be able to:

1. Appraise the basic concepts of java
2. Implement inheritance and polymorphism
3. Identify usage of collection framework and build multi-threaded applications
4. Design Applets by using Event Handling features
5. Implement Graphical User Interface applications using Swings

UNIT I

Java Basics: History of Java, Java buzzwords, data types, variables, scope and lifetime of variables, arrays, operators, expressions, control statements, simple java program, concepts of classes, objects, constructors, methods, access control, this keyword, static keyword, Garbage collection, Overloading methods and constructors, parameter passing.

UNIT II

Inheritance: Introduction, forms of inheritance- specialization, specification, construction, extension, limitation, combination, Member access rules, super uses, using final with inheritance.

Polymorphism: Method overriding, Abstract classes, Object class

Packages and Interfaces: Defining, Creating and Accessing a Package, importing packages, differences between classes and interfaces, File, Byte Streams, Character Streams

Exception Handling - Concepts of exception handling, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception subclasses.
Package java.util- The Collection Interfaces, The Collection classes: LinkedList Class, HashSet Class. TreeSet Class, String Tokenizer, Date, Random, Scanner.
Multi-Threading: Differences between multithreading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, inter thread communication.

UNIT IV

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes.
Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, create applets, passing parameters to applets.

UNIT V

GUI Programming with Swing – Introduction, limitations of AWT, MVC architecture, components, containers. Understanding Layout Managers, Flow Layout, Border Layout, Grid Layout, Card Layout, Gridbaglayout.
Creating a Swing Applet, Painting in Swing, A Paint example, Exploring Swing Controls- JLabel and ImageIcon, JTextField, The Swing Buttons,JButton, JToggleButton, JCheckBox, JRadioButton, JTabbedPane, JScrollPane, JList, JComboBox, Swing Menus, Dialogs.

Text Book

1. Herbert Schildt, Java - The Complete Reference, Seventh edition, Tata McGraw Hill, 2006.

Reference Books

1. Bruce Eckel, Thinking in Java, Fourth Edition, Prentice Hall, 2006.
Y. Daniel Liang, Introduction to Java programming, Tenth Edition, Pearson education, 2014.

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Data Structures

Data Structures						M.Sc.1st year 2nd semester		
Code	Category	Hours / Week			Credits			
MS202	PC	L	T	P	C	Internal	End Exam	Total
		2	1	0	3	-	-	100

Course Objectives

Course Objectives of Data Structures are to:

1. Appraise the fundamental concepts of data structures and their representations
2. Describe the applications of non-linear data structures
3. Summarize the concepts of Advanced Trees
4. Discuss the implementation of various Graph representations and traversals
5. Outline the basic concepts of Hashing and Collision resolution Techniques

Course Outcomes

At the end of this Data Structures course, students will be able to:

1. Summarize Static and Dynamic data structures in implementing Stack applications
2. Implement Tree traversal algorithms in solving real time applications
3. Analyze the concepts of Advanced Trees to generate search efficiently
4. Interpret the importance of Graphs in solving real time applications
5. Apply the concepts of hashing

UNIT I

Introduction: What is data structure, Types of data structures, Static and Dynamic representation of data structure and comparison. Stacks-Definition, Operations, Implementation of stacks using arrays, Applications of stacks – Representation and evaluation of expressions using Infix, Prefix and Postfix, Algorithms for conversions and evaluations of expressions from infix to prefix and postfix using stack, Towers of Hanoi, Parenthesis checker.

Queues- Definition, Operations, Implementation of queues using arrays, Applications of queues

UNIT II

Linked Lists: Introduction to Linked List, Operations on Single Linked List (search, Insertion &Deletion)

Trees: Basic terminology, Types of trees: Binary Tree: terminology, Complete and Full Binary Tree, Extended Binary Trees, Threaded Binary Trees-Inorder Threading. Representation of Trees using Arrays and Linked lists (advantages and disadvantages). Tree Traversal and Representation of Algebraic expressions; Algorithms for Tree Traversals.
Heaps: Introduction, Types of Heaps – Min binary heap, Max binary heap.

UNIT III

Advanced concepts on Trees: Representation and Creation of Binary Search Trees (BST), Algorithm for inserting, deleting and searching in BST. Representation and advantages of AVL Trees, Algorithms on AVL Trees-Insertion, Rotation and Deletion. Definition and advantages of B-trees, B Tree of Order M, operations- Insertion and Searching, Introduction to Red-Black Trees and Splay Trees.

UNIT IV

Graphs: Basic terminology, Representation of Graphs: sequential representation (Adjacency, Path Matrix) Linked representation.
Graph Traversals-Breadth First Search, Depth First Search with algorithms. Definition and properties of Spanning Tree, Minimum Spanning Tree, Minimum Spanning Tree Algorithms, Dijkstra Algorithms.

UNIT V

Hashing: General Idea, Hash Functions, Collision Resolution- Separate Chaining, Open Addressing-Linear probing, Quadratic Probing, Double Hashing, Rehashing, Extendible Hashing, Implementation of Dictionaries.

Text Book

1. Richard F.Gillberg & Behrouz A. Forouzan, Data Structures, A Pseudo code Approach with C, Second Edition, Cengage Learning, India Edition, 2005

Reference Books

1. Seymour Lipschutz, Schaum's Outlines, Data Structures, Special Second Edition, Tata McGraw-Hill, 2014.
2. Aaron M. Tanenbaum, Yedidyah Langsam and Moshe J. Augenstein, Data Structures Using C and C++, PHI Learning Private Limited, Delhi India, 2001.
3. Horowitz and Sahani, Fundamentals of Data Structures, Galgotia Publications Pvt Ltd. Delhi India, 2015.
4. A.K. Sharma, Data Structure Using C, Pearson Education India, 2011

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Big Data Frameworks

Big Data Frameworks						M.Sc. 1st year 2nd semester		
Code	Category	Hours / Week			Credits	Marks		
MS203	PC	L	T	P	C	Internal	End Exam	Total
		4	0	0	4	-	-	100

Course Objectives

Course Objectives of Big Data Frameworks are to:
1. To understand the need of Big Data, challenges and different analytical architectures
2.Installation and understanding of Hadoop Architecture and its ecosystems
3.Processing of Big Data with Advanced architectures like Spark.

Course Outcomes

At the end of this Big Data Frameworks course, students will be able to :
1.Discuss the challenges and their solutions in Big Data
2.Understand and work on Hadoop Framework and eco systems.
3. Explain and Analyse the Big Data using Map-reduce programming in Both Hadoop and Spark framework.
4. Demonstrate spark programming with different programming languages

UNIT I

Introduction To Big Data: Characteristics of Big Data, Traits of Big data, Challenges of Conventional Systems, Sources of Big Data, Applications of big data, Features and benefits of big data, Analysis vs Reporting, CAP theorem, Modern Data Analytic Tools.

UNIT II

Introduction To Hadoop: History of Hadoop, Data Storage and Analysis, Hadoop –Setup, Hadoop operation modes, Configurations of Hadoop. Hadoop Distributed File System, HDFS Architecture, concepts of Blocks in HDFS Architecture, Name Nodes and Data Nodes, using command Line Interface with HDFS, HDFS Commands, Features of HDFS

UNIT III

MapReduce Applications: MapReduce workflows, unit tests with MR Unit, test data and local tests, anatomy of MapReduce job run, classic Map-reduce, YARN, failures in classic MapReduce and YARN, job scheduling, shuffle and sort, task execution, MapReduce types, input formats, output formats.

UNIT IV

Introduction to Hadoop ecosystem technologies: Serialization: AVRO, Co-ordination: Zookeeper, Databases: HBase, Hive, Scripting language: Pig, Streaming: Flink, Storm.

UNIT V

Introduction to GPU Computing, CUDA Programming Model, CUDA API, Simple Matrix, Multiplication in CUDA, CUDA Memory Model, Shared Memory Matrix Multiplication, Additional CUDA API Features. Spark Programming in Scala, SQL Context – Importing and Saving data – Data frames – using SQL –

Text Book

1. Mike Frampton, "Mastering Apache Spark", Packt Publishing, 2015.
2. TomWhite,"Hadoop:TheDefinitiveGuide",O'Reilly,4thEdition,2015.

Reference Books

1. Chris Eaton, Dirk De Roos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding Big Data:
2. Analytics for Enterprise Class Hadoop and Streaming Data", McGraw Hill Publishing, 2012
3. NickPentreath,MachineLearningwithSpark,PacktPublishing,2015.
4. Mohammed Guller, Big Data Analytics with Spark, Apress,2015
5. Donald Miner, Adam Shook, "Map Reduce Design Pattern", O'Reilly, 2012

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Cyber Security Fundamentals

Cyber Security Fundamentals						M.Sc. 1st year 2nd semester		
Code	Category	Hours / Week			Credits	Marks		
MS204 A	PE-I	L	T	P	C	Internal	End Exam	Total
		3	1	0	4	-	-	100

Course Objectives

Course Objectives of Fundamentals of Cyber Security are to:

1. Summarize major types of cyber-attacks.
2. Discuss computer malware programs and their impact on the world.
3. Elaborate firewall and password management.
4. Describe major cyber-security prevention mechanisms.
5. Outline Cyber-Security aspects of wireless networks and routers.

Course Outcomes

At the end of this Fundamentals of Cyber Security course, students will be able to:

1. Analyze the cyber security needs of an organization.
2. Design operational and strategic cyber security strategies and policies.
3. Demonstrate various network security applications.
4. Analyze software vulnerabilities and security solutions to reduce the risk of exploitation.
5. Design and develop a security architecture for an organization.

UNIT I

Introduction to Cyber Security Basics, Importance of Cyber Security, Cyber- attacks, objectives of cyber-attacks, Types of Cyber-attacks, Denial of Service (DoS), Distributed Denial of Service (DDoS), Man-in- the-Middle (MITM) Attacks, Crypto jacking, SQL Injection, Spamming, Cyber-terrorism, Digital Property Misappropriation, zero-day exploitation, phishing, digital vandalism, cyber-stalking, cyber frauds and forgery.

UNIT II

Introduction to Cyber-attacks and their impact, Equifax Data Theft, VPNFilter Cyber- attack, WannaCry Ransom Attack, Peta Cyber-attack, US Election Manipulation, Power Grid Hacking, Shadow Network attack, GitHub DDoS Attack, Under Armor Account Hacking, Types of Computer Malware, Viruses, Trojan Horse, Rootkit, Spyware, Worms, Adware, Scare-ware, Browser Hijacker.

UNIT III

Introduction to Computer Security, Firewall Settings, Antivirus Software, Anti-Spyware Software, Anti-Spam Software, Security Updates, Secure Browsing Settings, Scan Devices before Data Transfer, Social Engineering Attack Precautions. Password Management, Basics of Passwords, Threats to Passwords, Good and Bad about Passwords, Hacking Password, Effective Password Management, Creating and Managing Secure Passwords, Strong Password, Use of Biometrics, Two-Factor Authentication, Multi-Factor Authentication, Password Manager Tools.

UNIT IV

Prevention from Cyber-attacks, Algorithms and Techniques, Cyber-attack Detection, Cyber-attack Prediction, Cyber-attack Prevention , Firewalls, Activating Windows Firewall, Windows 10 firewall, Windows 7 firewall, Enabling Windows 7 firewall, Enabling Windows firewall service, Traffic Issues and rules , firewall settings, Intrusion Detection/Prevention Systems, Intrusion Detection System (IDS) , Intrusion Prevention System (IPS),,Authentication Using Hash, Message Digest , Secure Hash Algorithm ., Multi-Factor Authentication, Activating Two-Factor Authentication, Creating Application Specific Passwords , What If Your Phone with All Apps Enabled Is Lost?, Mac Computer Firewall Configuration, Virtual Private Network.

UNIT V

Introduction to Wireless Security, LAN Vulnerabilities, Reconnaissance Vulnerability, Resource Stealing and Invasion, Rogue Access Points (APs), STA and AP Plain Text Transaction, Denial of Service (DoS), Default AP Configuration, Rogue Insiders, Protocol Vulnerabilities, Ad Hoc Network Mode Security Problems ,Wireless WAN Vulnerabilities ,IoT Vulnerabilities, Wireless Network Security Measures, Modify Default Configuration, Wireless Router Location, Update Router Software, Stronger Encryption Algorithms, MAC Address Filtering ,Useful Tips on Safe Use of Wireless Network.

Text Book

1. Dr Kutub Thakur Dr Al-Sakib Khan Pathan, Cyber-security Fundamentals Real-World Perspective, first edition published 2020 by CRC Press, © 2020 Taylor & Francis Group, LLC.

Reference Books

1. Rajkumar Singh Rathore, Aatif Jamshed, Mayank Bhusan, Fundamental of Cyber Security Principles and Theory and Practices, BPB Publications, 01-Jun-2018.
2. J. Pieprzyk, T. Hardjono and J. Seberry, Fundamentals of computer security, Springer, 2003.

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Dean School of Engineering & Professor Department of CSE, Anurag University,

Software Engineering

Software Engineering						M.Sc. 1st year 2nd semester		
Code	Category	Hours / Week			Credits			
MS204 B	PE-I	L	T	P	C	Internal	End Exam	Total
		3	1	0	4	-	-	100

Course Objectives

Course Objectives are to:

1. Identify an appropriate Process Model.
2. Deliberate Software Requirements-functional and nonfunctional.
3. Design various system models for a given scenario.
4. Elaborate about different testing techniques.
5. Describe role of risk management in Software Engineering.

Course Outcomes

At the end of this course, students will be able to:

1. Analyze process models.
2. Emphasize Software Requirements -functional and nonfunctional.
3. Appreciate the system models.
4. Compare and contrast various testing techniques.
5. Identify various risk strategies

UNIT I

Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, Software myths. A Generic view of process: Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI).
Process models: The waterfall model, Incremental process models, Evolutionary process model. [TB:1, CH:1,2,3]

UNIT II

Agile process Model: Agile principles, Extreme programming, Dynamic System Development Methods, Feature Driven Development, Scrum framework, Sprint, Scrum master, Roles of Scrum Master, Implementing Scrum - A case study. [TB:1, CH:4]

Software Requirements: Functional and non-functional requirements, the software requirements document. Requirements engineering process: Feasibility studies, Requirements elicitation and analysis,

Requirements validation, Requirements management. [TB:2, CH:6,7]

System Models: Context Models, Behavioral models, Data models, Object models, structured methods. [TB:2, CH:8]
Design Engineering: Design process and Design quality, Design concepts, the design model. Modeling component level design: design class-based components, conducting component level design. Performing User interface design: Golden rules. [TB:1, CH:9,11]

UNIT IV

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing.
Product metrics: Software Quality, Metrics for Analysis Model- function based metrics, Metrics for Design Model-object oriented metrics, class-oriented metrics, component design metrics, Metrics for source code, Metrics for maintenance. [TB:1, CH:13,14,15]

UNIT V

Risk Management: Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.
Quality Management: Quality concepts, Metrics for Software Quality, Software Reviews, Formal Technical Reviews, Software Reliability, The ISO 9000 quality standards. [TB:1, CH:25, 26]

Text Books

1. Roger S. Pressman, Software Engineering - A practitioner‘s Approach, 6th edition. McGraw Hill International Edition, 2005.
2. Somerville, Software Engineering, 7th Edition, Pearson Education, 2009.

Reference Books

1. K.K. Agarwal & Yogesh Singh, Software Engineering, New Age International Publishers,3rd edition, 2008
2. Pankaj Jalote, An Integrated Approach to Software Engineering, Narosa Publishing House, 3rd edition, 2005.
3. James F. Peters, Witold Pedrycz, Software Engineering - an Engineering approach, JohnWiely, 2007.
4. Waman S Jawadekar, Software Engineering Principles and Practice, The McGraw-Hill Companies, 2013.
5. https://nptel.ac.in/courses/106/105/106105182/

Data Science

Data Science						M.Sc.1st year 2nd semester		
Code	Category	Hours / Week			Credits	Marks		
MS204 C	PE-I	L	T	P	C	Internal	End Exam	Total
		3	1	0	4	-	-	100

Course Objectives

Course Objectives are to:

1. Summarize the concepts of Data science
2. Outline various steps involved in Data science
3. Discuss data collection and manipulation methods in Data science
4. Describe how to handle categorical and time series data
5. Compare various methodologies in data visualization

Course Outcomes

At the end of this course, students will be able to:

1. Discuss data science concepts and Process
2. Handle large data in Single Computer
3. Manipulate large data using Python Programming language
4. Analyze large categorical and time series data
5. Create dashboards to display the data using visualization

UNIT I

Data science in a Big Data World: Benefits and uses of data science and big Data-Facets of data-The data science process-The big data ecosystem and data science. The data science process-Overview of the data science process-Steps: Defining research goals and creating-- Retrieving data. [TB:1, CH:1]

UNIT II

Handling Large Data on a Single Computer: The problem in handling large data-General techniques for handling large volumes of data-General programming tips for dealing with large data sets-Case Studies. [TB:1, CH:2,4]

UNIT III

Data Manipulation with Pandas: Introducing Pandas Objects- Data Indexing and Selection- Operating on Data in Pandas- Handling Missing Data- Hierarchical Indexing- Combining Datasets: Concat and Append- Combining Datasets: Merge and Join- Aggregation and Grouping. [TB:2, CH:3]

UNIT IV

Data Manipulation with Pandas: Pivot Tables- Vectorized String Operations- Working with Time Series- High-Performance Pandas: eval () and query (). [TB:2, CH:3]

UNIT V

Visualization with Matplotlib: Simple Line Plots- Simple Scatter Plots- Visualizing Errors- Density and Contour Plots- Histograms, Binnings, and Density- Customizing Plot Legends- Customizing Colorbars- Multiple Subplots- Text and Annotation- Customizing Ticks- Customizing Matplotlib: Configurations and Stylesheets- Three-Dimensional Plotting in Matplotlib- Geographic Data with Basemap. [TB:2, CH:4]

Text Books

1. Davy Cielen, Arno d. B. Meysman, Mohamed Ali, Introduction to Data Science, Manning Publications, 2016.
2. Jake Vanderplas, Python Data science Hand Book, O'Reilly, 2017.

Reference Books

1. Cathy O'neil, Rachel Schutt, Doing Data Science, straight talk from the frontline, O'Reilly, 2013
2. Jure Leskovek, Anand Rajaraman, Jeffry Ullman, Mining of Massive datasets, V2.1, Cambridge University Press, 2014.
3. Joel Grus, Data Science from Scratch: First Principles with Python, first edition, O'Reilly, 2015.

Web References

1. An introduction to data science

https://www.edureka.co/blog/what-is-data-science/

https://intellipaat.com/blog/what-is-data-science/

2. Data collection:

http://bigdata-madesimple.com/3-effective-methods-of-data-collection-for-market-research/

3. Data sources:

https://www.allerin.com/blog/top-5-sources-of-big-data

http://tdan.com/combining-data-from-multiple-sources-join-integrate-blend/19877
https://www.techrepublic.com/blog/big-data-analytics/use-normalization-and-etl-to-get-the-big-data-results-you-want/
https://www.youtube.com/watch?v=f0nMfV1GvOg

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Digital Well Being

Digital Well Being						M.Sc.1st year 2nd semester		
Code	Category	Hours / Week			Credits			
MS205	PC	L	T	P	C	Internal	End Exam	Total
		2	0	0	2	-	-	100

Digital Wellbeing – Credit Course

(Teaching + Case Studies & Co-Curricular Activities)

(Note: Course can a self-study and we can provide video recordings)

Course Objectives:

To create awareness of digital wellbeing among students and fellow citizens regarding digital wellbeing by educating them in various kinds of frauds, threats and attacks in digital world along with their basic counter measures.

Course Outcomes:

By the end of the course, students will be

1. *Able to gain knowledge regarding cybercrimes and cyber offenses*
2. *Able to know how to uncover fake news and how to protect online data*
3. *Able to understand cyber bullying, and its counter measures, social media management along with Digital Parenting*
4. *Able to gain knowledge in Digital Legal and Ethical Issues*
5. *Able to analyse various case studies*

UNIT – I Introduction to Digital Wellbeing ***00.30 Hrs***

a) *Introduction to Digital Wellbeing*

UNIT – II ***Digital Security Tools and Techniques*** ***01:30 Hrs***

b) *Uncovering fake news, Is Privacy is a Myth?*

c) *Consent & Data Why is it different online.*

d) *Uncovering Fake News*

UNIT – III ***Digital Safety – Physical & Psychological Wellbeing*** ***01:30Hrs***

e) *Cyber bullying,*

f) *Digital Parenting,*

g) *Digital Addiction,*

UNIT – IV Digital Spirit – Legal and Ethical Issues 01:30 3Hrs

h) *Cyber Crime against Women and Children,*
i) *Managing Negative Comments Online,*
j) *Social Engineering Crimes*
k) *Digital Intelligence (Tips on Safety)*

UNIT – V Case Studies 04:00 Hrs

Case Studies (Mini Cases Example): State of Tamil Nadu vs. Suhas Katti Case, The Slumdog Millionaire Movie Piracy case, Cyber Pornography involving a Juvenile Criminal, Pune Citibank Mphasis call Center fraud, Swedish case of hacking and theft of trade secrets, Indian case of Cybersquatting and different varieties of Social Engineering Crimes and their modus operandi. (Or Any Case Study of Students Choice , A minimum of two case studies each 2000 word document)

Text Books:

1. *Cyber Security : Understanding Cyber Crimes, Computer Forensics ad Legal Perspectives – Nina Godbole – Sunit Belapure. Wiley India -2014.(Unit I, V)*
2. *Uncovering Fake News : ISBN : 978-81-946731-0-1*
3. *Is Privacy is a Myth? : ISBN: 978-81-946731-4-9*
4. *Consent & Data Why is it Different Online? :ISBN: 978-81-946731-6-3*
5. *Cyberbullying : ISBN: 978-81-946731-1-8*
6. *Digital Parenting : ISBN: 978-81-946731-7-0*
7. *Digital Addiction : ISBN: 978-81-946731-8-7*
8. *Cyber Crime Against Women and Children : ISBN : 978-81-946731-2-5*
9. *Managing Online Negative Comments : ISBN: 978-81-946731-5-6*

Co – Curricular Activities:

Students shall perform co-curricular activities like assignments, conducting seminars in government schools, colleges and also in neighbourhood, group discussions, etc.

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Core Java Programming Lab

Core Java Programming Lab						M.Sc. 1st year 2nd semester		
Code	Category	Hours / Week			Credits	Marks		
MS206	PC-Lab	L	T	P	C	Internal	End Exam	Total
		0	0	4	2			100

Course Outcomes

At the end of this Java Programming Lab course, students will be able to:

1. Implement simple Java Programs
2. Develop the programs using interfaces and packages
3. Demonstrate the use of threads and Exception handling
4. Design Applet programs
5. Develop GUI applications using Swings

List of Experiments

Week 1

1. Write a Java Program to define a class, define instance methods for setting and retrieving values of instance variables and instantiate its object
2. Demonstrate the use of static keyword and this keyword.

Week 2

1. Write a program to illustrate types of constructors and constructor overloading
2. Write a Java program to demonstrate the use of String class and its methods.

Week 3

1. Write a program to illustrate parameter passing Techniques
2. Write a java program to illustrate Recursion and nested class

Week 4

1. Write a program to demonstrate the use of inheritance.
2. Write a java program to demonstrate the concept of polymorphism.

Week 5

1. Write a program to illustrate Files.
2. Demonstrate the use of I/O Streams.

Week 6

1. Write a program to illustrate the use of packages.
2. Write a program to illustrate Interfaces.

Week 7

1. Write a program to illustrate try, catch, throw, throws and finally keywords
2. Write a program to implement the concept of User defined Exceptions.

Week 8

1. Write a program to illustrate Multithreading.
2. Write a program to illustrate thread priorities.

Week 9

1. Write a program to illustrate Thread Synchronization.
2. Write a program to illustrate Inter Thread Communication.

Week 10

1. Write a program to illustrate collection classes and interfaces.
2. Write a program to illustrate String Tokenizer, Date, Random and Scanner classes.
3. Write a program to illustrate Event Handling (keyboard, Mouse events).

Week 11

1. Develop an applet in Java that displays a simple message.
2. Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named “Compute” is clicked.

Week 12

1. Write a program to develop a calculator application using Swings.

Week 13

Review.

Data Structures Lab

Data Structures Lab						M.Sc. 1st year 2nd semester		
Code	Category	Hours / Week			Credits			
MS207	PC-Lab	L	T	P	C	Internal	End Exam	Total
		0	0	4	2	-	-	100

Course Outcomes

At the end of this Data Structures Lab course, students will be able to:

1. Develop the programs on stacks and its applications
2. Demonstrate the operations on Trees
3. Code the implementation of various advanced trees
4. Design and implementation of programs on BST and Graph Traversals
5. Develop the programs on Hashing and Dictionaries

Week 1

1. Program to implement Stack Operations using arrays and Linked Lists
2. Program to implement Queue Operations using arrays and Linked Lists

Week 2

1. Program to convert infix to postfix notation
2. Program to evaluate postfix notations

Week 3

1. Program to implement towers of Hanoi
2. Program to implement parenthesis checker

Week 4

1.Program to implement Single linked list

Week 5

1.Program to illustrate tree traversals

a) In order b) Preorder c) Post order

Week 6

1. Program to illustrate insertion, deletion and searching in Binary Search Tree

Week 7

1. Program to implement Heaps
   a) Min Heap b) Max Heap

Week 8

1. Program to illustrate Insertion on AVL Trees
2. Program to illustrate deletion and Rotation on AVL Trees

Week 9

1. Program to illustrate Graph traversals
   a) Breadth First Search
   b) Depth First Search

Week 10

1. Program to implement

a) Prim's algorithm b) Kruskal's algorithm

Week 11

1. Program to Implement Dijkstra algorithm

Week 12

1. Program to implement Hashing and collision resolution techniques

Week 13

1. Program to implement Dictionaries

Week 14

Internal Assessment

Note: The above experiments are for indicative purposes only. However, the concerned faculty member can add a few more experiments in addition to the existing. In such cases the concerned faculty member should get the syllabus approved by the BoS.

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M.Sc. 1st year 2nd semester

MS208: Free Certification Course from Microsoft/Amazon/IBM/Google

Note: Students are evaluated based on the certification course they have undergone during the semester. The courses need to be registered under the university recognized organizations and domains. This is mandatory course.

Dr. V.Vijaya Kumar, Chairperson BoS Dept of Computer Sciences, AKU Ongole, AP
Former professor of JNT University Hyderabad and Rayalaseema University Kurnool
Dean School of Engineering & Professor Department of CSE, Anurag University,

AK UNIVERSITY EXAMINATION 2023

First Semester

MS101

Masters of Sciences (COMPUTERS)

Paper-1- Python Programming

Time: Three hours Maximum: 70 marks

Answer ALL questions

All questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

First Semester

MS102

Masters of Sciences (COMPUTERS)

Paper-2- Database Management Systems

Time: Three hours Maximum: 70 marks

Answer ALL questions

All questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

First Semester

MS103

Masters of Sciences (COMPUTERS)

Paper-3- Computer Networks

Time: Three hours Maximum: 70 marks

Answer ALL questions

All questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

First Semester

MS104

Masters of Sciences (COMPUTERS)

Paper-4- Artificial Intelligence

Time: Three hours Maximum: 70 marks

Answer ALL questions

All questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

First Semester

MS105

Masters of Sciences (COMPUTERS)

Paper-5- Communication skills-1

Time: Three hours Maximum: 100 marks

Answer ALL questions

All questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

Second Semester

MS201

Masters of Sciences (COMPUTERS)

Paper-1- Core Java Programming

Time: Three hours Maximum: 70 marks

Answer ALL questions

All questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

Second Semester

MS202

Masters of Sciences (COMPUTERS)

Paper-2- Data Structures

Time: Three hours Maximum: 70 marks

Answer ALL questions

All questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

Second Semester

MS203

Masters of Sciences (COMPUTERS)

Paper-3- Big Data Frameworks

Time: Three hours Maximum: 70 marks

Answer ALL questions

All questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

Second Semester

MS204 A

Masters of Sciences (COMPUTERS)

Paper-4- Cyber Security Fundamentals

Time: Three hours Maximum: 70 marks

Answer ALL questions

All questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

Second Semester

MS204 B

Masters of Sciences (COMPUTERS)

Paper-4- Software Engineering

Time: Three hours Maximum: 70 marks

Answer ALL questions

All questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

Second Semester

MS204 C

Masters of Sciences (COMPUTERS)

Paper-4- Data Science

Time: Three hours Maximum: 70 marks

Answer ALL questions

All questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

Second Semester

MS205

Masters of Sciences (COMPUTERS)

Paper-5- Digital Well Being

Time: Three hours Maximum: 100 marks

Answer ALL questions

All questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

Third Semester

MS301

Masters of Sciences (COMPUTERS)

Paper-1- Advanced Java Programming

Time: Three hours Maximum: 70 marks

Answer ALL questions

All questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

Third Semester

MS302

Masters of Sciences (COMPUTERS)

Paper-2- Machine Learning

Time: Three hours Maximum: 70 marks

Answer ALL questions

All questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

Third Semester

MS303

Masters of Sciences (COMPUTERS)

Paper-3- R Programming

Time: Three hours Maximum: 70 marks

Answer ALL questions

All questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

Third Semester

MS304 A

Masters of Sciences (COMPUTERS)

Paper-4- Operating Systems(OS)

Time: Three hours Maximum: 70 marks

Answer ALL questions

All questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

Third Semester

MS304 B

Masters of Sciences (COMPUTERS)

Paper-4- Cyber Law

Time: Three hours Maximum: 70 marks

Answer ALL questions

All questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

Third Semester

MS304 C

Masters of Sciences (COMPUTERS)

Paper-4- Computer Vision

Time: Three hours Maximum: 70 marks

Answer ALL questions

All questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

Third Semester

MS304 D

Masters of Sciences (COMPUTERS)

Paper-4- Data Analytics

Time: Three hours Maximum: 70 marks

Answer ALL questions

All questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

Third Semester

MS401

Masters of Sciences (COMPUTERS)

Paper-1- Data Mining

Time: Three hours Maximum: 70 marks

Answer ALL questions

All questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

Third Semester

MS402 A

Masters of Sciences (COMPUTERS)

Paper-2- Cloud Computing

Time: Three hours Maximum: 70 marks

Answer ALL questions

All questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

Third Semester

MS402 B

Masters of Sciences (COMPUTERS)

Paper-2- Digital Forensic

Time: Three hours Maximum: 70 marks

Answer ALL questions

All questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

Third Semester

MS402 C

Masters of Sciences (COMPUTERS)

Paper-2- Distributed Computing

Time: Three hours Maximum: 70 marks

Answer ALL questions

All questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

Third Semester

MS403 A

Masters of Sciences (COMPUTERS)

Paper-3- Deep Learning

Time: Three hours Maximum: 70 marks

Answer ALL questions

All questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

Third Semester

MS403 B

Masters of Sciences (COMPUTERS)

Paper-3- NoSQL Data bases

Time: Three hours Maximum: 70 marks

Answer ALL questions

All questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

Third Semester

MS403 C

Masters of Sciences (COMPUTERS)

Paper-3- Internet of Things(IOT)

Time: Three hours Maximum: 70 marks

Answer ALL questions

All questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)