



OFFICE OF THE REGISTRAR
KAKATIYA UNIVERSITY
WARANGAL - 506009

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No. 1957 /B3/KU/2023

Date: 14 - 11 - 2023

To
All the Principals of University/
Constituent/ Affiliated / Private Colleges Offering B. Tech. (AI & ML) Course
Kakatiya University, Warangal

Sub:-FACULTY OF ENGINEERING - Syllabus- Revision of Scheme &
Syllabus of B. Tech. (AI &ML) Program III & IV Semesters under
CBCS pattern for implementation with effect from the academic year
2023-2024 onwards – Regarding.

Ref: Letter No. Nil, dated 03/11/2023 of the Chairperson, Board of Studies
in Computer Science & Engineering, KU.

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Sir/Madam,

I am to inform you that the Chairperson, Board of Studies in Computer Science and Engineering, Kakatiya University through her letter under reference cited has communicated the Revised Scheme and Syllabus of B. Tech (AI &ML) III & IV Semesters under CBCS pattern as recommended by the Board of Studies in Computer Science and Engineering for implementation for the academic year 2023-2024. The Dean, Faculty of Engineering, KU has recommended for implementation.

In view of the urgency, the Vice- Chancellor in anticipation of approval by the Standing Committee of the Academic Senate has accorded approval for the revised scheme and syllabus of B. Tech. (AI & ML) III & IV Semesters under CBCS pattern as recommended by the Board of Studies in Computer Science & Engineering for implementation with effect from the academic year 2023-2024 and onwards.

The same scheme and syllabus of the course shall be kept in KU Website. kakatiya.ac.in

As such, you are hereby informed to bring it to the notice of the students and staff concerned and initiate action accordingly.

Yours faithfully,


REGISTRAR

Copy to:-

- 1) The Dean, Faculty of Engineering, KU
- 2) The Head Dept. of Computer Science & Engineering, KU
- 3) The Chairperson, Board of Studies in Computer Science, KU
- 4) The Controller of Examinations, KU
- 5) The Additional Controller of Exams (P.G.)/ Confidential
- 6) The Secretary to Vice- Chancellor, KU
- 7) The P.A. to Registrar, KU
- 8) The SF.



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Faculty of Engineering & Technology

KAKATIYA UNIVERSITY, WARANGAL -506009

Department of Computer Science & Engineering

III SEMESTER OF B.TECH IN ENGINEERING (AI & ML)

SL No	Category/ Code	Course Title	L	T	P	Credits
1	BSC-301	Mathematics and Statistical foundations	3	0	0	3
2	PCS-301	Data Structures	3	1	0	4
3	PCS-302	Computer Architecture & Organization	3	1	0	4
4	PCS-303	OOPS through Java	3	1	0	4
5	PCS-304	Elements of Computer Science	3	1	0	4
6	PCS-301L	Data Structures Lab	0	0	3	1.5
7	PCS-303L	OOPs through java Lab	0	0	3	1.5
8	MC-310	Constitution of India	2	0	0	0
		Total		25		22

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Department of Computer Science & Engineering
Department of Information Technology

B.TECH (AI & ML) III SEMESTER

Sl. No	Category/ Code	Course Title	L	T	P	Credits
1	BSC-301	Mathematics and Statistical Foundations	3	0	0	3
2	PCS-301	Data Structures using "C"	3	1	0	4
3	PCS-302	Computer Architecture & Organization	3	1	0	4
4	PCS-303	OOP Through JAVA	3	1	0	4
5	PCS-304	Elements of Computer Science	3	1	0	4
6	PCS-301L	Data Structures Lab	0	0	4	1.5
7	PCS-303L	OOP Through JAVA Lab	0	0	4	1.5
8	MC-310	Constitution of India	2	0	0	0
		Total		25		22

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B.Tech AI&ML
III & IV Semester
Syllabus

Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL -506009
Department of Computer Science & Engineering
Department of Information Technology

B. Tech. (AI&ML) III SEMESTER

BSC-301 MATHEMATICAL AND STATISTICAL FOUNDATIONS

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	0	0	3	External Marks: 70

Module1: Statistical Methods

Introduction, Collection of Data, Graphical Representation, Measures of Dispersion, Moments, Skewness, Kurtosis, Correlation, Coefficient of Correlation, Lines of Regression.

(Sections 25.1, 25.2, 25.3, 25.6, 25.9, 25.10, 25.11, 25.12, 25.13, 25.14 of Text Book)

Module2: Probability & Distributions

Probability, Addition Law of Probability, Independent Events, Baye's Theorem, Random Variable, Continuous Probability Distribution, Expectation, Moment Generating Function, Binomial Distribution, Poisson Distribution, Normal Distribution, Exponential Distribution.

(Sections 26.1, 26.4, 26.5, 26.6, 26.7, 26.9, 26.10, 26.11, 26.14, 26.15, 26.16, 26.19(6) of Text Book)

Module3: Numerical Techniques-I

Solution of Algebraic and Transcendental Equations, Principle of Least Squares, Method of

Least Squares, Fitting of Other Curves, Finite Differences, Forward Differences, Backward Differences.
(Sections 28.2, 24.4, 24.5, 24.6, 30.2, 30.2(1), 30.2(2) Of Text Book)

Module4: Numerical Techniques-II

Central Differences, Other Difference Operators, Newton's Interpolation Formulae, Gauss's

Forward Interpolation Formula, Interpolation with Unequal Intervals, Numerical Differentiation. Sections 29.7, 29.4, 29.6, 29.7(1), 29.9, 30.1. of Text Book)

Module5: Numerical Techniques-III

Numerical Integration, Trapezoidal Rule, Simpson's one-third Rule, Simpson's three-eighth Rule, Weddle's Rule, Solution of Simultaneous Linear Equations (Iterative Methods) (Sections 30.4, 30.6, 30.7, 30.8, 30.10, 28.5 of Text Book)

Text Book:

B.S Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publications.

References

1. Erwin Kreyszig, Advanced Engineering Mathematics, 8th Edition, John Wiley & Sons
2. S.C. Gupta, V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand & Sons
3. S.S. Sastry, Introductory Methods of Numerical Analysis, PHI Learning Pvt. Ltd.

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B. Tech. (AI&ML) III SEMESTER

PCS – 301 DATA STRUCTURES USING C

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	1	-	4	External Marks: 70

UNIT-I

Introduction

Introduction to data structure, types of data structures, revision of arrays, memory representation of arrays, operations on arrays, static versus dynamic memory allocation, pointers, self-referential structure Time complexity.

UNIT-II

Linked lists

Single linked list representation, operations on single linked list, Circular linked list and its operations, Doubly linked list and its operations, applications of lists, polynomial representation using lists.

UNIT-III

Stack-Queue (Linear Data structures)

Definition of stack, operations on stack, implementation of stack using arrays and linked lists, application of stack, postfix evaluation using stack, conversion of infix to postfix and prefix expressions.

Definition of queue, operations on queue, implementation of queue using arrays and linked list, applications of queue, Circular queue and priority queue.

UNIT-IV

Trees-Graphs (Nonlinear Data structures)

Definition of trees, Terminology on trees, binary tree, binary search tree and its operations, tree traversal techniques.

Definition of graph, terminology on graphs, representation of graphs, graph traversal techniques, spanning tree, minimum spanning tree algorithms.

UNIT-V

Searching-Sorting

Searching: Linear search, Binary search

Sorting: Bubble sort, Insertion sort, selection sort, quick sort and merge sort.

Text Books:

1. Ellis Horowitz, Sartaj Sahani, Dinesh Metha, "Fundamentals of data structures in C", Galgotia Publications Pvt. Ltd, ISBN 81-203-1874-9.
2. D. Samanta, "Classic data structures", Printice Hall India, ISBN 81-203-1874-9.

Suggested Text/Reference Books:

1. Data Structures Using C, SIXTH edition, E. Balaguru Swamy, Tata McGraw-Hill. ISBN 1-25-9029544-9.
2. Fundamentals Of Data Structures In C, Horowitz, Sahni, Universities Press ISBN 10: 8173716056

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Department of Computer Science & Engineering
Department of Information Technology

B. Tech. (AI&ML) III SEMESTER

PCS – 302 COMPUTER ARCHITECTURE AND ORGANIZATION

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	1	-	4	External Marks: 70

UNIT-I

Review of Computer Systems: The Evolution of Computers, Basic Functional Units and Operation of Digital Computers, Performance Measures.

Number Representation: Integer, Signed, Unsigned, 1's Complement, 2's Complement, 1's Complement, Addition and Subtraction of Signed Numbers, Overflow in Integer Arithmetic, Fixed and Floating-Point Representation, IEEE 754 Representation, BCD, Gray code.

Instructions: Memory Location and Address: Byte addressability, Big endian & Little-endian assignments, Word alignment, Accessing Numbers, Characters and Character strings. Addressing modes, Instruction Format: Three, Two, One, Zero Address Instructions. Risk Instructions, Modes of Instructions, Instruction Sequencing, Assembly Language, Stacks and Queues, Subroutines.

UNIT-II

Central Processing Unit: Fundamental Concepts, Execution of Complete Instruction, Control Unit, Micro Programming Control Unit, Hardwired Control Unit, Study of 8088, Power Pc Processor.

Memory Unit: Basic Concepts of Memory, Memory Hierarchy, Technology: RAM, ROM, Flash Memory, EPROM, Cache Memory: Different Mapping Functions, Replacement Algorithms.

Performance Considerations: Interleaving, Hit Rate, Miss Penalty, Caches on Processor Chip, Virtual Memory: Address Translation, Associative Memory, Page replacement algorithms, Secondary Storage: Magnetic Hard disk, Optical Disk, Magnetic Tape.

UNIT-III

Computer Arithmetic: Addition & Subtraction of Signed Numbers, Carry look ahead adder, Multiplication of positive numbers, Booth's Algorithm, Fast Multiplication, Integer Division, Floating Point Arithmetic Operation: Addition, Subtraction, Multiplication & Division.

Input/Output Unit: I/O Interface: I/O Bus and Interface Modules, I/O Vs Memory Bus, Isolated I/O, Memory Mapped I/O, Synchronous & Asynchronous Data Transfer, Modes of Data Transfer: Programmed I/O, Interrupt initiated I/O, Priority Interrupt: Daisy Chaining Priority, Parallel Priority, Interrupt, Priority Encoder, Interrupt Cycle, Software Routine, DMA, Interface Circuit:

Parallel, Port, Serial Port, Standard I/O Interfaces: PCI Bus, SCSI Bus, Universal Serial Bus.

UNIT-IV

Computer Peripherals: Input Devices: Keyboard, mouse, joystick, track ball, touch pad, scanners.
Output Devices: Video displays, flat panel display, printers, graphics accelerators.

Pipelining: Basic concepts, Data & instruction hazards, Influence on instruction sets. Data path and control considerations, Super scalar operations.

Introduction to RISC, CISC. Introduction to parallel processing, interprocessor communication & synchronization

UNIT-V

Large Computer Systems: Forms of Parallel Processing, Array Processors, The Structure of General purpose multiprocessor, Interconnection Networks, Memory Organization, Program Parallelism and Shared Variables

Text Books:

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky Computer Organization, Tata McGraw Hill, 5/e

Reference Books:

1. Morris M. Mano, Computer System Architecture, PHI, 3rd Edition
2. John P. Hayes, Computer Architecture and Organization, McGraw Hill, 3/e
3. Andrew S. Tanenbaum, Structured Computer Organization, 6/e

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B. Tech. (AI&ML) III SEMESTER

PCS - 303 OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	1	-	4	External Marks: 70

UNIT-I

Programming Paradigms: Procedural Programming, Modular Programming, Object Oriented Programming and Generic Programming, Object Oriented Programming Concepts.
Java basics: Creation of Java, Java buzzwords, Data types, Variables and Arrays, Operators, Control statements, introductions to classes and simple programs.

UNIT-II

Classes and objects:

Creating classes and objects, visibility modes, constructors, overloading methods, Passing and returning objects, Recursion, Variable length arguments, Nested and inner classes, static - variables, Blocks and methods.

String: Exploring String, String Buffer, String Builder and String Tokenizer classes.

UNIT-III

Inheritance: Basic concepts, Types of inheritance, using super, creating multilevel inheritance. Method Overriding, Runtime polymorphism, Dynamic method dispatch, using abstract classes. Using final with inheritance, The Object class.

Packages and interfaces: Packages, Access Protection, importing packages, Interfaces Defining an interface, implementing interfaces, Nested interfaces, applying interfaces, Variables in interfaces, Interfaces can be extended.

UNIT-IV

Exception handling: Fundamentals of exception handling, exception type, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built in exceptions, creating own exceptions

Using I/O: The Predefined Streams, using byte streams, Reading and writing files using byte streams, Using Java's Character-based streams, Using Java's type wrappers to Convert Numeric Strings

UNIT-V

Applets: Applet basics, applet skeleton, Applet initialization and termination, requesting repainting, Using the status window, Passing parameters to Applets.

AWT: AWT classes, Window Fundamentals, Working with Frame Windows, creating a Frame Window in an applet AWT Controls: Control Fundamentals, Labels, Using Buttons, Check Boxes, Choice Controls, Lists, Scroll Bars, Text Field, Text Area, Understanding Layout Managers, Menu Bars and Menus, Dialog Boxes.

Text Books:

1. Herbert Schildt, "JAVA The Complete Reference", 9th Edition. McGraw-Hill Education India Pvt. Ltd, ISBN: 9781259002465, 2011.
2. Herbert Schildt, Dale Skrien, "Java Fundamentals (A Comprehensive Introduction)". 1st Edition, McGraw Hill Education, ISBN-13: 978-1-25-900659-3, 2013. (Chapters: 11, 15, 17, 18).

Reference Books:

1. Sachin Malhotra, Saurabh Choudhary, "Programming in JAVA", 2nd Edition. Oxford Publications, ISBN-13: 978-0-19-809485-2, 2013. (Chapters: 1 to 8, 12 to 15)
2. Kathy Sierra, Bert Bates, "Head First Java", 2nd Edition. O'Reilly Publications, ISBN- 13: 978-0596009205, 2013.
3. UttamK.Roy, "Advanced JAVA Programming", 1st edition, Oxford Publications: ISBN- 13: 978-0199455508, 2013

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B. Tech. (AI&ML) III SEMESTER

PCS – 304 Elements of Computer Science

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	1	0	4	External Marks: 70

UNIT – I

Basics of a Computer – Hardware, Software, Generations of computers. Hardware - functional units, Components of CPU, Memory – hierarchy, types of memory. Input and output devices. Software –systems software, application software, packages, frameworks, IDEs.

UNIT – II

Software development – waterfall model, Agile, Types of computer languages - Programming, markup, scripting Program Development – steps in program development. flowcharts. algorithms. data structures – definition, types of data structures

UNIT – III

Operating systems: Functions of operating systems, types of operating systems. Device & Resource Management

Database Management Systems: Data models, RDBMS, SQL, Database Transactions. data centers, Cloud services

UNIT – IV

Computer Networks: Advantages of computer networks, LAN, WAN, MAN, internet, WiFi, sensor networks, vehicular networks, 5G communication.

World Wide Web – Basics, role of HTML, CSS, XML, Tools for web designing. Social media. Online social networks.

Security – information security, cyber security, cyber laws

UNIT – V

Autonomous Systems: IoT, Robotics, Drones, Artificial Intelligence – Learning, Game Development, natural language processing, image and video processing.

Cloud Basics

TEXT BOOK:

1. Invitation to Computer Science, G. Michael Schneider, Macalester College. Judith L. Gersting University of Hawaii, Hilo, Contributing author: Keith Miller University of Illinois, Springfield.

REFERENCE BOOKS:

1. Fundamentals of Computers, Reema Thareja, Oxford Higher Education, Oxford University Press.
2. Introduction to computers, Peter Norton, 8th Edition, Tata McGraw Hill.
3. Computer Fundamentals, Anita Goel, Pearson Education India, 2010.
4. Elements of computer science, Cengage

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B. Tech. (AI & ML) III SEMESTER

MC 310 Constitution of India

Unit -1:

1. Making of Indian Constitution - Constituent Assembly
2. Historical Perspective of the Constitution of India
3. Salient Features and characteristics of the Constitution of India

Unit -2:

1. The Fundamental Rights
2. The Fundamental Duties and their Legal Status
3. The Directive Principles of State Policy – Their Importance and Implementation

Unit -3:

1. Federal Structure and Distribution of Administrative, Legislative and Financial Powers between the Union and the States
2. Parliamentary Form of Government in India – The Constitutional Powers and Status of the President of India
3. Amendment of the Constitutional Provisions and Procedure

Unit -4:

1. The Judiciary
2. Constitutional and Legal Frame Work for Protection of Environmental in Global and National Level
3. Corporate Social Responsibility (CSR) International and National Scenario.

Text books:

1. D.D. Basu: An Introduction of Indian Constitution
2. Greanvile Austin: The Indian Constitution
3. Paras Diwan: Studies on Environmental cases

References books:

1. Khanna Justice.H.R: Making of India's Constitution, Eastern Book Companies.
2. Rajani Kothari: Indian Politics
3. Ghosh Pratap Kumar: The Constitution of India. How it has been Formed, World Press.
4. A.Agrawal (Ed): Legal Control of Environmental Pollution.

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B. Tech. (AI&ML) III SEMESTER

PCS- 301L Data structures Lab Using C

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 25
-	-	3	1.5	External Marks: 50

LIST OF EXPERIMENTS

1. Program to implement array operations.
2. Program to represent sparse matrix using array, and display its transpose.
3. Program to perform addition of two sparse matrices.
4. Program to implement stack and its operations using arrays.
5. Program to implement stack operations using arrays.
6. Program to implement multiple stacks in single array.
7. Program to convert infix expression to postfix expression.
8. Program to convert given infix expression to prefix expression.
9. Program to evaluate given postfix expression.
10. Program to implement queue operations using arrays.
11. Program to implement circular queue operations using arrays.
12. Program to create single linked list and implement its operations.
13. Program to implement double linked list and its operations.
14. Program to implement stack and queue using linked list.
16. Program to implement binary search tree and traversing techniques.
15. Program for linear search and binary search.
16. Programs for bubble sort, selection sort, insertion sort, quick sort and merge sort.

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B. Tech. (AI&ML) III SEMESTER
PCS – 303L OOP Through Java Laboratory

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 25
-	-	3	1.5	External Marks: 50

List of Experiments

Experiment-I

1. Write a program to demonstrate control structures using sample of displaying prime numbers within a given range.
2. Write a program to read an array and display them using for-each control. Finally display the sum of array elements.
3. Write a program to read a matrix and display whether it is an identity matrix or not. Use civilized form of *break* statement.
4. Write a program to define a two-dimensional array where each row contains different number of columns. Display the 2D-array using for-each.

Experiment-II

1. Write a program to demonstrate creating classes and objects with different visibility modes.
2. Write a program to demonstrate passing objects to methods.
3. Write a program to demonstrate constructors.
4. Write a program to demonstrate static variables.

Experiment-III

1. Read at least 5 strings from command line argument and display them in sorted order.
2. Accept the string, count number of vowels and remove all vowels using *StringBuffer* class.
3. Accept a line of text, tokenize the line using *StringTokenizer* class and print the tokens in reverse order.

Experiment-IV

1. Write program to demonstrate single inheritance.
2. Write program to demonstrate multilevel-inheritance.
3. Write program to demonstrate run time polymorphism java.
4. Write a program to demonstrate use of abstract class.
5. Write a program to demonstrate the use of overriding *equals ()* method of an Object class.

Experiment-V

1. Write a program to create a package, and demonstrate to import a package into our file.
2. Write a program to implement multiple interfaces into single class.

Experiment-VI

1. Write a program to demonstrate exceptions using try and catch.
2. Handle *ArrayIndexOutOfBoundsException, NumberFormatException and ArithmeticException* using multiple catch blocks.
3. Write a program to demonstrate re-throw of exception, and finally block.

Experiment-VII

1. Write a program to demonstrate wrapper class using sample of reading two integer numbers from command line and display their quotient.
2. Write a program to demonstrate Character-based streams.
3. Write a program to show the content of the specified file.
4. Write a program to copy the content of one file to another.

Experiment-VIII

1. Develop an applet to display "Good Morning" if current time is between 6AM and 12PM and "Good Afternoon" if the current time is between 12PM and 6PM, and "Good Evening" if the current time is between 6PM and 12AM.
2. Develop an applet which draws different geometric shapes and fill them with different colors.
3. Implement an applet program to display moving banner. **Experiment-X**
1. Design a registration form using java frame window with AWT controls
2. Write a program to create frame windows to include different controls with different layouts.
