

**DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY, UTTAR
PRADESH, LUCKNOW**



Evaluation Scheme & Syllabus

For

B.Tech. 2nd Year

Computer Science and Engineering (Artificial Intelligence)

**Computer Science and Engineering (Artificial Intelligence & Machine
Learning)**

Computer Science and Engineering (Data Science)

Computer Science and Engineering (Internet Of Things)

On

AICTE Model Curriculum

(Effective from the Session: 2021-22)

DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY LUCKNOW

B.TECH
(CSAI/CSML/CSDS/CSIOT)
COMPUTER SCIENCE AND ENGINEERING)
SEMESTER- III

Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KOE031-38/ KAS302	Engineering Science Course/Maths IV	3	1	0	30	20	50		100		150	4
2	KAS301/ KVE 301	Technical Communication/Universal Human values	2	1	0	30	20	50		100		150	3
			3	0	0								
3	KCS301	Data Structure	3	1	0	30	20	50		100		150	4
4	KCS302	Computer Organization and Architecture	3	1	0	30	20	50		100		150	4
5	KCS303	Discrete Structures & Theory of Logic	3	0	0	30	20	50		100		150	3
6	KCS351	Data Structures Using C Lab	0	0	2				25		25	50	1
7	KCS352	Computer Organization Lab	0	0	2				25		25	50	1
8	KCS353	Discrete Structure & Logic Lab	0	0	2				25		25	50	1
9	KCS354	Mini Project or Internship Assessment*	0	0	2			50				50	1
10	KNC301/ KNC302	Computer System Security/Python Programming	2	0	0	15	10	25		50			0
11		MOOCs (Essential for Hons. Degree)											
		Total										950	22

*The Mini Project or internship (3-4 weeks) conducted during summer break after II semester and will be assessed during III semester.

SEMESTER- IV

Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KAS402/ KOE041-48	Maths IV/Engg. Science Course	3	1	0	30	20	50		100		150	4
2	KVE401/ KAS301	Universal Human Values/ Technical Communication	3	0	0	30	20	50		100		150	3
			2	1	0								
3	KCS401	Operating Systems	3	0	0	30	20	50		100		150	3
4	KCS402	Theory of Automata and Formal Languages	3	1	0	30	20	50		100		150	4
5	KCS403	Microprocessor	3	1	0	30	20	50		100		150	4
6	KCS451	Operating Systems Lab	0	0	2				25		25	50	1
7	KCS452	Microprocessor Lab	0	0	2				25		25	50	1
8	KCS453	Python Language Programming Lab	0	0	2				25		25	50	1
9	KNC402/ KNC401	Python Programming/Computer System Security	2	0	0	15	10	25		50			0
10		MOOCs (Essential for Hons. Degree)											
		Total										900	21

B.TECH.
(CSAI/CSML/CSDS/CSIOT)
(COMPUTER SCIENCE AND ENGINEERING)
THIRD SEMESTER (DETAILED SYLLABUS)

DATA STRUCTURE (KCS301)		
Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able to understand		
CO 1	Describe how arrays, linked lists, stacks, queues, trees, and graphs are represented in memory, used by the algorithms and their common applications.	K₁, K₂
CO 2	Discuss the computational efficiency of the sorting and searching algorithms.	K₂
CO 3	Implementation of Trees and Graphs and perform various operations on these data structure.	K₃
CO 4	Understanding the concept of recursion, application of recursion and its implementation and removal of recursion.	K₄
CO 5	Identify the alternative implementations of data structures with respect to its performance to solve a real world problem.	K₅, K₆
DETAILED SYLLABUS		3-1-0
Unit	Topic	Proposed Lecture
I	<p>Introduction: Basic Terminology, Elementary Data Organization, Built in Data Types in C. Algorithm, Efficiency of an Algorithm, Time and Space Complexity, Asymptotic notations: Big Oh, Big Theta and Big Omega, Time-Space trade-off. Abstract Data Types (ADT)</p> <p>Arrays: Definition, Single and Multidimensional Arrays, Representation of Arrays: Row Major Order, and Column Major Order, Derivation of Index Formulae for 1-D,2-D,3-D and n-D Array Application of arrays, Sparse Matrices and their representations.</p> <p>Linked lists: Array Implementation and Pointer Implementation of Singly Linked Lists, Doubly Linked List, Circularly Linked List, Operations on a Linked List. Insertion, Deletion, Traversal, Polynomial Representation and Addition Subtraction & Multiplications of Single variable & Two variables Polynomial.</p>	08
II	<p>Stacks: Abstract Data Type, Primitive Stack operations: Push & Pop, Array and Linked Implementation of Stack in C, Application of stack: Prefix and Postfix Expressions, Evaluation of postfix expression, Iteration and Recursion- Principles of recursion, Tail recursion, Removal of recursion Problem solving using iteration and recursion with examples such as binary search, Fibonacci numbers, and Hanoi towers. Tradeoffs between iteration and recursion.</p> <p>Queues: Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, Array and linked implementation of queues in C, Dequeue and Priority Queue.</p>	08
III	<p>Searching: Concept of Searching, Sequential search, Index Sequential Search, Binary Search. Concept of Hashing & Collision resolution Techniques used in Hashing. Sorting: Insertion Sort, Selection, Bubble Sort, Quick Sort, Merge Sort, Heap Sort and Radix Sort.</p>	08
IV	<p>Graphs: Terminology used with Graph, Data Structure for Graph Representations: Adjacency Matrices, Adjacency List, Adjacency. Graph Traversal: Depth First Search and Breadth First Search, Connected Component, Spanning Trees, Minimum Cost Spanning Trees: Prims and Kruskal algorithm. Transitive Closure and Shortest Path algorithm: Warshal Algorithm and Dijkstra Algorithm.</p>	08

V	<p>Trees: Basic terminology used with Tree, Binary Trees, Binary Tree Representation: Array Representation and Pointer(Linked List) Representation, Binary Search Tree, Strictly Binary Tree ,Complete Binary Tree . A Extended Binary Trees, Tree Traversal algorithms: Inorder, Preorder and Postorder, Constructing Binary Tree from given Tree Traversal, Operation of Insertation , Deletion, Searching & Modification of data in Binary Search . Threaded Binary trees, Traversing Threaded Binary trees. Huffman coding using Binary Tree. Concept & Basic Operations for AVL Tree , B Tree & Binary Heaps</p>	08
<p>Text books:</p> <ol style="list-style-type: none"> 1. Aaron M. Tenenbaum, Yedidyah Langsam and Moshe J. Augenstein, “Data Structures Using C and C++”, PHI Learning Private Limited, Delhi India 2. Horowitz and Sahani, “Fundamentals of Data Structures”, Galgotia Publications Pvt Ltd Delhi India. 3. Lipschutz, “Data Structures” Schaum’s Outline Series, Tata McGraw-hill Education (India) Pvt. Ltd. 4. Thareja, “Data Structure Using C” Oxford Higher Education. 5. AK Sharma, “Data Structure Using C”, Pearson Education India. 6. Rajesh K. Shukla, “Data Structure Using C and C++” Wiley Dreamtech Publication. 7. Michael T. Goodrich, Roberto Tamassia, David M. Mount “Data Structures and Algorithms in C++”, Wiley India. 8. P. S. Deshpandey, “C and Data structure”, Wiley Dreamtech Publication. 9. R. Kruse etal, “Data Structures and Program Design in C”, Pearson Education. 10. Berztiss, AT: Data structures, Theory and Practice, Academic Press. 11. Jean Paul Trembley and Paul G. Sorenson, “An Introduction to Data Structures with applications”, McGraw Hill. 12. Adam Drozdek “Data Structures and Algorithm in Java”, Cengage Learning 		

Computer Organization and Architecture (KCS302)		
Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able to understand		
CO 1	Study of the basic structure and operation of a digital computer system.	K ₁ , K ₂
CO 2	Analysis of the design of arithmetic & logic unit and understanding of the fixed point and floating-point arithmetic operations.	K ₂ , K ₄
CO 3	Implementation of control unit techniques and the concept of Pipelining	K ₃
CO 4	Understanding the hierarchical memory system, cache memories and virtual memory	K ₂
CO 5	Understanding the different ways of communicating with I/O devices and standard I/O interfaces	K ₂ , K ₄
DETAILED SYLLABUS		3-1-0
Unit	Topic	Proposed Lecture
I	Introduction: Functional units of digital system and their interconnections, buses, bus architecture, types of buses and bus arbitration. Register, bus and memory transfer. Processor organization, general registers organization, stack organization and addressing modes.	08
II	Arithmetic and logic unit: Look ahead carries adders. Multiplication: Signed operand multiplication, Booths algorithm and array multiplier. Division and logic operations. Floating point arithmetic operation, Arithmetic & logic unit design. IEEE Standard for Floating Point Numbers	08
III	Control Unit: Instruction types, formats, instruction cycles and sub cycles (fetch and execute etc), micro operations, execution of a complete instruction. Program Control, Reduced Instruction Set Computer, Pipelining. Hardwire and micro programmed control: micro programme sequencing, concept of horizontal and vertical microprogramming.	08
IV	Memory: Basic concept and hierarchy, semiconductor RAM memories, 2D & 2 1/2D memory organization. ROM memories. Cache memories: concept and design issues & performance, address mapping and replacement Auxiliary memories: magnetic disk, magnetic tape and optical disks Virtual memory: concept implementation.	08
V	Input / Output: Peripheral devices, I/O interface, I/O ports, Interrupts: interrupt hardware, types of interrupts and exceptions. Modes of Data Transfer: Programmed I/O, interrupt initiated I/O and Direct Memory Access., I/O channels and processors. Serial Communication: Synchronous & asynchronous communication, standard communication interfaces.	08
Text books:		
<ol style="list-style-type: none"> 1. Computer System Architecture - M. Mano 2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky Computer Organization, McGraw-Hill, Fifth Edition, Reprint 2012 3. John P. Hayes, Computer Architecture and Organization, Tata McGraw Hill, Third Edition, 1998. Reference books 4. William Stallings, Computer Organization and Architecture-Designing for Performance, Pearson Education, Seventh edition, 2006. 5. Behrooz Parahami, "Computer Architecture", Oxford University Press, Eighth Impression, 2011. 6. David A. Patterson and John L. Hennessy, "Computer Architecture-A Quantitative Approach", Elsevier, a division of reed India Private Limited, Fifth edition, 2012 7. Structured Computer Organization, Tannenbaum(PHI) 		



SEM:III-A

ABES Engineering College, Ghaziabad
Department of CSE-Data Science
Time-Table Odd Semester (Session: 2021-22)

ANNEXURE VI

W.E.F:- 6.09.2021

Day / Time	I	II	10:30-10:40	III	IV	12:20-1:10	V	VI	VII	VIII	
	08:50-09:40	09:40-10:30		10:40-11:30	11:30-12:20		1:10-2:00	2:00-2:50	2:50-3:40	3:40-4:30	
Monday	Problem Solving	Verbal Ability	BREAK	KCS-302 Computer Organisation & Architecture	LUNCH	KCS-301 Data Structures	Mentor Mentee				
Tuesday	KNC-302 Python			Soft Skills		KCS-301 Data Structures	KCS-303 DSTL				
Wednesday	KCS-302 Computer Organisation & Architecture			KCS-303 DSTL		KAS-302 Maths-IV	Lab (A1)		CS-353 DSTL Lab (A2)		
Thursday	KCS-301 Data Structures			Problem Solving		KCS-303 DSTL	Mentor Mentee				
Friday	KCS-302 Computer Organisation & Architecture			KAS-302 Maths-IV		Universal Human Values	KCS-353 DSTL Lab (A1)		Lab (A2)		

Signature of HoD:
Name of HoD:

Signature of Time Table Coordinator(s)
Name of Time Table Coordinator(s):