Course code: Course Title	Course Structure			Pre-Requisite
CE104: Mechanics of Solids	L	T	P	NIL
	3	0	2	

Course Objective: To understand the influence of forces/loads on various objects.

S. NO	Course Outcomes (CO)
CO1	Describe the stress and strain.
CO2	Describe the complex stress and strain with pressure vessels and failure theories.
CO3	Draw Shear Force and bending moment diagrams of beams.
CO4	Compute bending and shear stresses in beams.
CO5	Describe concept of torque and buckling of columns.

S. NO	Contents	Contact Hours
UNIT 1	Stress and Strain: Stress, normal and shearing stresses, stresses acting at a point, complementary shear stress, stress tensor, determining stresses on a plane from given stress tensor. Strains, normal and shearing strain, measurement of strains, strain rosettes, strains acting at a point, strain tensor, determining strains on a plain from given strain tensor, principal strains, Strain-displacement relationships, conditions of compatibility and Generalised Hook's law, Relation amongst elastic constants.	10
UNIT 2	Complex Stress and Strain: Determining principal stress and their planes, Mohr's circle of stress and strain. Thin and thick cylindrical shells subjected to internal pressure, Spherical Shells subjected to internal pressure and their designs. Failure theory of materials.	8

UNIT 3	Shear Force and Bending Moment Diagrams: Basic concepts, Types of supports, Shear Force, Bending moments, relationship between them and their diagrams, Inclined loading, Gradual, sudden and Impact loading, loading and Bending Moment diagrams from Shear Force diagrams, Problems related to cantilever, simply supported, overhanging, fixed and continuous beams.	8
UNIT 4	Bending and Shear Stresses in Beams: Moment of inertia of different sections, including unsymmetrical sections and built up sections, Theory of simple bending, design criterion and section modulus, beams of composite section i.e. Flitched beams, Strain Energy due to bending, Force on a partial area of a beam section and its moment about neutral axis. Distribution of shearing stresses over rectangular, solid circular, I- and other sections, Principal stresses and principal planes at a point in a beam section.	8
UNIT 5	Shaft and Columns: Torsion of Shafts: Introduction, Relation between Twisting moment i.e. Torsion and shearing stress, Torsion of shafts not circular in section, Design of shafts, combined Bending and Torsion, Principal stresses, shafts in series and parallel, Torsion Strain Energy, Problems, Springs. Columns and Struts: Elastic Stability, Euler's Theory, Equivalent length, Limitations of Euler's Formula, Eccentric Loading, Practical End conditions and Effective Length Factors, Built up Columns.	8
	TOTAL	**42**

REFERENCES

S.No.	Name of Books/Authors/Publishers	Year of Publication / Reprint
1	Theory of Elasticity; S. P. Timoshenko, J. N. Goodier, Tata Mc Graw Hill.	2010
2	Mechanics of Materials, J. M. Gere, S. P. Timoshenko. CBS Publishers.	2004
3	Mechanics of Materials; R. C. Hibbeler, Pearson.	2007
4	Mechanics of Materials; B. C. Punmia, A. K. Jain, A. K. Jain, Laxmi Publications (P) Ltd.	2001

B. Tech . Computer Science and Engineering

Course code: Course Title	Course Structure			Pre-Requisite
	L	**T**	**P**	
CS104:Data Structures				NIL

CS104:Data Structures	3	0	2	NIL

Course Objective: The objective of studying data structures is to understand and utilize efficient techniques for organizing and managing data in computer programs.

S. NO	Course Outcomes (CO)
CO1	Demonstrate an in-depth understanding the properties, functionalities, and trade-offs of essential data structures such as arrays, linked lists, stacks, queues, trees, and graphs.
CO2	Analyze and evaluate the time and space complexity of operations performed on data structures, such as insertion, deletion, searching, and traversal.
CO3	Identify and select appropriate data structures to efficiently solve real-world computational problems.
CO4	Combine multiple data structures and algorithms to devise comprehensive solutions.

S. NO	Contents	Contact Hours
UNIT 1	Introduction:Introduction to Algorithms, Complexity- Time-Space Trade off. Introduction to abstract data types, design, implementation and applications. Introduction to List data structure. Arrays and Strings: Representation of Arrays in Memory: One-dimensional, Two dimensional and Multidimensional, Accessing of elements of array, performing operations like Insertion, Deletion and Searching. Sorting elements of arrays. Strings and String Operations. Stacks and Queues: Introduction to data structures like Stacks and Queues. Operations on Stacks and Queues, Array representation of Stacks , Applications of Stacks : recursion, Polish expression and their compilation conversion of infix expression to prefix and postfix expression, Operations of Queues, Representations of Queues Applications of Queues, Priority queues.	10
UNIT 2	Linked Lists: Singly linked lists, Representation of linked list, Operations of Linked list such as Traversing, Insertion and Deletion, Searching, Applications of Linked List. Concepts of Circular linked list and Doubly linked list and their Applications. Stacks and Queues as linked list. Trees:Basic Terminology, Binary Trees and their representation, binary search trees, various operations on Binary search trees like traversing, searching, Insertion and Deletion, Applications of Binary Search Trees, Complete Binary trees, Extended binary trees. General trees, AVL trees, Threaded trees.	10

UNIT 3	Graphs: Terminology and Representations, Graphs & Multi-graphs, Directed Graphs, Representation of graphs and their Transversal, Spanning trees, shortest path, minimum spanning trees, Activity Networks, Topological Sort and Critical Paths.	**7**
UNIT 4	Searching and Sorting: Linear Search, Binary search, Interpolation Search, Insertion Sort, Quick sort, Merge sort, Heap sort, sorting on different keys, External sorting. Hashing: Hashing, Hash tables, Hash Functions, Collision Resolution Techniques.	**7**
UNIT 5	Heaps: Binary heap structure, min-heap, max-heap and operations on heaps, Heap sort, Priority queues. B Trees: structure of nodes, operations like insertion, deletion, B+ trees. Disjoint Sets: representations, union and find operations, collapsing find, weighted union concepts.	**8**
	TOTAL	**42**

REFERENCES

S.No.	Name of Books/Authors/Publishers	Year of Publication / Reprint
1	Horowitz, Sahni, Freed, “Fundamentals of Data structures in C”, ORIENT BLACKSWAN PRIVATE LIMITED, 2nd Edition.	2008
2	Tannenbaum, “Data Structures”, PHI	2008
3	Jean Paul Tremblay & Pal G. Sorenson , An introduction to data structures and application McGraw Hill.	2017
4	Robert Lafore, Data Structures and Algorithms in Java, Second edition, SAMS	2003
5	Michael T. Goodrich , Roberto Tamassia, Michael H. Goldwasser, Data Structures and Algorithms in Python, WILEY	2013
6	R.L. Kruse, B.P. Leary, C.L. Tondo, “Data structure and program design in C”, PHI	2007

B. Tech. Electrical Engineering