K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE - 560109

DEPARTMENT OF BASIC SCIENCE

SESSION: 2021-2022 (ODD SEMESTER)

CO-PO MAPPING

Course: Calculus and Differential Equations			
Type: Core		Course Code: 21MAT11	
No of Hours			
Theory (Lecture Class)	Practical/Field Work/Allied Activities	Total/Week	Total teaching hours
4	0	4	40
Marks			
Internal Assessment	Examination	Total	Credits
50	50	100	3

Aim/Objectives of the Course

The goal of the course Calculus and Differential Equations - 21MAT11 is

- To facilitate the students with a concrete foundation of differential calculus
- To solve the first and higher-order ordinary differential equations enabling them to acquire the knowledge of these mathematical tools.
- To develop the knowledge of matrices and linear algebra in a comprehensive manner.

Course Learning Outcomes

After completing the course, the students will be able to

CO1	**Apply** the knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of a curve.	**Applying (K3)**
CO2	**Learn** the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite functions and Jacobians.	**Applying (K3)**
CO3	**Test** the consistency of a system of linear equations and to solve them by direct and iterative methods.	**Applying (K3)**
CO4	**Solve** first order linear/nonlinear differential equation analytically using standard methods	**Applying (K3)**
CO5	**Demonstrate** various models through higher order differential equations and solve such linear ordinary differential equations.	**Applying (K3)**

Syllabus Content

Module 1: **Differential Calculus-1:** Polar curves, angle between the radius vector and the tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature - Cartesian, Parametric, Polar and Pedal forms. Problems. Self-study: Center and circle of	**CO1** 8 hrs

curvature, evolutes and involutes.. (RBT Levels: L1, L2 and L3) **LO:** At the end of this session the student will be able to 1. Find the angle between the radius vector and tangent, angle between two curves. 2. Find the Pedal equation of the curve. 3. Find the curvature and radius of curvature, evolutes and involutes.	PO1-3 PO2 -2 PO4-1 PO9-1 PO10-1 PO12-1 PSO1-3 PSO2-2
Module 2: **Differential Calculus-2:** Taylor's and Maclaurin's series expansions for one variable (statements only), indeterminate forms - L' Hospital's rule. Partial differentiation; Total derivatives-differentiation of composite functions. Maxima and minima for a function of two variables. Jacobians-simple problems. **Self-study**: Euler's Theorem and problems. Method of Lagrange undetermined multipliers with single constraint. (RBT Levels: L1, L2 and L3) (RBT Levels: L1 & L2) **LO:** At the end of this session the student will be able to 1. Obtain the series solution for the given functions.. 2. Evaluate the given funtions with limits. 3. Find the Total derivatives, maxima and minima for a function of two variables and Lagrange multipliers.	**CO2** 8 hrs. PO1-3 PO2 -2 PO4-1 PO9-1 PO10-1 PO12-1 PSO1-3 PSO2-2
Module 3 **Linear Algebra:** Elementary row transformation of a matrix, Rank of a matrix. Consistency and Solution of system of linear equations; Gauss-elimination method, Gauss-Jordan method and Approximate solution by Gauss Seidel method. Eigenvalues and Eigenvectors-Rayleigh's power method to find the dominant Eigenvalue and Eigenvector. **Self-Study:** Solution of system of equations by Gauss-Jacobi iterative method. Inverse of a square matrix by Cayley- Hamilton theorem. (RBT Levels: L1, L2 and L3). **LO:** At the end of this session the student will be able to 1. Define Rank of a matrix and echelon form. 2. Solve the system of equations using Gauss-elimination method, Gauss – Jordan method and Gauss-Seidel method. Diagonalizable the square matrix	**CO3** 8 hrs PO1-3 PO2 -2 PO4-1 PO9-1 PO10-1 PO12-1 PSO1-3 PSO2-2

Module 4: **Ordinary differential equations(ODE's)of first order:** Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations. Applications of ODE's-Orthogonal trajectories, Newton's law of cooling. Nonlinear differential equations: Introduction to general and singular solutions; Solvable for p only; Clairaut's equations, reducible to Clairaut's equations. Problems. **Self-Study**: Applications of ODE's: L-R circuits. Solvable for x and y. **(RBT Levels: L1, L2 and L3)** **LO:** At the end of this session the student will be able to 1. Solve first order linear/nonlinear differential equation analytically using standard methods.	**CO4** 8 hrs PO1-3 PO2 -2 PO4-1 PO9-1 PO10-1 PO12-1 PSO1-3 PSO2-2
Module 5: **Ordinary Differential Equations of higher order:** Higher-order linear ODE's with constant coefficients - Inverse differential operator, method of variation of parameters, Cauchy's and Legendre homogeneous differential equations. Problems. **Self-Study:** Applications to oscillations of a spring and L-C-R circuits. (RBT Levels: L1, L2 and L3) **LO:** At the end of this session the student will be able to 1. Solve the differential equations by inverse differential operation method. 2. Solve the differential equations by method of variation of parameters. 3. Solve linear ordinary differential equations.	**CO5** 8hrs PO1-3 PO2 -2 PO4-1 PO9-1 PO10-1 PO12-1 PSO1-3 PSO2-2
Text Books **1. B.S. Grewal**: Higher Engineering Mathematics, Khanna Publishers, 43 Ed., 2015. **2. E. Kreyszig**: Advanced Engineering Mathematics, John Wiley & Sons, 10 Rd Ed.(Reprint), 2016.	
Reference Books (specify minimum two foreign authors text books) 1. **V. Ramana:** "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed. 2. **Srimanta Pal & Subodh C.** Bhunia: "Engineering Mathematics" Oxford University Press, 3rd Reprint, 2016. 3. **N.P Bali and Manish Goyal**: "A textbook of Engineering Mathematics" Laxmi Publications, Latest edition. 4. **C. Ray Wylie, Louis C. Barrett:** "Advanced Engineering Mathematics" McGraw – Hill Book	

Co.Newyork, Latest ed.
5. **Gupta C.B, Sing S.R and Mukesh Kumar:** "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education(India) Pvt. Ltd 2015.
6. **H.K.Dass and Er. Rajnish Verma:** "Higher Engineering Mathematics" S.Chand Publication (2014).
7. **James Stewart:** "Calculus" Cengage publications, 7th edition, 4th Reprint 2019.

Useful Websites

- http://.ac.in/courses.php?disciplineID=111
- http://www.class-central.com/subject/math(MOOCs)
- http://academicearth.org/
- VTU e-Shikshana Program
- VTU EDUSAT Program

Useful Journals

- Annals of Mathematics
- Acta Mathematica
- International Journal of Mathematics
- Communications on pure and applied Mathematics.

Teaching and Learning Methods

1. Lecture class: 40 hrs
2. Practical classes: 0

Assessment

Type of test/examination: Written examination/Activity

Continuous Internal Evaluation (CIE):
1. Three Unit Tests each of 20 Marks (Test duration: 1hour)
2. Two assignments each of 10 Marks
3. Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks (duration 01 hours).
The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and
will be scaled down to 50 marks

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.
Semester End Exam (SEE):
Theory SEE will be conducted by University as per the scheduled timetable, with common question papers
for the subject (duration 03 hours)
1. The question paper will have ten questions. Each question is set for 20 marks.
2. There shall be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module. The students have to answer 5 full questions, selecting one full question from each module.

SEE will be conducted for 100 marks (students have to answer all main questions) which will be reduced to 50 Marks.
Examination duration: 3 hrs.

CO to PO Mapping

PO1: Science and engineering Knowledge **PO2:** Problem Analysis **PO3:** Design & Development **PO4:**Investigations of Complex Problems **PO5:** Modern Tool Usage **PO6:** Engineer & Society	**PO7:**Environment and Society **PO8:**Ethics **PO9:**Individual & Team Work **PO10:** Communication **PO11:**Project Management & Finance **PO12:**Life long Learning

PSO1: Ability to apply concept of Mathematics in engineering to design a system, a component or a process/system to address a real world challenges

PSO2: Ability to develop effective communication, team work, entrepreneurial and computational skills

CO	PO	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
18 MAT11	K-level														
CO1	K3	3	2	-	1	-	-	-	-	1	1	-	1	3	2
CO2	K3	3	2	-	1	-	-	-	-	1	1	-	1	3	2
CO3	K3	3	2	-	1	-	-	-	-	1	1	-	1	3	2
CO4	K3	3	2	-	1	-	-	-	-	1	1	-	1	3	2
CO5	K3	3	2	-	1	-	-	-	-	1	1	-	1	3	2

Course In charge

Head of the Department

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Principal

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K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BENGALURU - 560109

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CO-PO Mapping

Course: Data Structures and Applications			
Type: Core		Course Code: 18CS32	
No of Hours			
Theory (Lecture Class)	Practical/Field Work/Allied Activities	Total/Week	Total teaching hours
4	0	4	50
Marks			
Internal Assessment	Examination	Total	Credits
40	60	100	4

Aim/Objectives of the Course

1. To explain fundamentals of data structures and their applications essential for programming/problem solving.
2. To illustrate linear representation of data structures: Stack, Queues, Lists, Trees and Graphs.
3. To demonstrate sorting and searching algorithms.
4. To find suitable data structure during application development/Problem Solving.

Course Learning Outcomes

After completing the course, the students will be able to

CO1	**Apply** the basic data structures concepts such as arrays, structures, unions, pointers, strings and dynamic memory allocation function to solve simple problems.	Applying (K3)
CO2	**Make use of** stacks to evaluate mathematical expression and apply queues to solve maze problem.	Applying (K3)
CO3	**Utilize** linked list for implementation of lists, stacks, queues, polynomials and sparse matrix.	Applying (K3)
CO4	**Construct** various types of trees using linked list and array representation and apply tree traversal method for expression evaluation.	Applying (K3)
CO5	**Make use of** BFS, DFS, searching, sorting, hashing and file concept techniques appropriately.	Applying (K3)

Syllabus Content

Module 1: Introduction: Data Structures, Classifications (Primitive & Non Primitive), Data structure Operations, Review of Arrays, Structures, Self-Referential Structures, and Unions. Pointers and Dynamic Memory Allocation Functions. Representation of Linear Arrays in Memory, Dynamically allocated arrays. **Array Operations**: Traversing, inserting, deleting, searching, and sorting. Multidimensional Arrays, Polynomials and Sparse Matrices. **Strings**: Basic Terminology, Storing, Operations and Pattern Matching algorithms. Programming Examples. **LO:** At the end of this session the student will be able to 1. Understand the basic data structures concepts. 2. Analyze the pattern matching problem and sparse matrix 3. Understand the string terminologies.	CO1 10 hrs PO1-1 PO2-3 PO3-3 PO4 - 3 PO6-1 PO12 -1 PSO1-3 PSO2-1

Module 2: Stacks: Definition, Stack Operations, Array Representation of Stacks, Stacks using Dynamic Arrays, Stack Applications: Polish notation, Infix to postfix conversion, evaluation of postfix expression. **Recursion** - Factorial, GCD, Fibonacci Sequence, Tower of Hanoi, Ackerman's function. **Queues**: Definition, Array Representation, Queue Operations, Circular Queues, Circular queues using Dynamic arrays, de queues, Priority Queues, A Mazing Problem. Multiple Stacks and Queues. Programming Examples. **LO:** At the end of this session the student will be able to 1. Analyse the stack operations. 2. Understand recursion concepts. 3. Define and solve the simple queue problems.	**CO2** 10 hrs. PO1-1 PO2-3 PO3-3 PO4 - 3 PO6-1 PO12 -1 PSO1-3 PSO2-1
Module 3: Linked Lists: Definition, Representation of linked lists in Memory, Memory allocation; Garbage Collection. Linked list operations: Traversing, Searching, Insertion, and Deletion. Doubly Linked lists, Circular linked lists, and header linked lists. Linked Stacks and Queues. Applications of Linked lists – Polynomials, Sparse matrix representation. Programming Examples **LO:** At the end of this session the student will be able to 1. Understand the concepts of linked list. 2. Solve simple problems on linked list such as sparse matrix and polynomials.	**CO3** 10 hrs PO1-1 PO2-3 PO3-3 PO4 - 3 PO6-1 PO12 -1 PSO1-3 PSO2-1
Module 4: Trees: Terminology, Binary Trees, Properties of Binary trees, Array and linked Representation of Binary Trees, Binary Tree Traversals - Inorder, postorder, preorder; Additional Binary tree operations. Threaded binary trees, Binary Search Trees – Definition, Insertion, Deletion, Traversal, Searching, Application of Trees-Evaluation of Expression, Programming Examples **LO:** At the end of this session the student will be able to 1. Understand the tree terminologies. 2. Solve binary tree traversals. 3. Evaluate the expression of the given tree. 4. Determine the various operations on trees like insertion, deletion.	**CO4** 10hrs PO1-1 PO2-3 PO3-3 PO4 - 3 PO6-1 PO12 -1 PSO1-3 PSO2-1
Module 5: Graphs: Definitions, Terminologies, Matrix and Adjacency List Representation Of Graphs, Elementary Graph operations, Traversal methods: Breadth First Search and Depth First Search. **Sorting and Searching**: Insertion Sort, Radix sort, Address Calculation Sort. **Hashing**: Hash Table organizations, Hashing Functions, Static and Dynamic Hashing. **Files and Their Organization**: Data Hierarchy, File Attributes, Text Files and Binary Files, Basic File Operations, File Organizations and Indexing **LO:** At the end of this session the student will be able to 1. Understand the graph terminologies. 2. Solve tree traversals using BFS & DFS methods. 3. Understand hashing technique. 4. Define the basics of file and their organization.	**CO5** 10hrs PO1-1 PO2-3 PO3-3 PO4 - 3 PO6-1 PO12 -1 PSO1-3 PSO2-1

Text Books

1. Ellis Horowitz and Sartaj Sahni, **Fundamentals of Data Structures in C**, 2nd Ed, Universities Press, 2014.
2. Seymour Lipschutz, **Data Structures Schaum's Outlines**, Revised 1st Ed, McGraw Hill, 2014.

Reference Books (specify minimum two foreign authors text books)

1. Gilberg & Forouzan, Data Structures: **A Pseudo-code approach with C**, 2nd Ed, Cengage Learning,2014.
2. Reema Thareja, **Data Structures using C**, 3rd Ed, Oxford press, 2012.
3. Jean-Paul Tremblay & Paul G. Sorenson, **An Introduction to Data Structures with Applications**, 2nd Ed, McGraw Hill, 2013
4. A M Tenenbaum, **Data Structures using C**, PHI, 1989
5. Robert Kruse, **Data Structures and Program Design in C**, 2nd Ed, PHI, 1996.

Useful Websites

- https://nptel.ac.in/courses/106102064/
- https://www.youtube.com/watch?v=Db9ZYbJONHc
- https://www.youtube.com/watch?v=DFpWCI_49i0
- https://www.youtube.com/watch?v=3hyxc4juJRg

Useful Journals

- IEEE TECHNOLOGY NAVIGATOR
- Journal of informatics and data mining
- Journal of computer and system sciences-Elsevier

Teaching and Learning Methods

1. Lecture class: 50 hrs
2. Practical classes: 3hrs

Assessment

Type of test/examination: Written examination

Continuous Internal Evaluation(CIE) : 40 marks (Average of three tests will be considered)

Semester End Exam(SEE) : 100 marks (students have to answer all main questions) which will be reduced to 60 Marks.

Test duration: 1 :30 hrs

Examination duration: 3 hrs

CO to PO Mapping

PO1: Science and engineering Knowledge **PO2:** Problem Analysis **PO3:** Design & Development **PO4:**Investigations of Complex Problems **PO5:** Modern Tool Usage **PO6:** Engineer & Society	**PO7:**Environment and Society **PO8:**Ethics **PO9:**Individual & Team Work **PO10:** Communication **PO11:**Project Mngmt & Finance **PO12:**Life long Learning

PSO1: Understand fundamental and advanced concepts in the core areas of Computer Science and Engineering to analyze, design and implement the solutions for the real world problems.

PSO2: Utilize modern technological innovations efficiently in various applications to work towards the betterment of society and solve engineering problems.

CO	PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
18CS32	K-level														
CO1	K3	1	3	3	3	-	1	-	-	-	-	-	1	3	1
CO2	K3	1	3	3	3	-	1	-	-	-	-	-	1	3	1
CO3	K3	1	3	3	3	-	1	-	-	-	-	-	1	3	1
CO4	K4	1	3	3	3	-	1	-	-	-	-	-	1	3	1
CO5	K3	1	3	3	3	-	1	-	-	-	-	-	1	2	1

Swathi

Course In charge

Head of the Department

HOD
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Principal

Principal / Director
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K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE - 560109

DEPARTMENT OF CIVIL ENGINEERING

CO-PO Mapping

Course: Strength of Materials			
Type: Core		Course Code: 18CV32	
No of Hours			
Theory Lecture: Tutorial	Practical/Field Work/Allied Activities	Total hours/Week	Total teaching hours
3:2	---	05	50
Marks			
Internal Assessment	Examination	Total	Credits
40	60	100	4

Aim/Objectives of the Course

1. To understand the basic concepts of the stresses and strains for different materials and strength of structural elements.
2. To know the development of internal forces and resistance mechanism for one dimensional and two dimensional structural elements.
3. To analyze and understand different internal forces and stresses induced due to representative loads on structural elements.
4. To analyze and understand principal stresses due to the combination of two dimensional stresses on an element and failure mechanisms in materials.
5. To evaluate the behavior of torsion members, columns and struts.

Course Learning Outcomes

After completing the course, the students will be able to

CO1	**Evaluate** the stresses, strains and strengths of various structural elements.	**Applying (K3)**
CO2	**Evaluate** the behavior of structural elements such as beams (deflection), columns and struts.	**Applying (K3)**
CO3	**Evaluate** the behavior of beams subjecting to various loading conditions and draw Shear Force and Bending Moment diagrams.	**Applying (K3)**
CO4	**Evaluate** the bending and shear stresses in beams, behavior of members subjected to torsion and **design** members subjected to torsion.	**Analyzing (K3)**
CO5	**Evaluate** the behavior and strength of structural elements under the action of compound stresses, thick and thin cylinders subjected to internal and external pressures and understand various theories of failure.	**Applying (K3)**

Syllabus Content	
Module 1: Simple Stresses and Strain: Introduction, Definition and concept and of stress, and strain. Hooke's law, Stress-Strain diagrams for ferrous and non-ferrous materials, factor of safety, Elongation of tapering bars of circular and rectangular cross sections, Elongation due to self-weight. Saint Venant's principle, Compound bars, Temperature stresses, Compound section subjected to temperature stresses, state of simple shear, Elastic constants and their relationship. **LO:** At the end of this session the student will be able to 1. Define stress, strain, elastic limit, and modulus of elasticity, Hooke's law, Poisson's ratio, elastic constants, composite member, temperature stresses, principle of superposition, and modulus of elasticity, modular ratio, and lateral strain. 2. Derive expressions for deformation of tapering circular and rectangular bars subjected to axial force, deformation of a member due to self-weight, and relation between elastic constants. 3. Explain the salient features of stress-strain diagram for ferrous and non-ferrous materials and Saint Venant's principle. 4. Determine stress, strain for the given member, Poisson's ratio, elongation of bars, temperature stresses induced, deformation in compound sections, and elastic constants.	**CO1** 10 hrs PO1-3 PO2-3 PO12 -1 PSO1-3 PSO2-2
Module 2: Deflection of Beams: Definition of slope, Deflection and curvature, Sign conventions, Derivation of moment curvature equation. Double integration method and Macaulay's method: Slope and deflection for standard loading cases and for determinate prismatic beams subjected to point loads, UDL, UVL and couple. **Columns and Struts:** Introduction, short and long columns. Euler's theory; Assumptions, Derivation for Euler's Buckling load for different end conditions, Limitations of Euler's theory. Rankine-Gordon's formula for columns. **LO:** At the end of this session the student will be able to 1. Define the terms, slope, deflection and curvature. 2. Derive the moment-curvature equation. 3. Determine the slope and deflection of the given beams. 4. Distinguish between long and short columns. 5. Derive the crippling load for different end conditions of columns. 6. Determine the crippling load for the column from the given data by Euler's and Rankine's formula.	**CO2** 10hrs PO1-3 PO2-3 PO12 -1 PSO1-3 PSO2-2

Module 3: Shear Force and Bending Moment in Beams: Introduction to types of beams, supports and loadings. Definition of bending moment and shear force, Sign conventions, relationship between load intensity, bending moment and shear force. Shear force and bending moment diagrams for statically determinate beams subjected to points load, uniformly distributed loads, uniformly varying loads, couple and their combinations. **LO:** At the end of this session the student will be able to 1. Define shear force, bending moment, shear force diagram, bending moment diagram, point of contra flexure. 2. Explain hogging bending moment and sagging bending moment. 3. List and explain the different types of beams, loading and supports with sketches. 4. Derive the relation between load intensity, bending moment and shear force. 5. Calculate shear force and bending moment at salient points and sketch SFD and BMD for the given beam. Locate point of contraflexure if any. 6. Obtain the loading pattern and also draw the BMD from the given shear force diagram. 7. Derive general expressions for shear force and bending moment for various standard loading conditions and sketch relevant diagrams.	**CO3** 10 hrs. PO1-3 PO2-3 PO12 -1 PSO1-3 PSO2-2
Module 4: Bending and Shear Stresses in Beams: Introduction, pure bending theory, Assumptions, derivation of bending equation, modulus of rupture, section modulus, flexural rigidity. Expression for transverse shear stress in beams, Bending and shear stress distribution diagrams for circular, rectangular, 'I', and 'T' sections. Shear centre (only concept). **Torsion in Circular Shaft:** Introduction, pure torsion, Assumptions, derivation of torsion equation for circular shafts, torsional rigidity and polar modulus, Power transmitted by a shaft. **LO:** At the end of this session the student will be able to 1. Define bending stress, shear stress, pure bending theory, modulus of rupture, section modulus, flexural rigidity, short and long column, effective length, slenderness ratio, radius of gyration, buckling load, neutral axis, moment of resistance and shear centre. 2. List the assumptions made in Bernoulli's pure bending theory, Euler's theory of columns and limitations of Euler's theory. 3. Derive equations for crippling load of a long column for various end conditions. 4. Relate between bending stresses and radius of curvature, moment and radius of curvature. 5. Calculate the bending stress and shear stress across the section and draw the stress distribution diagram for the same at various points on the beam. 6. Define torsion, torsional rigidity, polar moment of inertia. 7. List the assumptions made in the theory of pure torsion. 8. Show that hollow shaft is stronger and stiffer than a solid shaft of same material, length and weight. 9. Derive expressions for the theory of pure torsion and relationship between the torque transmitted and shear stress induced in the shaft. 10. Determine suitable diameter for the shaft from the given data. 11. Compare the strengths of a hollow shaft to that of a solid shaft and calculate the percentage saving in weight that can be achieved by changing over to hollow shaft.	**CO4** 10 hrs PO1-3 PO2-3 PO12 -1 PSO1-3 PSO2-2

Module 5: Compound Stresses: Introduction, state of stress at a point, General two-dimensional stress system, Principal stresses and principal planes. Mohr's circle of stresses. Theory of failures: Max. Shear stress theory and Max. principal stress theory. **Thin and Thick Cylinders:** Introduction, Thin cylinders subjected to internal pressure; Hoop stresses, Longitudinal stress and change in volume. Thick cylinders subjected to both internal and external pressure; Lame's equation, radial and hoop stress distribution. **LO:** At the end of this session the student will be able to 1. Define principle stresses, principal planes, Mohr's circle, thick and thin cylinders, hoop stress, longitudinal stress, and radial stress. 2. Explain the procedure for determining normal and tangential stresses, lame's equation and construction of Mohr's circle for compound stress in 2D system. 3. Construct Mohr's circle for the given data. 4. Show that sum of any two orthogonal components of stresses at a point is constant and that longitudinal stress is equal to half of hoop stress. 5. Determine the magnitude of principal stresses, direction of the principal planes and magnitude of maximum shear stress and direction from the given data. 6. Explain the various theories of failure. 7. Calculate stresses for the given thick and thin cylinders for the given data. 8. Derive expressions for stresses in thin and thick cylinders (Lame's equation).	**CO5** 10hrs PO1-3 PO2-3 PO12 -1 PSO1-3 PSO2-2

Text Books

1. B.S. Basavarajaiah, P Mahadevappa "Strength of Materials" in SI Units, University Press (India) Pvt. Ltd., 3rd Edition, 2010
2. Ferdinand P. Beer, E. Russell Johnston and Jr.John T. DeWolf, "Mechanics of Materials", Tata McGraw-Hill, Third Edition, SI Units

Reference Books

1. D.H. Young, S.P. Timoshenko " Elements of Strength of Materials", East West Press Pvt. Ltd., 5th Edition (Reprint 2014)
2. R K Bansal, "A Textbook of Strength of Materials", 4th Edition, Laxmi Publications, 2010
3. S.S. Rattan " Strength of Materials" McGraw Hill Education (India) Pvt. Ltd., 2nd Edition (Sixth reprint 2013)
4. Vazirani, V N, Ratwani M M. and S K Duggal "Analysis of Structures Vol. I", 17th Edition, Khanna Publishers, New Delhi

Useful Websites

- http://nptel.ac.in/courses/105105108/
- http://www.aboutcivil.org/strength-of-materials.html

Useful Journals

- International Journal of Mechanical and Materials Engineering
- International Journal of Materials Science and Engineering

Teaching and Learning Methods

1. Lecture class: 50 hours
2. Tutorials: hours

3. Assignment: 3 hours
4. Revision: 26 hours

Assessment

Type of test/examination: Written examination

Continuous Internal Evaluation(CIE) : 40 marks (30 marks -Average of three tests + 10 marks Assignments)

Semester End Exam (SEE): 100 marks (students have to answer all main questions) which will be reduced to 60 marks.

Test duration: 1.5 hours

Examination duration: 3 hours

CO to PO Mapping

PO1: Science and engineering Knowledge **PO2:** Problem Analysis **PO3:** Design & Development **PO4:**Investigations of Complex Problems **PO5:** Modern Tool Usage **PO6:** Engineer & Society	**PO7:**Environment and Sustainability **PO8:**Ethics **PO9:**Individual & Team Work **PO10:** Communication **PO11:**Project Mngmt & Finance **PO12:**Life long Learning

PSO1: The proficiency in mathematics, fluid dynamics and management sciences helps to excel in the areas of planning, analysis related to Civil Engineering systems.

PSO2: Identify sustainable materials and technologies, codes of practice in construction industry and transportation systems.

CO	PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
18CV32	K-level														
CO1	K3	3	3	-	-	-	-	-	-	-	-	-	1	3	2
CO2	K3	3	3	-	-	-	-	-	-	-	-	-	1	3	2
CO3	K3	3	3	2	-	-	-	-	-	-	-	-	1	3	2
CO4	K3	3	3	-	-	-	-	-	-	-	-	-	1	3	2
CO5	K3	3	3	-	-	-	-	-	-	-	-	-	1	3	2

Course In charge

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K.S SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SESSION: 2021-22 (ODD SEMESTER)

CO-PO MAPPING

Course Title: Digital Signal Processing			
Type: Core		Course Code: 18EC52	
No of Hours			
Theory (Lecture Class)	Practical/Field Work/Allied Activities	Total hours/Week	Total teaching hours
4	3	4	50
Marks			
Internal Assessment	Examination	Total	Credits
40	60	100	4

Aim/Objective of the Course:

1. To understand the frequency domain sampling and reconstruction of discrete time signals.
2. To Study the properties and the development of efficient algorithms for the computation of DFT.
3. To realize of FIR and IIR filters in different structural forms.
4. To learn the procedures to design of IIR filters from the analog filters using impulse invariance and bilinear transformation.
5. To study the different windows used in the design of FIR filters and design appropriate filters based on the specifications.

Course Learning Outcomes
After completing the course, the students will be able to

CO1	**Make use of** Linear transformation and apply properties of DFT	Applying (K3)
CO2	**Make use of** FFT Algorithm for computation of DFT and IDFT, Utilize linear filtering techniques	Applying (K3)
CO3	**Identify** the need for efficient computation of DFT and realize IIR ad FIR filter structures	Applying (K3)
CO4	**Design** an FIR and IIR filter for the given specifications	Applying (K3)
CO5	**Examine** the architecture and working of DSP processor	Applying (K3)

Syllabus Content:	
Module 1: Discrete Fourier Transforms (DFT): Frequency domain sampling and reconstruction of discrete time signals. DFT as a linear transformation, its relationship with other transforms. Properties of DFT, multiplication of two DFTs- the circular convolution. LO: At the end of this session the student will be able to, 1. Apply Linear transformation to obtain DFT and IDFT 2. Understand Sampling and reconstruction of the signal 3. Identify suitable properties to solve the given problem with less complexity	CO1 10hrs PO1-3 PO2-3 PO5-1 PO6-2 PO12-1
Module 2: Linear filtering methods based on the DFT: Use of DFT in Linear Filtering, Filtering of Long data Sequences. Fast-Fourier-Transform (FFT) algorithms: Efficient Computation of the DFT: Radix-2 FFT algorithms for the computation of DFT and IDFT–decimation-in-time and decimation-in-frequency algorithms. LO: At the end of this session the student will be able to, 1. Understand FFT algorithms and its importance 2. Compare computational efficiency between DFT and FFT 3. Apply DIT-FFT and DIF-FFT to compute DFT	CO2 PO1-3 PO2-3 PO5-1 PO6-2 PO12-1 CO3 PO1-3 PO2-3 PO3-1 PO4-1 PO5-1 PO6-2 PO12-1 10hrs.
Module 3: Design of FIR Filters: Characteristics of practical frequency – selective filters, Symmetric and Antisymmetric FIR filters, Design of Linear-phase FIR filters using windows - Rectangular, Hamming, Hanning, Bartlett windows. Design of FIR filters using frequency sampling method. Structure for FIR Systems: Direct form, Cascade form and Lattice structures. LO: At the end of this session the student will be able to, 1. Realize different FIR structures 2. Design FIR filter for the given specification	CO3 CO4 10hrs PO1-3 PO2-3 PO3-1 PO4-1 PO5-1 PO6-2 PO12-1

Module 4: IIR Filter Design: Infinite Impulse response Filter Format, Bilinear Transformation Design Method, Analog Filters using Lowpass prototype transformation, Normalized Butterworth Functions, Bilinear Transformation and Frequency Warping, Bilinear Transformation Design Procedure, Digital Butterworth Filter Design using BLT. Realization of IIR Filters in Direct form I and II. LO: At the end of this session the student will be able to, 1. Realize different IIR structures 2. Design IIR Analog filter for the given specification(Butterworth and chebyshev) 3. Design IIR Digital filter for the given specification(Butterworth and chebyshev)	CO3 CO4 10hrs PO1-3 PO2-3 PO3-1 PO4-1 PO5-1 PO6-2 PO12-1
Module 5: Digital Signal Processors: DSP Architecture, DSP Hardware Units, Fixed point format, Floating point Format, IEEE Floating point formats, Fixed point digital signal processors, Floating point processors, FIR and IIR filter implementations in Fixed point systems. LO: At the end of this session the student will be able to, 1. Understand the architecture of DSP Processor 2. Perform	CO5 10hrs PO1-3 PO2-3 PO6-2 PO12-1

Text Books: - (specify minimum two foreign authors text books)

1. Proakis & Monalakis, "Digital signal processing – Principles Algorithms & Applications", 4th Edition, Pearson education, New Delhi, 2007. ISBN: 81-317-1000-9.
2. Li Tan, Jean Jiang, "Digital Signal processing – Fundamentals and Applications", Academic Press, 2013, ISBN: 978-0-12-415893.

Reference Books:

1. Sanjit K Mitra, "Digital Signal Processing, A Computer Based Approach", 4th Edition, McGraw Hill Education, 2013,
2. Oppenheim & Schaffer, "Discrete Time Signal Processing" , PHI, 2003.
3. D.GaneshRao and Vineeth P Gejji, "Digital Signal Processing" Cengage India Private Limited, 2017, ISBN: 9386858231

Useful Websites
https://www.tutorialspoint.com/digital_signal_processing/
https://nptel.ac.in/courses/108105055/

Useful Journals
https://www.journals.elsevier.com/digital-signal-processing
https://www.sciencedirect.com/journal/digital-signal-processing

Teaching and Learning Methods:
1. Lecture class: 50 hrs.

Practical classes: 3hrs (Separate practical class in curriculum)

Assessment:
Type of test/examination: Written examination
Continuous Internal Evaluation(CIE) : 40 marks (Average of all three tests will be considered)

Semester End Exam(SEE) : 60 marks (students have to answer all main questions)
Test duration: 1 :30 hr
Examination duration: 3 hrs

CO to PO Mapping

PO1: Science and engineering Knowledge **PO2:** Problem Analysis **PO3:** Design & Development **PO4:**Investigations of Complex Problems **PO5:** Modern Tool Usage **PO6:** Engineer & Society	**PO7:**Environment and Society **PO8:**Ethics **PO9:**Individual & Team Work **PO10:** Communication **PO11:**Project Mngmt & Finance **PO12:**Life long Learning

PSO1: Be able to acquire knowledge and apply concepts in the field of Engineering and interdisciplinary subjects

PSO2: Be able to identify the existing problems, effectively utilize tools to provide solutions and disseminate the information

CO	PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
17 EC52															
CO1	K3	3	3	-	-	1	2	-	-	-	-	-	1	3	1
CO2	K3	3	3	-	-	1	2	-	-	-	-	-	1	3	1
CO3	K3	3	3	1	1	1	2	-	-	-	-	-	1	2	1
CO4	K3	3	3	1	1	1	2	-	-	-	-	-	1	2	1
CO5	K3	3	3	-	-	-	2	-	-	-	-	-	1	2	1

Course In-charge

Head of the Department

Principal

Principal / Director
K.S. School of Engineering & Management
Bangalore-560 062

K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BENGALURU - 560109

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SESSION: 2021-2022 (ODD SEMESTER)

CO-PO MAPPING

Course Title: Signals and Systems			
Type: Core		Course Code: 18EE54	
No of Hours			
Theory (Lecture Class)	Practical/Field Work/Allied Activities	Total hours/Week	Total teaching hours
3	0	3	40
Marks			
Internal Assessment	Examination	Total	Credits
40	60	100	3

Aim/Objectives of the Course

1. To discuss arising of signals in different systems.
2. To classify the signals and define certain elementary signals.
3. To explain basic operations on signals and properties of systems.
4. To explain the use of convolution integral and convolution summation in analyzing the response of linear time invariant systems in continuous and discrete time domains.
5. To explain the properties of linear time invariant systems in terms of impulse response description.
6. To explain determination of response of a given linear time invariant system and to provide a block diagram representation to it.
7. To explain Fourier transform representation of continuous time and discrete time non –periodic signals and the properties of Fourier Transforms.
8. To explain the applications of Fourier transform representation to study signals and linear time invariant systems. To explain the use of Z-transform in the complex exponential representation of discrete time signals and the analysis of systems.

Course Learning Outcomes

After completing the course, the students will be able to

CO1	**Solve** problems on classification of signals and mathematical operations on signals.	**Applying (K3)**
CO2	**Find** solution of differential & difference equation and **draw** block diagram representation of an LTI system.	**Applying (K3)**
CO3	**Find** Z-transform and inverse Z-transform.	**Applying (K3)**
CO4	**Prove** continuous time Fourier transform properties, **find** the Fourier transform of the given signal using properties.	**Applying (K3)**
CO5	**Prove** discrete time Fourier transform properties, **find** the Fourier transform of the given signal using properties.	**Applying (K3)**

Syllabus Content

Module 1: **Introduction:** Definitions of signals and a system, classification of signals, basic operations on signals. Elementary signals viewed as interconnections of operations, properties of systems.	**CO1** 08 hrs
LO: At the end of this session the student will be able to	PO1-3

1. Define signals and systems 2. Explain classification of signals with examples 3. Distinguish between the signals 4. Solve problems on classification of signals and mathematical operations on signals. 5. Explain the properties of the system	PO2-3 PO5-1 PO12-1 PSO1-3 PSO2-2
Module 2: Time – Domain Representations for LTI Systems: Convolution, impulse response, properties, solution of differential and difference equations, block diagram representation. **LO:** At the end of this session the student will be able to 1. Find convolution sum 2. Find the impulse response of the system 3. Explain the properties of the LTI system 4. Find response of the given system 5. Draw the block diagram of a system	**CO2** 08 hrs PO1-3 PO2-3 PO3-2 PO5-1 PO12-1 PSO1-3 PSO2-2
Module 3: Z- Transforms: Introduction, Z-transform, properties of ROC, properties of Z-transforms, inversion of Z-transform methods - power series and partial expansion, Transforms analysis of LTI systems, transferfunction, stability and causality, unilateral Z-transform and its application to solve difference equations. **LO:** At the end of this session the student will be able to 1. Determine the Z-transform of the given signal 2. Define ROC in Z-transform and list out properties of ROC 3. State and prove the properties of Z-transform 4. Find the inverse Z-transform using partial fraction method and power series method 5. Determine stability and causality of the system 6. Find the unilateral Z-transform of the given signal	**CO3** 08 hrs PO1-3 PO2-3 PO3-2 PO5-1 PO12-1 PSO1-3 PSO2-2
Module 4: The Continuous-Time Fourier Transform: Representation of a non - periodic signals: continuous-time Fourier transform (FT), Properties of continuous-time Fourier transform, Applications. Frequency response of LTI systems, Solutions of differential equations. **LO:** At the end of this session the student will be able to 1. Find the Fourier transform of the given signal 2. State and prove the properties of continuous time Fourier transform and equation of a system 3. Find the total solution to the given difference equation, using CTFT	**CO4** 08 hrs PO1-3 PO2-2 PO3-2 PO5-1 PO12-1 PSO1-3 PSO2-2

Module 5: The Discrete-Time Fourier Transform: Representations of non-periodic signals: The discrete-time Fourier transforms (DTFT), Properties of DTFT and applications. Frequency response of LTI system,Solutions of difference equations. **LO:** At the end of this session the student will be able to 1. Find the Fourier transform of the given signal and obtain the magnitude plot 2. State and prove the properties of discrete time Fourier transform and use these properties to find the Fourier transform 3. Find the total solution to the given difference equation using DTFT	**CO5** 08 hrs PO1-3 PO2-3 PO3-2 PO5-1 PO12-1 PSO1-3 PSO2-2

Text Books

1. Simon Haykin, Berry Van Veen, "**Signals and Systems**", Wiley 2nd Edition, 2002.

Reference Books

1. Michael J. Roberts, Govind K Sharma, "**Fundamentals of Signals and Systems**" McGraw Hill 2nd Edition, 2011.
2. NagoorKani, "**Signals and Systems**", McGraw Hill 1st Edition, 2010.
3. Matthew N.O. Sadiku Warsame H. Ali, "**Signals and Systems A Primer with MATLAB**", CRC Press 1st Edition, 2016.
4. Anand Kumar, "**Signals and Systems**", PHI 3rd Edition, 2015.

Useful Websites

- http://www.nptelvideos.in/2012/12/signals-and –system.html
- http://www.youtube.com/playlist?list=PLC6210462711083C4

Useful Journals

- http://www.inderscience.com/jhome.php?jcode=ijsise
- http://link.springer.com/journel/11265
- http://www.scimagojr.com/journalsearch.php?q=19700173022&tip=sid&clean=0

Teaching and Learning Methods

1. Lecture class: 40 hours

Assessment

Type of test/examination: Written examination

Continuous Internal Evaluation(CIE) : 40 marks (30 marks -Average of three tests + 10 marks Assignments)

Semester End Exam (SEE): 100 marks (students have to answer all main questions) which will be reduced to 60 Marks.

Test duration: 1 :30 hours

Examination duration: 3 hours

CO to PO Mapping

PO1: Science and engineering Knowledge **PO2:** Problem Analysis **PO3:** Design & Development **PO4:**Investigations of Complex Problems **PO5:** Modern Tool Usage **PO6:** Engineer & Society	**PO7:** Environment and Society **PO8:** Ethics **PO9:** Individual & Team Work **PO10:** Communication **PO11:** Project Mngmt& Finance **PO12:** Life long Learning

PSO1: Graduates should be able to develop an inclination towards acquiring analytical, technical, managerial and communicative skills by gaining knowledge in fundamental concepts in the field of Electrical sciences and allied subjects.

PSO2: Graduates should be able to Contribute for the development of society by providing technical solutions to complex electrical engineering problems through life-long learning

CO	PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
18EE64	K-level														
CO1	K3	3	3	-	-	1	-	-	-	-	-	-	1	3	2
CO2	K3	3	3	2	-	1	-	-	-	-	-	-	1	3	2
CO3	K3	3	3	2	-	1	-	-	-	-	-	-	1	3	2
CO4	K3	3	2	2	-	1	-	-	-	-	-	-	1	3	2
CO5	K3	3	3	2	-	1	-	-	-	-	-	-	1	3	2

Priya
Course In charge

Head of the Department

K. Rama
Principal

K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE - 560109

DEPARTMENT OF MANAGEMENT STUDIES

CO-PO Mapping

Course: INVESTMENT MANAGEMENT			
Type: Elective		**Course Code: 20MBAFM303**	
No of Hours			
Theory (Lecture Class)	Practical/Field Work/Allied Activities	Total/Week	Total teaching hours
3	2	5	52
Marks			
Internal Assessment	Examination	Total	Credits
40	60	100	4

Aim/Objectives of the Course

1) To understand the capital market and various instruments for investment.
2) To learn valuation of equity, debt and mutual funds.
3) To learn the theories of portfolio management.
4) To learn diversification of securities for risk return trade off in capital market
5) To learn Portfolio Construction for retail investors, high net worth individuals, mutual funds.

Course Learning Outcomes

After completing the course, the students will be able to

The student will

CO1	**Discover** the capital market and various Instruments for Investment	**Applying (K3)**
CO2	**Illustrate** the risk and return associated with the investment	**Applying (K3)**
CO3	**Interpret** after applying methods to value securities	**Applying (K3)**
CO4	**Prepare** to analyze the Economy, Industry, and Company Framework for Investment Management.	**Applying (K3)**
CO5	**Practice** the theories of Portfolio management	**Applying (K3)**
CO6	**Apply** the tools and techniques for efficient portfolio management	**Applying (K3)**

Syllabus Content

Unit 1: (7 Hours) Introduction to Investment: Investment Avenues, Attributes, Investor V/s speculator, Features of a good Investment, Investment Process. Financial Instruments: Money Market Instruments, Capital Market Instruments, Derivatives. Securities Market: Primary Market, Secondary Market. Stock Market Indicators-Indices of Indian Stock Exchanges (only Theory). **LO:** At the end of this session the student will be able to 1. **Describe** the Investment Attributes. 2. **Distinguish** between Investor and Speculator.	**CO1** 07 hrs PO1- 3 PSO2- 2

CO-PO Mapping

3. **Explain** the Money Market Instruments. 4. **Distinguish** between Primary Market and Secondary Market. 5. **What** is Index and discuss its types?	
Unit 2: (7 Hours) Risk and Return Concepts: Concept of return, individual security returns, rate of return, Concept of Risk, Causes of Risk, Types of Risk- Systematic risk- Market Price Risk, Interest Rate Risk, Purchasing Power Risk, Unsystematic Risk- Business risk, Financial Risk, Insolvency Risk, Risk-Return Relationship, Concept of diversifiable risk and non-diversifiable risk. Calculation of Return and Risk of Individual Security (Theory & Problems). **LO:** At the end of this session the student will be able to 1. **What** is Portfolio Risk and Return? 2. **Explain** the types of Risk with examples. 3. **What** is Correlation and Beta. 4. **What** is Return?	**CO2** 7 hrs. PO1- 3 PO4-3 PO5- 2 PSO1-2 PSO2-1
Unit 3: (9 Hours) Valuation of securities: Bond features, Types of Bonds, Determinants of interest rates, Bond Valuation, Bond Duration, Bond Management Strategies. Preference Shares- Concept, Features, Valuation. Equity Shares- Concept, Valuation, Dividend Valuation Models, P/E Ratio valuation model. (Theory & Problems). **LO:** At the end of this session the student will be able to 1. **Discuss** features and types of Bonds? 2. **Determine** the types of Equity shares. 3. **Discuss** YTM, Duration and Macaulay's Duration. 4. **Explain** the Dividend valuation models?	**CO3** 09 hrs PO1- 3 PO4-3 PO5-2 PSO1-2 PSO2-1
Unit 4: (7 Hours) Macro-Economic and Industry Analysis: Fundamental analysis-EIC Frame Work, Economy Analysis, Industry Analysis, Company Analysis- Financial Statement Analysis. Market Efficiency: Efficient Market Hypothesis, Forms of Market Efficiency, Empirical test for different forms of market efficiency. Technical Analysis – Concept, Theories- Dow Theory, Eliot Wave theory. Charts- Types, Trends and Trend Reversal Patterns. Mathematical Indicators –Moving Average Convergence-Divergence, Relative Strength Index (Theory only). **LO:** At the end of this session the student will be able to 1. **Outline** EIC Approach 2. **Discuss** the types of Charts. 3. **Explain** the Eliot wave theory. 4. **Distinguish** between Fundamental Analysis and Technical Analysis.	**CO4** 7hrs PO1- 3 PO5- 3 PSO2-1
Unit 5: (11 Hours) Modern Portfolio Theory: Markowitz Model- Diversification, Portfolio Return, Portfolio Risk, Efficient Frontier. Sharpe's	**CO5**

CO-PO Mapping

Single Index Model, Capital Asset Pricing Model: Assumptions, CAPM Equation, Capital Market Line, Security Market Line, CML V/s SML. Sharpe's Optimum Portfolio Construction. Arbitrage Pricing Theory: Equation, Assumption, CAPM V/s APT (Theory & Problems). **LO:** At the end of this session the student will be able to 1. **Explain** the Sharpe's Single Index Model. 2. **Explain** the difference between APT and CAPM. 3. **Discuss** the assumptions of Capital Asset pricing Model. 4. **Distinguish** between CML and SML.	11 hrs PO1- 3 PO5-3 PSO1-1 PSO2-2
Unit 6: (9 Hours) Portfolio Management Strategies and Performance Evaluation: Portfolio Management Strategies: Active and Passive Portfolio Management strategy. Portfolio Revision: Portfolio Revision Strategies – Objectives, Performance plans. Mutual Funds: Concept of Mutual Funds, Participants in Mutual Funds, Advantages of Investment in Mutual Fund, Measure of Mutual Fund Performance. Portfolio performance Evaluation: Measures of portfolio performance (Theory & Problems). **LO:** At the end of this session the student will be able to 1. **Discuss** the forms of Market Efficiency. 2. **What** if Efficient Market Hypothesis? 3. **Write** short note on Random Walk theory. 4. **Explain** the Active and Passive Management strategies?	**CO6** 9 hrs PO1- 3 PO5-2 PSO1-3 PSO2-1

Text Books

1. Investment Analysis and Portfolio Management – Prasanna Chandra,3/e,TMH, 2010.
2. Investments – ZviBodie, Kane, Marcus &Mohanty, 8/e, TMH,2010.
3. Security Analysis & Portfolio Management- J Kevin, TMH

Reference Books (specify minimum two foreign authors text books)

1. Analysis of Investments & Management – Reilly & Brown, Cengage, 10e/2017
2. Security Analysis & Portfolio Management – Punithavathy EhavathyPandian,2/e, Vikas, 2005.
3. Investment Management- Bhalla V.K. , Vikas Publication, 19/e, 2018

Useful Websites

- http://www.investopedia.com/
- http://www.bseindia.com/
- www.nseindia.com/
- www.forbes.com/
- www.moneycontrol.com/

Useful Journals

- Journal of Investment Management
- Vikalpa
- Journal of Investment strategies
- Journal of Finance and Investment

- Journal of Finance
- Journal of Investment Management and Financial Innovations

Teaching and Learning Methods

1. Lecture class: 30 hrs
2. Practical classes: 22 hrs

Assessment

Type of test/examination: Written examination

Continuous Internal Evaluation(CIE) : 40 marks (Average of TWO tests will be considered)

Semester End Exam(SEE) : 100 marks (students have to answer all main questions) which will be reduced to 60 Marks.

Test duration: 1 :30 hrs **Examination duration:** 3 hrs

PO1: Acquire sufficient theoretical knowledge and are enabled to apply them to solve practical problems in business and other organizations/ institutions of importance.

PO2: Apply effective communication skills with a high degree of lateral and critical thinking that enhances learn ability, developed for being continuously employable.

PO3: Demonstrate leadership qualities, ethically sound, enabled with decision making skills that reflect a high degree of social consciousness.

PO4: Recognize the need for sustained research orientation to comprehend a growing complex, economic, legal and ethical environment.

PO5: Possess self- sustaining entrepreneurship qualities that encourages calculated risk taking.

PSO1: Develop viable Managerial solutions in the dynamic Business eco system

PSO2: Establish and Encourage Entrepreneurial zeal along with Ethical Values in the business.

K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE - 560109

DEPARTMENT OF MANAGEMENT STUDIES

CO-PO Mapping

CO		PO						
		PO1	PO2	PO3	PO4	PO5	PSO1	PSO2
20MBAFM303	K- Level	-	-	-	-	-	-	-
CO1	K3	3	-	-	-	-	-	2
CO2	K3	3	-	-	3	2	2	1
CO3	K3	3	-	-	3	2	2	1
CO4	K3	3	-	-	-	3	-	1
CO5	K3	3	-	-	-	3	1	2
CO6	K3	3	-	-	-	2	3	1

Course In charge

Head of the Department

Professor & HOD-MBA,
K.S School of Engineering & management,
#15, Mallasandra, Off. Kanakapura Road.
Bengaluru - 560 109

K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE - 560109

DEPARTMENT OF MECHANICAL ENGINEERING

CO-PO Mapping

Course: Mechanics of Materials			
Type: Core		**Course Code: 18ME32**	
No of Hours			
Theory (Lecture Class)	Practical/Field Work/Allied Activities	Total hours/Week	Total teaching hours
3	2	5	50
Marks			
Internal Assessment	Examination	Total	Credits
40	60	100	4

Aim/Objectives of the Course

1. To know the different types of stresses and strains developed in the member subjected to axial, bending, shear, torsion & thermal loads.
2. To know behaviour & properties of engineering materials.
3. To understand the stresses developed in bars, compounds bars, beams, shafts, and cylinders.
4. To understand the concepts of calculation of shear force and bending moment for beams with different supports.
1. To expose the students to concepts of Buckling of columns and strain energy.

Course Learning Outcomes

After completing the course, the students will be able to

CO1	**Develop** the concept of stress and strain	**Applying (K3)**
CO2	**Construct** the concepts for cylinder and shafts in strength analysis	**Applying (K3)**
CO3	**Derive** the bucking equation for columns and strain energy	**Applying (K3)**
CO4	**Analyze** the mechanics of beams.	**Applying (K3)**
CO5	**Solve** problems on compound loading	**Applying (K3)**

Syllabus Content

	CO1
Module 1: Stresses and Strains: Introduction, Properties of materials, Stress, Strain and Hooke's law, Stress strain diagram for brittle and ductile materials, True stress and strain, Calculation of stresses in straight, Stepped and tapered sections, Composite sections, Stresses due to temperature change, Shear stress and strain, Lateral strain and Poisson's ratio, Elastic constants and relations between them. **LO:** At the end of this session the student will be able to 1. Understand the concept of stress, strain and its classification 2. Analysis of stress and strain in structures of different cross section 3. Evaluate the effect of temperature on stress development	10 hrs PO1-3 PO2-3 PO3-2 PO4 - 1 PO5-1 PO12 -1 PSO1-3 PSO2-1

Module 2: Cylinders: Thin cylinder: Hoop's stress, maximum shear stress, circumferential and longitudinal strains, Thick cylinders: Lames equations. **Torsion**: Circular solid and hallow shafts, Torsional moment of resistance, Power transmission of straight and stepped shafts, Twist in shaft sections, Thin tubular sections, Thin walled sections. **LO:** At the end of this session the student will be able to 1. Understand the difference between different thin and thick cylinder 2. Derive the lames equation 3. Analysis of stress and strain in solid and hallow cylinders.	**CO2** 10 hrs. PO1-3 PO2-3 PO3-2 PO4 - 1 PO5-1 PO12 -1 PSO1-3 PSO2-1
Module 3: Columns: Buckling and stability, Critical load, Columns with pinned ends, Columns with other support conditions, Effective length of columns, Secant formula for columns. **Strain Energy:** Strain energy due to axial, shear, bending, torsion and impact load. Castigliano's theorem I and II and their applications. **LO:** At the end of this session the student will be able to 1. Derive the buckling equations. 2. Define Castigliano's theorem I and II.	**CO3** 10 hrs PO1-3 PO2-3 PO3-2 PO4 - 1 PO5-1 PO12 -1 PSO1-3 PSO2-1
Module 4 Shear Force and Bending Moment: Type of beams, Loads and reactions, Relationship between loads, shear forces and bending moments, Shear force and bending moments of cantilever beams, Pin support and roller supported beams subjected to concentrated loads, uniformly distributed constant / varying loads. **Stress in Beams:** Bending and shear stress distribution in rectangular, I and T section beams. **LO:** At the end of this session the student will be able to 1. Analyze the shear and bending stresses in beams	**CO4** 10hrs PO1-3 PO2-3 PO3-2 PO4 - 1 PO5-1 PO12 -1 PSO1-3 PSO2-1
Module 5 Analysis of Stress and Strain: Introduction to three dimensional state of stress, Stresses on inclined planes, Principal stresses and maximum shear stress, Principal angles, Shear stresses on principal planes, Maximum shear tress, Mohr circle for plane	**CO5** 10hrs

stress conditions. **Theories of Failure:** Maximum Principal stress theory, Maximum shear stress theory. **LO:** At the end of this session the student will be able to 1. Derive the equation for principal stresses in a loaded member 2. Failure analysis of structures	PO1-3 PO2-3 PO3-2 PO4 - 1 PO5-1 PO12 -1 PSO1-3 PSO2-1

Text Books

1. J M Gere, B J Goodno, **"Mechanics of Materials"**, Cengage, 2013.
2. R K Rajput, **"Fundamentals of Strength of Materials"**, PHI Learning Pvt. Ltd, 2013.

Reference Books

1. S. S. Ratan, **"Strength of Materials"**, McGraw Hill Education, 2008

Useful Websites

- W1 Nptel.ac.in
- https://en.wikipedia.org/wiki/Strength_of_materials
- https://en.wikipedia.org/wiki/List_of_materials_properties

Useful Journals

- Journal of ACTA Materialia
- Ain Shams Engineering Journal
- Materials Today: Elsevier

Teaching and Learning Methods

1. Lecture class: 68 hours

Assessment

Type of test/examination: Written examination

Continuous Internal Evaluation(CIE) : 40 marks (30 marks -Average of three tests + 10 marks Assignments)

Semester End Exam(SEE) : 100 marks (students have to answer all main questions) which will be reduced to 60 Marks.

Test duration: 1 :30 hours

Examination duration: 3 hours

CO to PO Mapping

PO1: Science and engineering Knowledge **PO2:** Problem Analysis **PO3:** Design & Development **PO4:**Investigations of Complex Problems **PO5:** Modern Tool Usage **PO6:** Engineer & Society	**PO7:**Environment and Society **PO8:**Ethics **PO9:**Individual & Team Work **PO10:** Communication **PO11:**Project Mngmt & Finance **PO12:**Life long Learning

PSO1: Ability to apply concept of mechanical engineering to design a system, a component or a process/system to address a real world challenges

PSO2: Ability to develop effective communication, team work, entrepreneurial and computational skills

CO	PO	PO1	PO2	PO3	PO 4	PO5	PO6	PO 7	PO8	PO9	PO10	PO1 1	PO12	PS O1	PS 2
18 ME32	K-level														
CO1	K3	3	3	2	1	1	-	-	-	-	-	-	1	3	1
CO2	K3	3	3	2	1	1	-	-	-	-	-	-	1	3	1
CO3	K3	3	3	2	1	1	-	-	-	-	-	-	1	3	1
CO4	K3	3	3	2	1	1	-	-	-	-	-	-	1	3	1
CO5	K3	3	3	2	1	1	-		-	-	-	-	1	3	1

Course In charge **Head - Dept** **Principal**