

Code: 1BMEML107/207**Course: Mechanics and Materials Laboratory****Credits: 1****L:T:P 0:0:2****SET: 50%****CIE: 50%****SET Hours: 2****Max. Marks:100**

Prerequisites if any	Pre-University Physics and Mathematics
Learning objectives	1. Verify fundamental principles and theorems of mechanics. 2. Identify and determine properties of construction materials

Course Outcomes:*On the successful completion of the course, the student will be able to*

COs	Course Outcomes	Bloom's level
CO1	Apply fundamental principles of engineering mechanics to verify theorems of equilibrium, analyze force systems, determine properties of construction materials through laboratory tests (specific gravity, sieve analysis), and identify common building materials through visual inspection.	Understand, Apply
CO2	Conduct open-ended laboratory experiments related to reactions, cement testing, and particle size distribution of aggregates (gap graded, uniformly graded, well graded),	Apply, Analyze Evaluate, Create

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	2	2	-	-	-	-	3	3	-	2	-	3
CO2	3	2	2	2	-	-	-	-	3	3	-	2	-	3

Mapping Strength: Strong– 3 Medium – 2 Low – 1**Course Structure**

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
List of Experiments				
1.1	Verification of Lami's Theorem			2
1.2	Equilibrium of concurrent forces			2
1.3	Parallel force system- Simply supported beam.			2
1.4	Verification of Varignon's theorem			2
1.5	Specific Gravity of a) Fine aggregates. b) Coarse aggregates. c) Cement d) Soil			4
1.6	Sieve analysis of Soil - Graphical representation of the gradation curve			2
1.7	Visual identification of building materials: Bricks, Blocks, Stones, Tiles, M-Sand, Standard Sand, Soil, Aggregates, Bitumen, Wood, Steel Bars of Various Sizes.			2

1.8	Open-ended experiments: These are a type of laboratory activity where the outcome is not predetermined, and students are given the freedom to explore, design, and conduct the experiment based on the problem statements as per the concepts defined by the course coordinator. It encourages creativity, critical thinking, and inquiry-based learning. 1. Reactions. 2. Field tests on cement. 3. Particle size distribution. 4. Gap graded. 5. Uniformly graded. 6. Well graded.			4
Total No. of Lecture Hours				
Total No. of Tutorial Hours				
Total No. of Practical Hours				20

Textbooks:

1. M. L. Gambhir: Concrete Manual: Dhanpat Rai & Sons New – Delhi, ISBN 135551234001965.
2. Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, Basic Civil Engineering and Engineering Mechanics, third edition, 2015, Laxmi Publications, ISBN: 9789380856674
3. Ramamrutham S, Engineering Mechanics, Dhanpat Rai Books, 2013, ISBN: 9789352164271.
4. B C Punmia, Ashok Kumar Jain, Arun Kumar Jain, Soil Mechanics and foundation Engineering, 18th edition, 2023, Laxmi Publications New Delhi.

Reference Books:

1. Meriam J. L. and Kraige L. G, Engineering Mechanics-Statics, Vol I–sixth Edition, 2008, Wiley publication.
2. Rattan S.S., Strength of Materials, Third edition, 2017, McGraw Hill Education; New Delhi. ISBN-13978-9385965517.
3. Bansal R K, Strength of Materials, Laxmi Publications. 2023, 4th Edition, ISBN:978 8131808146.
4. IS 4031 (Part 11):1988 – Specific gravity test for hydraulic cement.
5. IS 383:1970 – Specification for coarse and fine aggregates from natural sources for concrete.
6. IS 2386(Part 3):1963 Methods of test for aggregates for concrete: Part 3 Specific gravity, density, voids, absorption and bulking.
7. IS 2720 (Part 3/Sec 1):1980 – Determination of specific gravity of soil.

Online Resources:

1. <https://nptel.ac.in/courses/112103109/>
2. <http://vlab.co.in/>