



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

CONSTRUCTION MATERIALS								
IV Semester: CE								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
ACED07	Core	3	0	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 48			
Prerequisite: Nil								

I. COURSE OVERVIEW:

The construction materials course introduces students to materials used in different construction projects from building materials to ground and foundation make-up. Specific materials studied include soil, metals, concrete and wood. This course also covers finishes and materials for the exterior and interior of buildings. Skills are developed to assess the effect materials have on a building projects related to structure, fire safety, building codes as well as market demand. A large part of construction management has to do with overseeing entire building projects or multiple construction projects. This course helps to develop students' skills in managing projects and people. This course may be taken at different times in a construction management program with an emphasis on residential or commercial construction.

II. COURSE OBJECTIVES:

The students will try to learn:

- I. Aggregates are crucial in construction for enhancing the strength and durability of concrete.
- II. The practical understanding of basic testing procedures for materials such as cement, lime, and concrete.
- III. Fibers enhance the strength and durability of concrete providing structural integrity in various applications.
- IV. Self-healing polymers into construction enhances structural functionality, resilience, and responsiveness to environmental conditions.

III. COURSE OUTCOMES:

At the end of the course students should be able to:

- CO 1 Explain the principles governing the behavior of construction materials under different loading and environmental conditions.
- CO 2 Develop a comprehensive plan for the efficient and sustainable use of cement, mortar, and concrete in construction projects.
- CO 3 Explain the chemical and physical properties of wood and rubber as alternative materials in construction and their compatibility with various building applications.
- CO 4 Analyze the structural and corrosion-resistant features of steel and aluminum, assessing their impact on the durability and safety of constructed elements.
- CO 5 Make use of aluminum's properties to solve engineering problems, such as selecting appropriate alloys for specific structural requirements.
- CO 6 Evaluate the economic and environmental impact of using geomembranes in engineering projects, considering factors such as installation costs, maintenance requirements, and long-term sustainability.

IV. COURSE CONTENT:

MODULE - I: AGGREGATES AND PROPERTIES (09)

Physical and Mechanical properties of construction materials, Classification of stones, stone quarrying, precautions in blasting, dressing of stone; Aggregates-properties, classification, deleterious materials, Importance of size, shape and texture in aggregates; Bricks- classification, characteristics of good brick, ingredients of good brick earth, methods of manufacturing bricks, testing methods for Bricks.

MODULE - II: CEMENT, MORTAR AND CONCRETE (09)

Classification of lime and uses, chemical composition of cement, IS specifications and tests on Portland cement, different types of cements and their uses. Preparation of cement mortar for different types of works, concrete-ingredients of concrete, types of concrete and their specific use.

MODULE - III: ALTERNATIVE MATERIALS (09)

Timber-properties, Types, Seasoning and various products, ply wood and its uses, Paints, enamels, varnishes, tar, bitumen, asphalt- properties and use; Ceramics-classification, refractories, glass and its uses, GI sheets.

Polymeric materials – Rubbers, plastics, polymer, fiber reinforced plastics - manufacture, properties and applications.

MODULE - IV: STEEL AND ALUMINIUM (09)

Types of steel-mild steel, high carbon steel, high strength steel - properties and uses, light gauge steel, commercial forms of steel and aluminium and their uses.

MODULE - V: INTRODUCTION TO ADVANCED MATERIALS (09)

Ferro cement, FRP, FAL-G brick, fly ash, super plasticizers, geotextiles, geogrids, geomembranes, and geocomposites, composites and smart materials- classification and characteristics, Insulation materials, adhesives

V. TEXT BOOKS:

1. S. K. Duggal, *Building Materials*, New Age International (P) Limited, 4th Edition, 2016.
2. Punmia, B. C., Ashok Kumar Jain, and Arun Kumar Jain, *Building construction*, Firewall Media, 2005.
3. Kazimi S. M. A, "Solid Mechanics", Tata McGraw Hill, 2nd Edition, 2017.

VI. REFERENCE BOOKS:

1. Sushil Kumar, "*Building Materials and construction*", Standard Publishers, 20th Edition, reprint, 2015.
2. P C Vergese, *Building Materials*, PHI Learning Pvt. Ltd, 2nd Edition, 2015.
3. Jagadish. K.S, *Alternative Building Materials Technology*, New Age International, 2007.
4. M. S. Shetty, *Concrete Technology*, S. Chand & Co. New Delhi, 2005.

VII. ELECTRONICS RESOURCES:

1. <http://nptel.ac.in/courses/105102088/>
2. <http://nptel.ac.in/courses/105101088/>

VIII. MATERIAL ONLINE:

1. Course template
2. Tech-talk topics
3. Assignments
4. Definition and terminology
5. Tutorial question bank
6. Model question paper – I
7. Model question paper – II
8. Lecture notes
9. Early lecture readiness videos (ELRV)
10. Power point presentations