



**Subject :** Modern Construction Materials - METCP11501

**Type of course:** Major(Core)

**Prerequisite:** NIL

**Rationale:** Modern construction materials are revolutionizing how we build. They are lighter yet stronger, allowing for creative designs and lasting structures. This translates to lower maintenance costs and less environmental impact. Additionally, these materials excel in energy efficiency, reducing reliance on heating and cooling systems. Sustainability is key, with recycled materials and lower production footprints becoming the norm. Modern materials also address safety concerns with improved fire resistance and earthquake resilience. From faster construction times to stunning aesthetics, these advancements are shaping a future of efficient, safe, and eco-friendly buildings.

**Teaching and Examination Scheme:**

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P		Theory Marks		Practical Marks		CA	
			ESE	MSE	V	P	ALA		
4	0	2	5	60	30	10	20	30	150

*Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.*

**Continuous Assessment:**

Sr. No	Active Learning Activities	Marks
1	<b>Building Material &amp; Metal</b> Prepare the traditional and Modern building material & Metal and upload on GMIU Web Portal.	10
2	<b>Architecture Material!</b> Prepare the Architectural material with their function and uses. And upload on GMIU Web Portal.	10
3	<b>Smart Materials</b> Prepare the various smart material use in building and how to reduce the	10



	cost of construction. And upload on GMIU Web Portal.	
<b>Total</b>		<b>30</b>

**Course Content:**

Sr. No	Course content	Hrs	% Weightage
1	<p><b>Building Materials</b> Cement- types - properties and testing – Aggregate – types - properties and Testing, Reinforcement – Types - Manufacturing Process - Properties – Types of Coatings &amp; Coatings to reinforcement.</p> <p><b>Metals</b> Metals and Special Alloys of Steel - Water Jet Cut Stainless Steel, Mill Slab Steel, Tension Rods Assemblies and Cast Iron - Heat Treatment – Tendons - GI sheets, tubes, and lightweight roofing materials - Aluminum and its products</p>	16	27%
2	<p><b>Architectural Materials</b> Wood and Wood Product – Glass - Floor Finishes – Paints – Tiles - Thermal insulation and acoustic absorption materials - decorative panels and laminates - architectural glass and ceramics - ferrocement.</p> <p><b>Polymers</b> Polymers- Structural Plastics and Composites- Polymer Membranes- Coatings - Adhesives, Non-Weathering Materials- Flooring and Facade Materials- Glazed Brick - Photo Catalytic Cement – Acid Etched Copper and Composite Fibres</p>	18	30%
3	<p><b>Smart Materials</b> Neoprene, Bridge pads, thermocole, Smart and Intelligent Materials – Special features – Case studies showing the applications of smart and Intelligent Materials. Petroleum products, Fibre Reinforced Polymers, Bituminous Materials</p> <p><b>Chemical and Mineral Admixtures</b> Types and properties of Chemical Admixtures - Water Proofing Compounds– sealants, engineering grouts, various types of finishes &amp; treatments, Fly ash – silica fume – GGBFS - metakaolin – rice husk ash - properties and its application in concrete under special environment.</p>	18	30%
4	<p><b>Special Concrete</b> Self-Compacting Concrete – Lightweight concrete – Self dynamic concrete – Self Healing Concrete – Nanotube concrete – High density concrete – High Performance Concrete – Ready mix Concrete – Geopolymer Concrete.</p>	8	13%
	<b>Total</b>	<b>60</b>	<b>100</b>



**Suggested Specification table with Marks (Theory):60**

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	NA	NA	NA	NA	NA	NA

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

**Course Outcome:**

After learning the course, the students should be able to:	
CO1	Compare the properties of most common and advanced building materials
CO2	Explain the role of metals and alloys in construction industry
CO3	Identify the required architectural materials for various buildings
CO4	Explain the role of polymers in construction industry, properties and applications of special concrete
CO5	Describe various properties and applications of chemical and mineral admixtures

**List of Assignment**

Assignment base on the above mention topic.

**Instructional Method:**

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of the tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.



**Text Books:**

1. Kumar Mehta P. and Paulo J. M. Monteiro, (2014), Concrete: Microstructure, Properties and Materials, 4th Edition, McGraw-Hill, New Delhi.

**Reference Books:**

1. Shetty. M. S., (2017), Concrete Technology, S. Chand and Company Ltd, New Delhi.
2. Neville. A. M, (2012), Properties of Concrete, Pearson, New Delhi.
3. ACI 211.1-91 Reapproved 2009, Standard Practice for selecting Proportions for Normal, Heavyweight, and Mass Concrete, USA
4. George C. Sih, Alberto Carpinteri and Surace, G (Eds.) (2010), Advanced Technology for Design and Fabrication of Composite Materials and Structures: Applications to the Automotive, Marine, Aerospace and Construction Industry, in: Engineering Applications of Fracture Mechanics Series, Springer, Netherlands.

