ELEMENTS OF MODERN CONSTRUCTION MATERIAL

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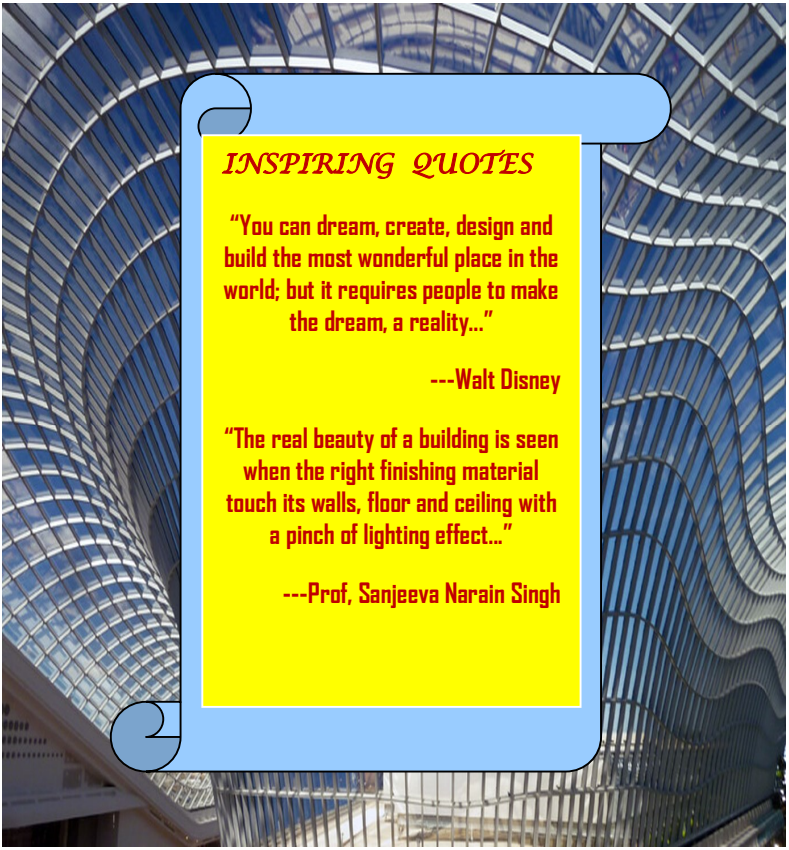
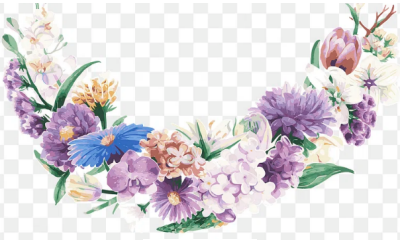

INSPIRING QUOTES
"You can dream, create, design and build the most wonderful place in the world; but it requires people to make the dream, a reality..."
---Walt Disney
"The real beauty of a building is seen when the right finishing material touch its walls, floor and ceiling with a pinch of lighting effect..."
---Prof, Sanjeeva Narain Singh

This Book is Dedicated



To
The Very Source
of our

“Exhistence & Inspiration”
Our Lovely Parents
Dear
“Father & Mother”

PREFACE

Construction materials have been used since ancient times depending upon their local availability worldwide. Due to advancement in technology available to mankind at different times in the history of our existence, materials to be used for construction have also undergone a sea change. Right from use of mud, straw, wood, stone, bamboo to burnt clay bricks, steel, iron, ice for igloo in cold countries to reinforced concrete in high-rise buildings, there are a vast array of materials in use worldwide depending upon the climatic conditions and terrain.

Construction material has a direct impact on the health of human beings. Due to climate change, major thrust is on reduction of energy consumption in its manufacture. Construction material should be environment friendly and fire resistant.

Alongwith the research, innovation and discovery of new technology, a material that has been engineered to have improved desirable properties is known as modern construction material. Although concrete, aluminium and steel are commonly used modern materials ; due to recent advancement in their engineered properties, they have changed the way we manufacture and use products.

Our main focus is also to engineer a modern construction material that is cheaper, without compromising on its strength, durability and quality for construction of eco-friendly and cost-effective buildings and structures.

Whole book on Modern Construction Material is carved into five Units of study material. First Unit covers basics of Modern Construction Material including properties and their uses. The materials covered are flyash bricks, cement blocks, calcium silicate bricks, RFPC and GFRG.

Second Unit tells all about geosynthetics and bituminous

material covering properties and uses of fire-resistant paints, tiles, bricks and glass, light weight concrete and waste material-based concrete.

Third Unit describes in detail Modern Construction Material Concrete, ferro-cement and fibre reinforced concrete, high density concrete, nuclear concrete, heat resisting and refractory concrete.

Unit Four of the book deals with Composite and Chemicals in modern concrete with use of polymers, fibre reinforced polymers, sulphur and sulphur-infilterated concrete.

Last but not the least, Unit Five educates us all about Modern Waterproofing and Insulating Material and their uses. It explains thermal, acoustics and electrical insulating materials apart from giving the concept of polymer floor finishes.

This book is dedicated to Civil Engineering Students, practising Engineers and Researchers worldwide with the aim of enriching their knowledge in Civil Engineering Modern Construction Material which are used on modern construction projects worldwide. It is based on a standard University syllabus practised in India in standard and renowned premier engineering institutions in many countries.

✍ *Author(s)*

ACKNOWLEDGEMENT

Thank You, Divine Almighty ! mystery of the Universe, for letting there be Construction Materials, Human Brains, Divine Technology, Life Sustaining Elements on the only planet Earth in this Galaxy of Milky Way. The present book on Modern Construction Material is an amalgamation of our thoughts, Teaching and Industry Experience of Civil Engineering Scholars, Professionals and Practitioners.

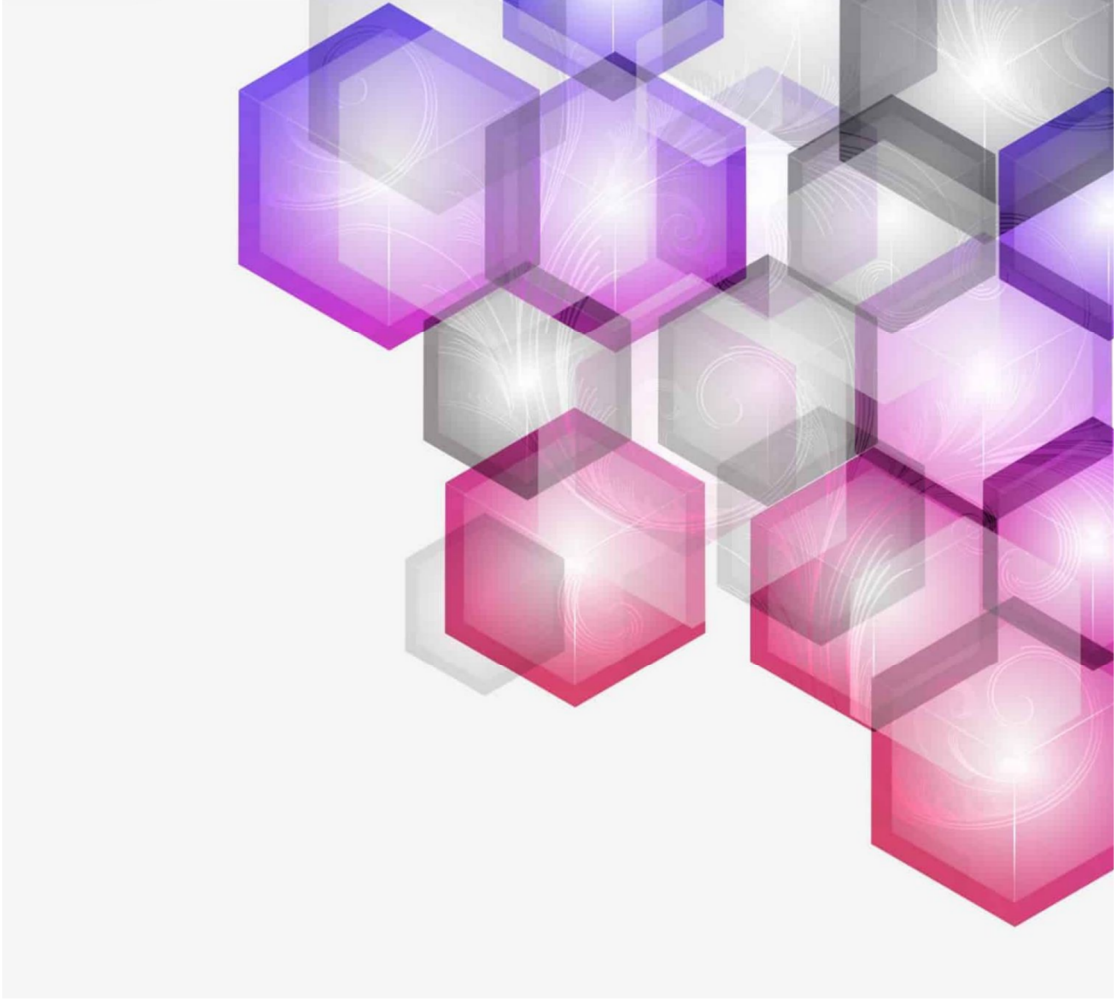
We are deeply indebted to the Research Scholars whose contribution to the understanding of Modern Construction Material in the background of changing dynamics of Construction Technology that have evolved in the modern era has defined a new set of lifestyle and comfort in luxury living.

We owe a deep sense of gratitude to our family members, especially children for their constructive co-operation and peaceful atmosphere in writing this book.

VSRD Academic Publishing (A Division of Visual Soft Indai Private Limited) staff and management deserve special thanks for their valuable guidance and facilities provided by them for bringing out this edition so explicitly.

✍ *Prof. Dr. Tabassum Abassi*

✍ *Prof. Sanjeeva Narain Singh*



SYLLABUS

UNIT 1

Introduction, properties, and uses of modern building materials: fly ash bricks, soil – cement blocks, calcium silicate bricks, red mud jute fibre polymer composite (RFPC), glass reinforced gypsum.

UNIT 2

Introduction, properties, and use of: geosynthetics, bituminous material, fire resistant materials (chemicals, paints, tiles, bricks, glass), metals, light – weight concrete, mass concrete, waste material-based concrete.

UNIT 3

Introduction, properties, and use of: Ferro cement &fibre reinforced concrete, different types of fibres, high density concrete, nuclear concrete, heat resisting & refractory concretes, prefabricated systems.

UNIT 4

Introduction, properties, and use of: Polymers, fibre reinforced polymers, polymer concrete composites (PCCs), sulphur concrete and sulphur – infiltrated concrete.

UNIT 5

Introduction, properties, and use of: Conventional and modern water proofing materials, Conventional and modern insulating materials (thermal, sound, and electrical insulating materials). Concept of polymer floor finishes.

UNIT 6

Advanced Innovations in Concrete - Bendable Concrete, Concrete Canvas, CSF & GGBFS Concrete, Light-Weight Concrete, HVFA Concrete, Hydrophobic Concrete, Pigmented Concrete, Self-Curing Shrinkage Free Concrete, Self-Compacting Concrete (SCC), Translucent Concrete; Advanced Innovations in Cement – Light Generating Cement, Photo-Catalytic Cement, Self-Healing Cement, Self-Levelling Concrete topping Cement, Ternary Blended Cement ; Recycled Aggregate ; Rammed Earth & Clay as Construction Material; Liquid Granite & Sensitile as advanced interior finishing works material.

UNIT 7

Wood – Cross Laminated Timber (CLT), Electrified Wood, Transparent Wood; Bamboo ; Recycled Paper – Papercrete, Richlite Honeycomb Matrix made of Aluminium, Nomax, Thermoplastic, Steel, paper, clay ; Auxetic Honeycomb Matrix ; Flexicomb Aluminium Foam ; Carbon Fiber ; Graphene as advanced innovative material.

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