

# **SHIV NADAR UNIVERSITY**

## **UNDERGRADUATE COURSE PROPOSAL**

**I. COURSE TITLE:** Material Science and Engineering

**II. COURSE CODE:** CED 103

**III. COURSE CREDITS (L:T:P):** 3:0:0

**IV. TOTAL CONTACT HOURS/ BATCH/WEEK (L:T:P):** (3L+0+0 =3)

**V. NO. OF BATCHES:**

**VI. COURSE TYPE (MAJOR/UWE/CCC/REAL/VELS/IC), PLEASE MENTION ALL**

**THAT APPLIES:** Major

**VII. PREREQUISITE/S (IF ANY):** NA

**VIII. COURSE COORDINATOR/INSTRUCTOR(S):** Dr. Sumedha Moharana

**IX. SCHOOL/ DEPARTMENT:** Department of Civil Engineering

**X. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST:**

1. Civil Engineering

**XI. Course objective**

The course aims to provide knowledge about fundamental principles of structural, physical and long-term performance of construction materials. Students will gain a knowledge of building materials and its possible applications in construction and architecture.

**XII. Learning outcome**

On successful completion of the course, students will be able to:

- Comparative knowledge of material properties (physical & structural) for most common and advanced building materials,
- Understanding of typical and potential applications of materials,
- Identify the crucial problem areas in manufacture and applications of building materials

### **XIII. Course Content**

#### **1. Module-1 Theory of Building Systems**

*Structural morphology, basic structural elements and force systems & material behaviour. Mechanical properties (strength, structural performance) & Non-Mechanical properties (physical properties, durability)*

#### **2. Module-2 Classical building materials-I**

*Stone: Requirement of good building stones, dressing of stones, deterioration and preservation of stone work. Bricks: Methods of brick manufacturing - characteristics of good bricks – classification of bricks and their uses. Lime: Source of lime, classification of lime, various stage of lime, characteristics of lime, types and uses.*

#### **3. Module-3 Classical building materials-II**

*Wood: Types of wood (hardwood & softwood), species, performance properties, wood decays. Bamboo – characters and uses in building industry. Timber: Characteristics of timber - classification of timber - defects of timber and their causes - seasoning, preservation and fire-proofing.*

#### **4. Module-4 New age building materials-I**

*Cement: Composition of ordinary portland cement-functions of cement, ingredients characteristics and types of cement and uses Mortar: Characteristics of mortar - types of mortar using lime, cement, mud, - composite mortars using fly ash and surkhi Concrete: Characteristics of concrete, types of concrete, production of concrete and mechanical properties of concrete. Steel: Composition, classification, production and mechanical and structural properties.*

#### **5. Module-5 Miscellaneous materials**

*Brief introduction to soil and other materials used for geo-technical structure and transport engineering, Thermal and acoustic materials, plastics, metals, water proofing and damp proofing materials, composite materials and geosynthetics, Relation between materials and their applications in buildings / case studies / structural and non-structural applications.*

### **XIV. Assessment Strategy**

Minor exam: 20

Quizzes: 20

Class participation (Group presentation and discussion):20

Major exam: 40

Passing mark: 50

### **XV. Recommended Books**

1. S.K.Duggal, “Building Materials”, (Fourth Edition) New Age International (P) Limited, 2016
2. National Building Code(NBC) of India
3. P C Vergese, “Building Materials”, PHI Learning Pvt. Ltd
4. Building Materials and Components, CBRI, 1990, India
5. Dr. B.C.Punmia, Ashok kumar Jain, Arun Kumar Jain, “Building Construction, Laxmi Publications (P) ltd., New Delhi.

6. Rangawala S. C. "Engineering Materials", Charter Publishing House, Anand, India.