Ferrocement Technology (Elective for B.E.Civil)

Teaching Scheme: Theory: 4 Hrs / week Exam Scheme: Paper 100 marks

Section I

Unit 1: What is ferrocement?

a) Definition. Basic concept like bond increase. Comparison with concretes like RCC, Prestressed, Asbestos cement, Fiber reinforced, Polymer concretes. Composition of ferrocement. Special types of ferrocement .Ferrocement as substitute for conventional building materials. Typical characteristics and their applications.

b) Raw materials, skills, tools and plants. Ferrocement as material of construction. Forming a ferrocement structure. Properties and specifications of raw materials. Proportioning of cement mortar. Job requirements of required skills. Tools and plants.

Unit 2: Mechanical properties and construction methods:

a) Mechanical properties and typical features affecting design. Properties under static and dynamic loading. Shrinkage and creep. Testing of ferrocement.

b) Methods of constructing ferrocement structures. Standardizing method of construction. Planning the work. Fabricating skeleton, tying meshes and mortaring. Curing. Maintenance. Protective surface treatments. Damage to ferrocement structures.

Unit 3: Strength through shape and design :

a) Strength through shape. Design of structure based on form and shape. Forms in nature. Various structural forma and their behavior. Typical strengths of different materials. Comparative study of various forms.

b) Design of ferrocement structures. Design, analysis and optimization. Special design considerations for ferrocement. Typical features of ferrocement affecting design. Conventional design methods like working stress, load factor, applied to ferrocement. Design based on equivalent area method for compression, tension and flexural members. Specific surface method and crack control method, Design of structures subjected to membrane stresses. Design of shaped structures in ferrocement like stiffened plates, arch faced walls, stiffened cavity walls and hollow floors and beams. Design of forms like 'T', 'U' 'T' '+' 'L'.

Section II

Unit 4: Cost analysis and ferrocement in Building construction.

a) Cost analysis: Factors governing cost analysis. Special considerations for ferrocement structures. Cost comparison with conventional construction. Specifications for ferrocement structures. Quantity analysis of material and labour for feroocement items. Cost and value of ferrocement construction.

b) Ferrocement in building construction. Ferrocement in foundations, walls, floors roofs. Ferrocement single wall construction. Design and construction of houses with cavity

walls, hollow floors and hollow beams. Staircases and other building accessories. Earthquake resisting structures. Special characteristics of ferrocement to resist shock loading. Design and construction of quake proof structures.

Unit 5: Hydraulic and soil retaining structures in ferrocemnent:

a) Hydraulic structures. Why ferrocement? Water retaining structures. Storage tanks of various types. Structures across streams. Ferrocement in layered form used for lining, water proofing and surface coating.

b) Soil retaining structures. Types of retaining walls and their comparison with ferrocement arch faced wall. Design and method of fabrication and casting. Ferrocement counterfort retaining wall. Ferrocement containers for storing granular materials.

Unit 6: Space structures and precast products:

a) Ferrocement large size special purpose structures. Space structures like shells, pyramids, domes corrugated catenaries.

b) Precast ferrocement products: Why ferrocement for precasting? Methods of precasting. Design of precast elements. Ferrocement precast walling and flooring panels. Joints in precast ferrocement elements.

Termwork: Journal reporting practicals based on testing of properties of raw materials and ferrocement in laboratory and field.

Books recommended:

!) State-of-the-art report and guide for Design,Construction and Repairs of Ferrocement;

ACI committee Report. No ACI549R- 88 and ACI 549.1R.88.

Published by American Concrete Institute, Detroit, USA

2) Ferrocement

Authors: B R Paul and R P Pama.

Published by International Ferrocement Information Centre. A.I.T.Bangkok, Thailand.

3)Ferrocement and laminated cementitious composites

Author: A E Naaman.

Publisher: Techno-press, Ann Arbor, Michigan, U S A.

4)Ferrocement- Materials and applications;

Publication SP 61, A C I Detroit. U S A

5) Ferrocrete Technology- A Construction Manual.

Author: Dr B N Divekar.

Published by the Author.

6) Chapter 1 titled 'Ferrocement' by S P Shah and P N Balaguru.

in book 'Concrete Technology and Design Vol II

Editor; R N Swamy.

7) Proceedings of International Symposiums on

' Ferrocement and thin reinforced composites.- Ferro 1 to Ferro 10.

Available with International Ferrocement Information Centre, A I T Bangkok, Thailand.
