

Subject Code: 1RI3000102	Subject Title: Essentials of Disciplinary Research Subject-1 Road Pavement Material
Pre-requisite Subject	Road materials, Material science

Objectives of course: To learn about materials of Concrete related to road pavement and their properties

Learning outcomes: After learning the course, the students should be able to understand the basic concept of Concrete ingredients related to road pavement & their properties, Mechanical and chemical property testing, fresh & Hard Concrete Properties, Mix Design

Teaching Scheme (Credit Distribution)				Evaluation Scheme(% Marks)	Total Marks
Lecture	Tutorial	Practical	Credit	Continuous (Internal) Assessment	100
4	--	--	4	100%	

Unit	Content	Lecture	Wt. (%)
1	Concrete Pavement Making Materials: Cement: Chemical composition, Hydration of cement, structure of hydrated cement, Tests on cement, water chemical admixtures. Aggregates: Classification IS specifications, Properties, Grading, Methods of combining aggregates, specified grading, Testing of aggregates. Water - General requirements & limiting values of impurities	4	25
2	Fresh Concrete: Properties of fresh concrete, Definition and Measurement methods of workability as per IS, factors affecting workability, Segregation & Bleeding, Slump loss, Re-tempering, Site preparations for concreting, Mixing, Stages of concreting. Curing & various methods of curing.	3	25
3	Hardened Concrete: Strengths of hardened concrete (Tensile & Compressive strength, Flexural & Bond strength), standard test methods as per IS and ASTM, Failure mechanism under compression & tension, Stress-strain behavior of concrete, Overview of Modulus of elasticity, Dimensional stability -Creep & Shrinkage	4	25
4	Mix Design for Pavement Concrete: Principles of concrete mix design, Parameters and factors influencing mix design, Indian Standard methods of mix design	4	25

List of References:

1. Advanced Concrete Technology – ZONGJIN Li
2. IRC-15-2017, Code of Practice for Construction of Jointed Plain Concrete Pavements.
3. IRC-58-2015, Guidelines for the Design of Plain Jointed Rigid Pavements for Highways.
4. IS-2386-1963-PART 1 to 5, Methods of Test for Aggregates for Concrete.
5. IS-4031-PART 1& 2, Methods of Physical Tests for Hydraulic Cement.
6. IS-9103, Specification for Concrete Admixtures.
7. IS-3025, Methods of sampling and test (physical and chemical) for water and wastewater.
8. IS-1727, Methods of test for pozzolanic materials.
9. IS-3812-2013, Specification for Pulverized Fuel Ash.
10. IS-15388-2003, Specification for Silica Fume.

Subject Code: 1RI3000103	Subject Title: Essentials of Disciplinary Research Subject-2 Analysis and Design of Road Pavement
Pre-requisite Subject	Road Pavement

Objectives of course: To learn about road pavement and their properties

Learning outcomes: Student will be able to understand the basics characteristics of Thin White Topping and Advances testing of concrete

Teaching Scheme (Credit Distribution)				Evaluation Scheme(% Marks)	Total Marks
Lecture	Tutorial	Practical	Credit	Continuous (Internal) Assessment	100%
2	--	--	2	100%	

Unit	Content	No. of Lecture	Wt. (%)
1	Condition survey of Existing Flexible and Rigid Road Pavement	2	10
2	Evaluation of Road Pavement by Condition Rating	3	20
3	Measurement of Strength and thickness by FWD or BBD Test	3	25
4	Various technique for Design thin white topping pavement on existing Flexible or Rigid Pavement	4	25
5	Checking of Durability of Proposed Thin white topping Pavement	3	20

List of References:

1. IRC-82-2015, Code of Practice for Maintenance of Bituminous Road Surfaces
2. IRC-81-1997, Guidelines for strengthening of flexible road pavements using benkelman beam deflection technique.
3. IRC-115-2014, Guidelines for Structural Evaluation and Strengthening of Flexible Road Pavements Using Falling Weight Deflectometer (FWD) Technique.
4. IRC-SP-76-2015, Guidelines for conventional and thin white topping.
5. IRC-114, Guidelines for Use of Silica-Fume in Rigid Pavement.
6. IRC-44, Guidelines for Cement Concrete Mix Design for Pavements.
7. IRC-SP-46, Guidelines for Design and Construction of Fibre Reinforced Concrete for Pavements.
8. MORT&H, 5th Revision.
9. IRC-SP-129, Specifications for Open-Graded Friction Course.
10. IS-10262, Concrete Mix Proportioning – Guidelines.