



THIAGARAJAR COLLEGE OF ENGINEERING - MADURAI 625 015
TCE-III

S.No	One credit course need analysis sheet	
1.	Name of the Course	ARBITRATION AND DISPUTE RESOLUTION (BIF)
2.	Name of the Industry	SCEBA CONSULTANCY SERVICES, MADURAI
3.	Name of the SIG associated with	NIL
4.	Motivation for offering the course	
4.1	Feedback (If yes, Details of the feedback as per the annexure I)	
	From Recruiter	Y/N
	From Employer	Y/N
	From Alumni	Y/N
	From Academic Council members	Y/N
	From Board of Studies members	Y/N
	From Senior students	Y/N
	From current students	Y/N
	From Performance Assessment Committee	Y/N
	From Department Advisory committee	Y/N
4.2	Faculty participation in Seminar/FDP (If yes, details)	
	At higher learning institutes	-
	At Industry	-
5.	Outcomes expected	
	Technology transfer	✓
	Student Internship	
	Placement	
	Organizing FDP/seminar at TCE	
	Collaborative research/consultancy projects	
	Faculty as Trainee/Trainer in the Industry	
	Joint publications	
	Setting up of Lab/Infrastructure	



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TCE-III

Attendance sheet for the one/~~two~~ credit

Name of the Course: Arbitration and Dispute Resolution (BIF)

Name of the Industry: Sreeba consultancy services, Madurai

Name of the Expert: Er. Sarma Ratrevel, CEO

Number of Students enrolled: 101

Name of the Faculty: M. A. Ravindhar Raja

Date/Time/Venue: 14.10.2014 / 9.00 AM to 5.00 PM / Civil Seminar Hall

S.No	Reg.No	Name	Department	Signature

for M. A. Ravindhar Raja

Signature of the Faculty Coordinator



THIAGARAJAR COLLEGE OF ENGINEERING - MADURAI 625 015

TCE-III

Course Schedule

Name of the Course: Arbitration and Dispute Resolution (BIF)

Name of the Industry: Sreeba consultancy services, Madurai

Name of the Expert: Er. Sanna Routhavel, CEO

Number of Students enrolled: 101

Name of the Faculty: M. A. Ravindhar Raja

Date/Time/Venue: 14.10.2014 / 9.00 Am to 5.00pm / Civil Seminar Hall

Date	Time	Topics	Remarks
Day1	9.00 to 1.00	Introduction, Contract Act, Arbitration	} NIL
	2.00 to 5.00	Alternate Dispute Resolution - All types	
Day2			

for. M. A. 

Signature of the Faculty coordinator



THIAGARAJAR COLLEGE OF ENGINEERING - MADURAI 625 015

Course Instructor Feedback for One/Two credit course

TCE-III

Name of the Course: Arbitration and Dispute Resolution (BIF)

Name of the Industry: Sceba consultancy Services, Madurai

Name of the Expert: Er. Sanna Ratnavel, CEO

Date/Time/Venue: 14.10.2014 | 9.00 AM to 5.00 PM | Civil Seminar Hall

	Comments
Student attendance	Good
Level of the students in understanding the concepts	Very Satisfied
Any suggestions regarding new content to be included as Prerequisites/Special electives	Nil
Hall/Lab arrangements	Up to the Mark
Hospitality	Good

for M. A. Ratnavel
Signature of the Course Instructor

Signature of Head of the Department



THIAGARAJAR COLLEGE OF ENGINEERING - MADURAI 625 015
TCE-III

S.No	One credit course need analysis sheet	
1.	Name of the Course	Durability of Concrete Structures
2.	Name of the Industry	CSIR - Central Electrochemical Research Institute (CECRI)
3.	Name of the SIG associated with	Structural Engineering.
4.	Motivation for offering the course	
4.1	Feedback (If yes, Details of the feedback as per the annexure I)	
	From Recruiter	Y/N
	From Employer	Y/N
	From Alumni	Y/N
	From Academic Council members	Y/N
	From Board of Studies members	Y/N
	From Senior students	Y/N
	From current students	Y/N
	From Performance Assessment Committee	Y/N
	From Department Advisory committee	Y/N
4.2	Faculty participation in Seminar/FDP (If yes, details)	
	At higher learning institutes	
	At Industry	
5.	Outcomes expected	
	Technology transfer	✓
	Student Internship	-
	Placement	-
	Organizing FDP/seminar at TCE	
	Collaborative research/consultancy projects	-
	Faculty as Trainee/Trainer in the Industry	-
	Joint publications	-
	Setting up of Lab/Infrastructure	-

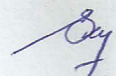


THIAGARAJAR COLLEGE OF ENGINEERING - MADURAI 625 015
TCE-III

Attendance sheet for the one/two credit

Name of the Course: BIE - Durability of Concrete Structures
 Name of the Industry: CSIR - Central Electrochemical Research Institute (CECRI)
 Name of the Expert: Dr. R. Selvaraj
 Number of Students enrolled:
 Name of the Faculty: Mr. A. RAJASEKAR
 Date/Time/Venue: Seminar Hall, Civil Department ; 15.10.2014, 9.30 AM to 4.30 PM

S.No	Reg.No	Name	Department	Signature


Signature of the Faculty Coordinator



THIAGARAJAR COLLEGE OF ENGINEERING - MADURAI 625 015

TCE-III

Course Schedule

Name of the Course: BIE - Durability of Concrete Structures

Name of the Industry: CSIR - Central Electrochemical Research Institute (CECRI)

Name of the Expert: Dr. R. Selvaraj

Number of Students enrolled:

Name of the Faculty: A. RAJASEKAR

Date/Time/Venue: 15-10-2014 / 9.30 to 4.30 PM / Seminar Hall, Civil Department

Date	Time	Topics	Remarks
Day1	9.30 AM to 12.30 PM	General Details of Concrete	Syllabus
	1.30 PM to 4.30 PM	Durability/service life of concrete	enclosed
Day2	9.30 AM to 12.30 PM	Deterioration Processes in concrete	
	1.30 PM to 4.30 PM	Cracking of concrete	

Signature of the Faculty coordinator


THIAGARAJAR COLLEGE OF ENGINEERING - MADURAI 625 015
Course Instructor Feedback for One/Two credit course
TCE-III

Name of the Course: BIE - Durability of Concrete Structures
 Name of the Industry: CSIR - Central Electrochemical Institute (CECRI)
 Name of the Expert: Dr. R. Selvaraj
 Date/Time/Venue: 15-10-2014 / 9-30 AM to 4-30 PM / Seminar Hall, Civil Department

	Comments
Student attendance	Good
Level of the students in understanding the concepts	Very Satisfactory
Any suggestions regarding new content to be included as Prerequisites/Special electives	NIL
Hall/Lab arrangements	Good
Hospitality	Good.

Sey
 Signature of the Course Instructor
 for

R. Selvaraj
 Signature of Head of the Department

Sub Code	Lectures	Tutorial	Practical	Credit
B1E	1	-	-	1

B1E Durability of Concrete Structures

Preamble

Durable concrete will retain its original form, quality and serviceability when exposed to the environment. This course gives an exposure to the importance and need for making durable concrete with overview on factors affecting durability.

Program Outcomes Addressed

1. Graduates will demonstrate knowledge of professional and ethical responsibilities
2. Graduates will show the understanding of impact of engineering solutions on the society and also will be aware of contemporary issues
3. Graduates will develop confidence for self education and ability for life-long learning

Competencies:

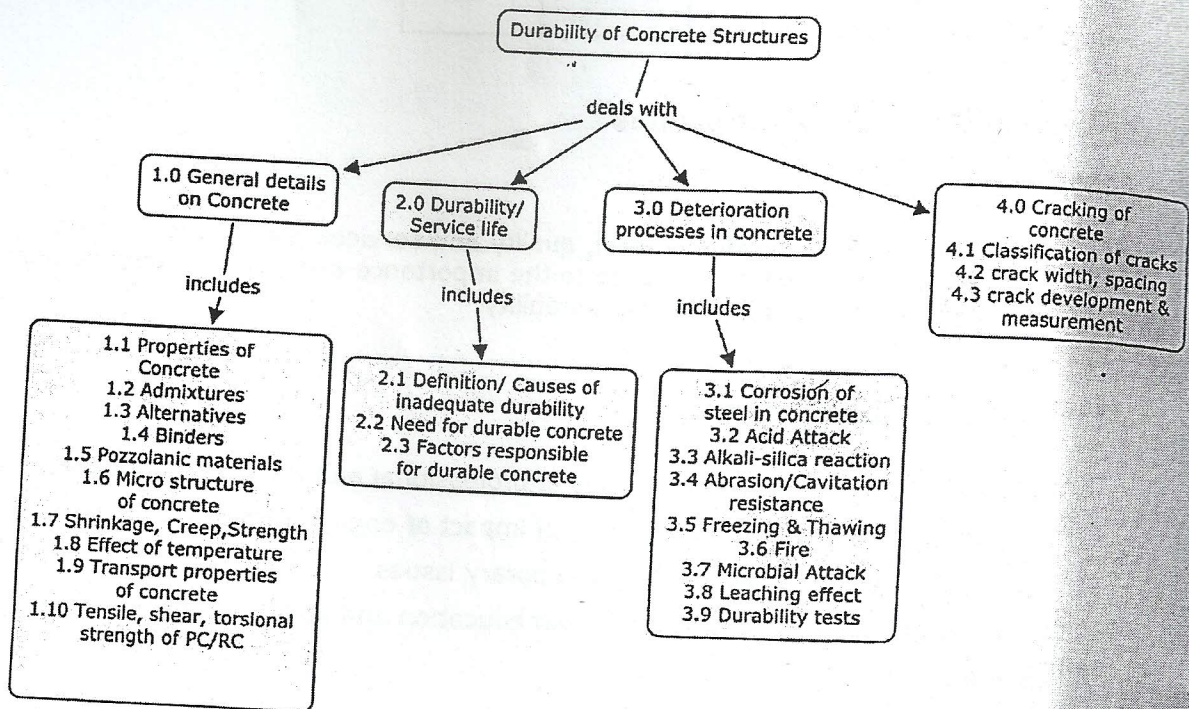
At the end of the course, the students will be able to:

1. Explain the properties of concrete and supplementary cementitious materials and their reaction process in concrete
2. Explain the effect of temperature, shrinkage, creep and transport properties on strength of concrete
3. Understand the need for making durable concrete and the factors affecting durability of concrete
4. Understand the deterioration processes in concrete due to various causes
5. Understand and explain the various methods of testing on durability of concrete

Assessment Pattern:

S. No.	Bloom's Category	Test 1	End -semester Examination
1.	Remember	20	20
2.	Understand	50	50
3.	Apply	30	30
4.	Analyze	0	0
5.	Evaluation	0	0
6.	Create	0	0

Concept Map:



Course Level Learning Objectives:

Remember

1. Define durability of concrete
2. List out the various types of cracks in concrete
3. Write the factors influencing the deterioration of concrete
4. Mention the factors which affects the durability of concrete
5. Define cracking of concrete

Understand

1. Bring out the discussion about thermal properties of concrete
2. Explain corrosion mechanism and its control
3. Write short notes on alkali aggregate reaction
4. Discuss the various tests to assess the durability of concrete
5. Explain in detail about the various techniques available for crack measurement

Apply

1. Suggest suitable tests to assess the durability of concrete, if the aggregate used are having reactive silicates? Explain any three in detail
2. Sewage pipes are buried underground and the soil is rich in sulphates; discuss the various measures you would recommend to make the structure safe against sulphate attack. Justify with proper reasons

3. Corrosion of rebars is influenced by cover thickness- justify. Mention the cover thickness to be provided for the following situations: Underwater concreting structure, Normal exposure concrete
4. An RCC structure is to be constructed in a marine environment; discuss the various measures you would recommend to make the structure safe against corrosion. Justify with proper reasons

Course Content and Lecture Schedule

S. No.	Topic	No. of Lectures
1.0	General Details of concrete	
1.1	Properties of Concrete	2
1.2	Special admixtures	
1.3	Alternatives	
1.4	Binders	
1.5	Pozzolanic materials and their reaction process in concrete	
1.6	Micro structure of concrete	
1.7	Shrinkage, creep and strength of concrete	1
1.8	Effect of temperature on concrete	
1.9	Transport Properties of concrete	
1.10	Tensile, shear bond and torsional strength of plain and reinforced concrete	
2.0	Durability/ Service life	
2.1	Definition of durability and service life of concrete, causes of inadequate durability	1
2.2	Need for durable concrete	
2.3	Factors responsible for durable concrete	
3.0	Deterioration processes in concrete	
3.1	Corrosion of steel in concrete	1
3.2	Acid attack and Sulphate attack	1
3.3	Alkali-silica reaction	1
3.4	Abrasion resistance, cavitations resistance	
3.5	Freezing-thawing resistance	
3.6	Fire resistance	1
3.7	Micro bial attack on concrete	
3.8	Leaching effects in concrete	1

3.9	Various Tests on Durability	2
	Health monitoring of concrete structures – durability measuring devices	
	Methods of enhancing durability of concrete	2
4.0	Cracking of concrete	
4.1	Classification of cracks	
4.2	Crack width crack spacing	1
4.3	Crack development and measuring techniques	1
Total Periods		14

Syllabus:

Basic properties of concrete, special admixtures, alternatives, binders, pozzolanic materials and their reaction process in concrete, micro structure of concrete, shrinkage, creep and strength of concrete, effect of temperature on concrete, transport properties of concrete, tensile, shear bond and torsional strength of plain and reinforced concrete. Definition of durability and service life of concrete, causes of inadequate durability, need for durable concrete, factors responsible for durable concrete. Deterioration processes in concrete corrosion of steel in concrete, acid attack, alkali-silica attack, sulphate attack, alkali-carbonate reaction, efflorescence, scaling, erosion, alkali-silicate reaction, abrasion resistance, cavitations resistance, freezing-thawing resistance, fire resistance, microbial attack on concrete, leaching effects in concrete and testing for all these durability measures. Health monitoring of concrete structures -durability measuring devices. Methods of enhancing durability of concrete. Cracking of concrete: Classification of cracks, crack width crack spacing, crack development and measuring techniques.

References

1. P. Kumar Mehta ,Paulo J. M. Monteiro, "Concrete: Microstructure, Properties, and Materials", McGraw Hill Publication, 2014
2. A.M. Neville, "Properties of Concrete", Pearson Publication, 2011

Course Designer:

R. Selvaraj, Chief Principal Scientist & Head, Department of Civil Engg., CECRI, Karaikudi, selvarajcecri@gmail.com