

Ref No:

SRI KRISHNA INSTITUTE OF TECHNOLOGY , BANGALORE-90



## COURSE PLAN

Academic Year 2019-20

Program:	B E – CIVIL ENGINEERING
Semester :	4
Course Code:	18CV44
Course Title:	Concrete Technology
Credit / L-T-P:	3 / 3-0-0
Total Contact Hours:	50
Course Plan Author:	Shivaprasad D G/ Renuka H R

## Academic Evaluation and Monitoring Cell

#29 Hesaragatta Main Road, Chimney Hills  
Chikkabanavara Post Bangalore-560090  
PH-080-23721477/23721315  
[www.Skit.org](http://www.Skit.org), Email: skitprinci1@gmail.com

## Table of Contents

A. COURSE INFORMATION.....	3
1. Course Overview.....	3
2. Course Content.....	3
3. Course Material.....	4
4. Course Prerequisites.....	4
5. Content for Placement, Profession, HE and GATE.....	5
B. OBE PARAMETERS.....	5
1. Course Outcomes.....	5
2. Course Applications.....	6
3. Mapping And Justification.....	6
4. Articulation Matrix.....	7
5. Curricular Gap and Content.....	8
6. Content Beyond Syllabus.....	8
C. COURSE ASSESSMENT.....	8
1. Course Coverage.....	8
2. Continuous Internal Assessment (CIA).....	8
D1. TEACHING PLAN - 1.....	9
Module - 1.....	9
Module - 2.....	10
E1. CIA EXAM – 1.....	11
a. Model Question Paper - 1.....	11
b. Assignment -1.....	11
D2. TEACHING PLAN - 2.....	12
Module - 3.....	12
Module - 4.....	13
E2. CIA EXAM – 2.....	14
a. Model Question Paper - 2.....	14
b. Assignment – 2.....	14
D3. TEACHING PLAN - 3.....	15
Module - 5.....	15
E3. CIA EXAM – 3.....	16
a. Model Question Paper - 3.....	16
b. Assignment – 3.....	17
F. EXAM PREPARATION.....	18
1. University Model Question Paper.....	18
2. SEE Important Questions.....	19

Note : Remove "Table of Content" before including in CP Book  
 Each Course Plan shall be printed and made into a book with cover page  
 Blooms Level in all sections match with A.2, only if you plan to teach / learn at higher levels

## A. COURSE INFORMATION

### 1. Course Overview

Degree:	BE	Program:	CIVIL ENGINEERING
Semester:	4	Academic Year:	2019-20
Course Title:	Concrete technology	Course Code:	18CV44
Credit / L-T-P:	3 / 3-0-0	SEE Duration:	180 Minutes
Total Contact Hours:	50 Hours	SEE Marks:	60 Marks
CIA Marks:	40 Marks	Assignment	1 / Module
Course Plan Author:	Shivaprasad D G/ Renuka H R	Sign ..	
Checked By:	Mohan KT	Sign ..	
CIA Target	75	SEE Target:	62

**Note:** Define CIA and SEE % targets based on previous performance.

### 2. Course Content

Content / Syllabus of the course as prescribed by University or designed by institute. Identify 2 concepts per module as in G.

Module	Content	Teaching Hours	Identified Module Concepts	Blooms Learning Levels
1	<p><b>Concrete Ingredients</b></p> <p>Cement – Cement manufacturing process, steps to reduce carbon footprint, chemical composition and their importance, hydration of cement, types of cement. Testing of cement. Fine aggregate: Functions, requirement, Alternatives to River sand, M-sand introduction and manufacturing. Coarse aggregate: Importance of size, shape and texture. Grading and blending of aggregate. Testing on aggregate, requirement.</p> <p>Recycled aggregates Water – qualities of water. Chemical admixtures – plasticizers, accelerators, retarders and air entraining agents. Mineral admixtures – Pozzolanic and cementitious materials, Fly ash, GGBS, silica fumes, Metakaolin and rice husk ash.</p>	10	material characteristics	L2
2	<p><b>Fresh Concrete</b></p> <p>Workability-factors affecting workability. Measurement of workability-slump, Compaction factor and Vee-Bee Consistometer tests, flow tests. Segregation and bleeding. Process of manufacturing of concrete- Batching, Mixing, Transporting, Placing and Compaction.</p> <p>Curing – Methods of curing – Water curing, membrane curing, steam curing, accelerated curing, self- curing. Good and Bad practices of making and using fresh concrete and Effect of heat of hydration during mass concreting at project sites.</p>	10	Workability and curing.	L2
3	<p><b>Hardened Concrete:</b> Factors influencing strength, W/C ratio, gel/space ratio, Maturity concept, Testing of hardened concrete, Creep –factors affecting creep. Shrinkage of concrete – plastic shrinking and drying shrinkage, Factors affecting shrinkage. Definition and significance of durability. Internal and external factors influencing durability, Mechanisms- Sulphate attack – chloride attack, carbonation, freezing and thawing. Corrosion, Durability requirements as per IS-456, Insitu testing of concrete- Penetration and pull out test, rebound hammer test, ultrasonic pulse velocity, core extraction – Principal, applications and limitations.</p>	10	properties of hardened Concrete.	L3

4	<b>Concrete Mix Proportioning</b> Concept of Mix Design with and without admixtures, variables in proportioning and Exposure conditions, Selection criteria of ingredients used for mix design, Procedure of mix proportioning. Numerical Examples of Mix Proportioning using IS-10262	10	Concrete mix design.	L5
5	<b>Special Concretes</b> RMC- manufacture and requirement as per QCI-RMPCPS, properties, advantages and disadvantages. Self-Compacting concrete- concept, materials, tests, properties, application and typical mix Fiber reinforced concrete - Fibers types, properties, application of FRC. Light weight concrete-material properties and types. Typical light weight concrete mix and applications	10	Properties of Special concrete ..	L5.
-	<b>Total</b>	<b>50</b>	-	-

### 3. Course Material

Books & other material as recommended by university (A, B) and additional resources used by course teacher (C).

1. Understanding: Concept simulation / video ; one per concept ; to understand the concepts ; 15 – 30 minutes
2. Design: Simulation and design tools used – software tools used ; Free / open source
3. Research: Recent developments on the concepts – publications in journals; conferences etc.

Modules	Details	Chapters in book	Availability
<b>A</b>	<b>Text books (Title, Authors, Edition, Publisher, Year.)</b>	-	-
1,2,3,4,5	Neville A.M. "Properties of Concrete"-4th Ed., Long man.	1,2,3,4,5	In Lib / In Dept
1,2,3,4,5	M.S. Shetty, Concrete Technology - Theory and Practice Published by S. Chand and Company, New Delhi.	1,2,3,4,5	In Lib/ In dept
<b>B</b>	<b>Reference books (Title, Authors, Edition, Publisher, Year.)</b>	-	-
<b>C</b>	<b>Concept Videos or Simulation for Understanding</b>	-	-
C1	<a href="https://www.youtube.com/watch?v=concretematerilas">https://www.youtube.com/watch?v=concretematerilas</a> – 15 Mins <a href="https://www.youtube.com/watch?concreteproperties">https://www.youtube.com/watch?concreteproperties</a> – 5 Mins		
C2	<a href="https://www.youtube.com/watch?Civilax.com">https://www.youtube.com/watch?Civilax.com</a>		
C3	<a href="https://www.youtube.com/watch?Theconstructor.org">https://www.youtube.com/watch?Theconstructor.org</a>		
C4	<a href="https://www.youtube.com/watch?Onlinecivil.net">https://www.youtube.com/watch?Onlinecivil.net</a>		
C5	<a href="https://www.youtube.com/watch?Www.civildigital.com">https://www.youtube.com/watch?Www.civildigital.com</a>		
<b>E</b>	<b>Recent Developments for Research</b>	-	-
<b>F</b>	<b>Others (Web, Video, Simulation, Notes etc.)</b>	-	-

### 4. Course Prerequisites

Refer to GL01. If prerequisites are not taught earlier, GAP in curriculum needs to be addressed. Include in Remarks and implement in B.5.

Students must have learnt the following Courses / Topics with described Content . . .

Modules	Course Code	Course Name	Topic / Description	Sem	Remarks	Blooms Level

## 5. Content for Placement, Profession, HE and GATE

The content is not included in this course, but required to meet industry & profession requirements and help students for Placement, GATE, Higher Education, Entrepreneurship, etc. Identifying Area / Content requires experts consultation in the area.

Topics included are like, a. Advanced Topics, b. Recent Developments, c. Certificate Courses, d. Course Projects, e. New Software Tools, f. GATE Topics, g. NPTEL Videos, h. Swayam videos etc.

Modules	Topic / Description	Area	Remarks	Blooms Level
1				
3				
3				
5				
-				
-				

## B. OBE PARAMETERS

### 1. Course Outcomes

Expected learning outcomes of the course, which will be mapped to POs. Identify a max of 2 Concepts per Module. Write 1 CO per Concept.

Modules	Course Code.#	Course Outcome At the end of the course, student should be able to ...	Teach. Hours	Concept	Instr Method	Assessment Method	Blooms' Level
1	18CV44.1	Students will be able to understand the testing of different ingredients of concrete- cement, aggregates as per IS code.	05	material characteristics	Lecture	Slip Test	Understand L2
1	18CV44.2	Students will be able to decide the type of admixtures to be used for concreting based on its properties	05	material characteristics	Lecture / Tutorial	Assignment	Analyze L4
2	18CV44.3	Students will be able to determine the properties of fresh concrete	05	Workability	Lecture	Assignment	Apply L3
2	18CV44.4	Students will be able to understand curing methods and its problems.	05	curing	Lecture	Slip Test	Understand L2
3	18CV44.5	Students will be able to determine the properties of hardened concrete.	05	properties of hardened Concrete.	Lecture	Slip test	Apply L3
3	18CV44.6	Students will be able to determine different properties of concrete by applying non-destructive testing of concrete and also explain the factors affecting durability of concrete	05	Non destructive testing	Lecture / Tutorial	Assignment	Apply L3
4	18CV44.7	Students will be able to design the concrete mix using IS code methods	10	Concrete mix design.	Lecture / Tutorial	Assignment	L3
5	18CV44.8	Students will be able to recommend special concretes depending on their specific applications and special processes and technology for particular types of structure	05	Properties of Special concrete ..	Lecture / Tutorial	Assignment	Analyze L4
5	18CV44.9	Students will be able to understand manufacturing of concrete	05	RMC	Lecture	Assignment	Understand L2
-	-	<b>Total</b>	<b>10</b>	-	-	-	<b>L2-L4</b>

## 2. Course Applications

Write 1 or 2 applications per CO.

Students should be able to employ / apply the course learnings to . . .

Mod ules	Application Area Compiled from Module Applications.	CO	Level
1	Used for manufacturing of cement and its process.	CO1	L2
1	Used for accelerating the properties of concrete.	CO2	L3
2	Used for study of experiments to be done for fresh concrete.	CO3	L3
2	Used for studying the curing of concrete.	CO4	L2
3	Used for study of experiments to be done for hardened concrete.	CO5	L3
3	Used for studying the non destructive testing methods,	CO6	L3
4	Used for mix design for various grades of concrete.	CO7	L5
5	Used for application of marine structures, and valuable structures.	CO8	L5

## 3. Mapping And Justification

CO – PO Mapping with mapping Level along with justification for each CO-PO pair.

To attain competency required (as defined in POs) in a specified area and the knowledge & ability required to accomplish it.

Mod ules	Mapping		Mapping Level	Justification for each CO-PO pair	Lev el
-	CO	PO	-	'Area': 'Competency' and 'Knowledge' for specified 'Accomplishment'	-
1	CO1	PO1	L2	Knowledge of the behavior of ingredients of concrete is essential to determine the properties of concrete by applying the knowledge of mathematics, science, engineering fundamentals.	L2
1	CO2	PO1	L2	Knowledge of the behavior of concrete while adding admixtures to concrete .by applying the knowledge of mathematics, science, engineering fundamentals	L3
1	CO2	PO3	L2	Selection of suitable type of admixtures in concreting is done based on its properties and it results in a concrete which satisfies the specified needs like strength, workability, economy etc. with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	L3
2	CO3	PO1	L5	Knowledge of the behavior of ingredients of fresh concrete is essential to determine the properties of fresh concrete by applying the knowledge of mathematics, science, engineering fundamentals	L2
2	CO3	PO3	L5	Proportioning of the ingredients of concrete should be designed in such a way that the concrete produced is economical and is of required strength, durability and workability which meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	L2
3	CO4	PO2	L5	Knowledge of the behavior of concrete while curing the fresh concrete by applying the knowledge of mathematics, science, engineering fundamentals	L
3	CO4	PO4	L5	Determination of properties of fresh and hardened concrete involves the use of research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to know the behavior of concrete.	L3
3	CO5	PO1	L5	Knowledge of the behavior of ingredients of hardened concrete is essential to determine the properties of hardened concrete by applying the knowledge of mathematics, science, engineering fundamentals	L2
3	CO5	PO4	L5	Investigation of complex problems Use research-based knowledge and research methods including for hardened concrete.	L2
3	CO6	PO1	L5	Knowledge of the behavior of determining the strength of concrete by	L2

				applying the knowledge of mathematics, science, engineering fundamentals	
3	CO6	PO4	L5	Non-destructive testing of concrete involves carrying out of investigations using research based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to determine the compression strength of an existing building, corrosion of reinforcement etc. and to take corrective measures.	L2
4	CO7	PO1	L5	Knowledge of mathematics, science, engineering fundamentals required for the mix design procedure of concrete.	L2
4	CO7	PO3	L5	Design of different grades of concrete is to be done by applying the knowledge and referring is codes.	L2
5	CO8	PO1	L5	Knowledge of mathematics, science, engineering fundamentals are required to study the properties of special concrete.	L2
5	CO8	PO7	L5	Special concretes and special concreting methods to be adopted depending on their specific applications such that the resulting concrete satisfies the need of a sustainable environment.	L2

#### 4. Articulation Matrix

CO – PO Mapping with mapping level for each CO-PO pair, with course average attainment.

Mod ules	CO.#	Course Outcomes At the end of the course student should be able to ...	Program Outcomes												PS O1	PS O2	PS O3	Lev el		
			PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12						
1	18CV44.1	Students will be able to understand the testing of different ingredients of concrete-cement, aggregates as per IS code.	3	-	-	-	-	-	-	-	-	-	-	-	-	-	L2			L2
1	18CV44.2	Students will be able to decide the type of admixtures to be used for concreting based on its properties	3	-	3	-	-	-	-	-	-	-	-	-	-	-	L3			L2
2	18CV44.3	Students will be able to determine the properties of fresh concrete	3	-	-	3	-	-	-	-	-	-	-	-	-	-	L3			L2
2	18CV44.4	Students will be able to understand curing methods and its problems.	3	-	-	3	-	-	-	-	-	-	-	-	-	-	L2			L3
3	18CV44.5	Students will be able to determine the properties of hardened concrete.	3	-	-	3	-	-	-	-	-	-	-	-	-	-	L3			L2
3	18CV44.6	Students will be able to determine different properties of concrete by applying non-destructive testing of concrete and also explain the factors affecting durability of concrete	2	-	-	2	-	-	-	-	-	-	-	-	-	-	L3			L2
4	18CV44.7	Students will be able to design the concrete mix using ACI and IS code methods	3	-	3	-	-	-	-	-	-	-	-	-	-	-	L5			L3
4	18CV44.8	Students will be able to recommend special concretes depending on their specific applications and special processes and technology for particular types of structure	3	-	-	-	-	-	2	-	-	-	-	-	-	-	L5			L2

-	<b>CS501PC</b>	<b>Average attainment (1, 2, or 3)</b>	<b>2</b>	-	<b>0.7</b>	<b>1.2</b>	-	-	<b>0.2</b>	-	-	-	-	-	-	-	-
-	PO, PSO	1.Engineering Knowledge; 2.Problem Analysis; 3.Design / Development of Solutions; 4.Conduct Investigations of Complex Problems; 5.Modern Tool Usage; 6.The Engineer and Society; 7.Environment and Sustainability; 8.Ethics; 9.Individual and Teamwork; 10.Communication; 11.Project Management and Finance; 12.Life-long Learning; S1.Software Engineering; S2.Data Base Management; S3.Web Design															

## 5. Curricular Gap and Content

Topics & contents not covered (from A.4), but essential for the course to address POs and PSOs.

Mod ules	Gap Topic	Actions Planned	Schedule Planned	Resources Person	PO Mapping
1					
2					
3					
4					
5					

## 6. Content Beyond Syllabus

Topics & contents required (from A.5) not addressed, but help students for Placement, GATE, Higher Education, Entrepreneurship, etc.

Mod ules	Gap Topic	Area	Actions Planned	Schedule Planned	Resources Person	PO Mapping

## C. COURSE ASSESSMENT

### 1. Course Coverage

Assessment of learning outcomes for Internal and end semester evaluation. Distinct assignment for each student. 1 Assignment per chapter per student. 1 seminar per test per student.

Mod ules	Title	Teachi ng Hours	No. of question in Exam						CO	Levels
			CIA-1	CIA-2	CIA-3	Asg	Extra Asg	SEE		
1	Concrete Ingredients	10	2	-	-	1	1	2	CO1, CO2	L2
2	Fresh Concrete	10	2	-	-	1	1	2	CO3, CO4	L3
3	Hardened Concrete	10	-	2	-	1	1	2	CO5, CO6	L3
4	Concrete Mix Proportioning	10	-	2	-	1	1	2	CO7,	L5
5	Special Concretes	10	-	-	4	1	1	2	CO8,	l3,l5
-	<b>Total</b>	<b>50</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>5</b>	<b>5</b>	<b>10</b>	-	-

### 2. Continuous Internal Assessment (CIA)

Assessment of learning outcomes for Internal exams. Blooms Level in last column shall match with A.2.

Evaluatio n	Weightage in Marks	CO	Levels	Evaluation
CIA Exam - 1	30	CO1, CO2, CO3, CO4	L2, l3,L3,L2	CIA Exam - 1
CIA Exam - 2	30	CO5, CO6,	L3,L2,L3,L3	CIA Exam - 2
CIA Exam - 3	30	CO7, Co8	L5, l5	CIA Exam - 3



Assignment - 1	10	CO1, CO2, CO3, CO4	L2, l3,L3,L2	Assignment - 1
Assignment - 2	10	CO5, CO6,	L3,L2,L3,L3	Assignment - 2
Assignment - 3	10	CO7, CO8	L5, l5	Assignment - 3
Seminar - 1	-	-	-	Seminar - 1
Seminar - 2	-	-	-	Seminar - 2
Seminar - 3	-	-	-	Seminar - 3

## D1. TEACHING PLAN - 1

### Module - 1

Title:	Concrete ingredients	Appr Time:	08 Hrs
<b>a</b>	<b>Course Outcomes</b>	-	<b>Blooms Level</b>
-	The student should be able to:	-	
1	Understand the testing of different ingredients of concrete- cement, aggregates as per IS code.	CO1	L2
2	Decide the type of admixtures to be used for concreting based on its properties	CO2	L2
<b>b</b>	<b>Course Schedule</b>	-	-
<b>Class No</b>	<b>Module Content Covered</b>	<b>CO</b>	<b>Level</b>
1	Cement – Cement manufacturing process	CO1	L2
2	steps to reduce carbon footprint, chemical composition and their importance, hydration of cement, types of cement	CO1	L2
3	Testing of cement. Fine aggregate: Functions, requirement,	CO1	L2
4	Alternatives to River sand, M-sand introduction and manufacturing	CO1	L2
5	Coarse aggregate: Importance of size, shape and texture. Grading and blending of aggregate. Testing on aggregate, requirement.	CO1	L2
6	Recycled aggregates Water – qualities of water.	CO2	L2
7	Chemical admixtures – plasticizers, accelerators, retarders and air entraining agents.	CO2	L2
8	Mineral admixtures – Pozzolan and cementitious materials,	CO2	L2
9	Fly ash, GGBS, silica fumes.	CO2	L3
10	Metakaolin and rice husk ash.	CO2	L3
<b>c</b>	<b>Application Areas</b>	<b>CO</b>	<b>Level</b>
1	Used for manufacturing of cement and its process.	CO1	L2
2	Used for Mixing of admixture in mixing of concrete.	CO2	L2
<b>d</b>	<b>Review Questions</b>	-	-
1	What is the common classification of aggregates?	CO1	L2
2	What is Light weight aggregates?	CO1	L2
3	Define Heavy weight aggregates.	CO1	L2
4	Mention the Classification of aggregate In accordance with size.	CO1	L2
6	Mention the Classification of aggregate In accordance with source	CO1	L2
7	What are the properties of Aggregate?	CO1	L2
8	Define Fineness modulus of aggregate	CO1	L3
9	List various types of cement.	CO1	L3

10	What is the chemical composition of cement?	CO1	L3
11	What are the various test which are to be done on aggregates?	CO2	L3
12	What is mean by controlled concrete?	CO2	L3
13	What is meant by hydration of cement?	CO2	L3
14	What are the two process of manufacturing of Cement?	CO2	L3
15	Classify the various concrete chemical based on their use.	CO2	L3
16	Describe the process of manufacture of cement by wet process.	CO2	L3
17	Describe the process of manufacture of cement by dry process.	CO2	L3
18	Explain in details the various specifications of concrete.	CO2	L3
19	Explain in detail of any three tests for aggregates.	CO2	L3
20	What are the end products of hydration? Explain.	CO2	L3
21	What are the different tests conducted on wet cement?	CO2	L3
<b>e</b>	<b>Experiences</b>	-	-
1			
2			
3			

## Module – 2

Title:	Fresh concrete	Appr Time:	08 Hrs
<b>a</b>	<b>Course Outcomes</b>	-	<b>Blooms Level</b>
-	The student should be able to:	-	
1	Determine the properties of fresh concrete	CO3	L2
2	Understand curing methods and its problems.	CO4	L3
<b>b</b>	<b>Course Schedule</b>	-	-
<b>Class No</b>	<b>Module Content Covered</b>	<b>CO</b>	<b>Level</b>
1	Work ability-factors affecting workability. Measurement of workability-slump,	CO3	L5
2	Compaction factor and Vee-Bee Consistometer tests.	CO3	L5
3	Flow tests. Segregation and bleeding.	CO3	L5
4	Process of manufacturing of concrete.	CO3	L5
5	Batching, Mixing, Transporting,	CO4	L5
6	Placing and Compaction.	CO4	L5
7	Curing – Methods of curing .	CO4	L5
8	Water curing, membrane curing, steam curing, accelerated curing, self-curing.	CO4	L5
9	Good and Bad practices of making and using fresh concrete.		
10	Effect of heat of hydration during mass concreting at project sites.		
<b>c</b>	<b>Application Areas</b>	<b>CO</b>	<b>Level</b>
1	Used for study of experiments to be done for fresh concrete.	CO3	L2
2	Used for studying the curing of concrete.	CO4	L2
<b>d</b>	<b>Review Questions</b>	-	-
1	Write short notes on a. Accelerators. b. Retarders c. Plasticizes.	CO3	L2
2	What are the various factors which affect the work ability of concrete?	CO3	L2
3	What are the Causes of bleeding and segregation?	CO3	L2
4	What is batching of concrete?	CO4	L2
5	Explain in detail of any three tests for Fresh Concrete.	CO4	L2
6	List the different types of work ability aids.	CO4	L3
7	What are the various factors which affect the work ability of concrete?	CO4	L3
8	What are the various factors affecting the work ability of concrete- Explain.	CO4	L3

9	Explain the influence of bleeding and segregation on fresh concrete.	CO4	L3
10	Explain the different stages of manufacture of concrete.	CO4	L3
<b>e</b>	<b>Experiences</b>	-	-

## E1. CIA EXAM – 1

### a. Model Question Paper - 1

Crs Code:	18CV44	Sem:	IV	Marks:	40	Time:	75 minutes	
Course:	Concrete technology							
-	-	<b>Note: Answer any 1 questions from each module, each carry equal marks.</b>				CO	Level	Marks
		<b>Module-1</b>						
1	a	Write the chemical composition of cement, Write the flow chart for dry process?				CO1	L2	8
	b	Explain the importance of size shape and texture of aggregate?				CO1	L2	7
		<b>OR</b>						
2	a	Explain the role of admixtures in concrete Technology?				CO1	L2	7
	b	Name any four types of cement . State the properties and specifications of any two cement?				CO1	L2	8
3	a	Define work-ability, Explain the factors influencing workability of concrete?				CO2	L5	15
	b	Write a note on segregation and Bleeding?						
		<b>OR</b>						
4	a	Why curing is needed to concrete? Explain curing method?				CO1	L2	8
	b	Why compaction is required to concrete? Explain compaction method by vibration?				CO1	L2	7

### b. Assignment -1

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions								
Crs Code:	18CV44	Sem:	IV	Marks:	10	Time:	90 – 120 minutes	
Course:	Concrete Technology							
Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.								
SNo	USN	Assignment Description				Marks	CO	Level
1		Write the chemical composition of cement, Write the flow chart for dry process?				10	CO1,	L2
2		Explain the importance of size shape and texture of aggregate?				10	CO1,	L2
3		What is the common classification of aggregates?				10	CO1,	L5
4		What is Light weight aggregates?				10	CO1,	L5
5		Define Heavy weight aggregates.				10	CO1,	L2
6		Mention the Classification of aggregate In accordance with size.				10	CO1,	L2
7		Mention the Classification of aggregate In accordance with source				10	CO1,	L2
8		What are the properties of Aggregate?				10	CO1,	L2
9		Define Fineness modulus of aggregate				10	CO1,	L5
10		List various types of cement.				10	CO1,	L5
11		Write short notes on a. Accelerators. b. Retarders c. Plasticizes.				10	CO2	L2
12		What are the various factors which affect the work ability of concrete?				10	CO2	L2

13		What are the Causes of bleeding and segregation?	10	CO2	L2
14		What is batching of concrete?	10	CO2	L2
15		Explain in detail of any three tests for Fresh Concrete.	10	CO2	L5
16		List the different types of work ability aids.	10	CO2	L5
17		What are the various factors which affect the work ability of concrete?	10	CO2	L2
18		What are the various factors affecting the work ability of concrete- Explain.	10	CO2	L2

## D2. TEACHING PLAN - 2

### Module - 3

<b>Title:</b>	Hardened concrete	<b>Appr Time:</b>	16 Hrs
<b>a</b>	<b>Course Outcomes</b>	-	<b>Blooms Level</b>
-	The student should be able to:	-	
1	determine the properties of hardened concrete.	CO5	L2
2	determine different properties of concrete by applying non-destructive testing of concrete and also explain the factors affecting durability of concrete	CO6	L2
<b>b</b>	<b>Course Schedule</b>		
<b>Class No</b>	<b>Module Content Covered</b>	<b>CO</b>	<b>Level</b>
1	Factors influencing strength	CO5	L5
2	W/C ratio, gel/space ratio, Maturity concept.	CO5	L5
3	Testing of hardened concrete, Creep –factors affecting creep..	CO5	L5
4	Shrinkage of concrete – plastic shrinking and drying shrinkage, Factors affecting shrinkage.	CO5	L5
5	Definition and significance of durability, Internal and external factors influencing durability.	CO6	L5
6	Mechanisms- Sulphate attack – chloride attack, carbonation, freezing and thawing, Corrosion,	CO6	L5
7	Durability requirements as per IS-456, In situ testing of concrete	CO6	L5
8	Penetration and pull out test, rebound hammer test.	CO6	L5
9	ultrasonic pulse velocity.		
10	core extraction – Principal, applications and limitations.		
<b>c</b>	<b>Application Areas</b>	<b>CO</b>	<b>Level</b>
1	Used for study of experiments to be done for hardened concrete.	CO5	L2
2	Used for studying the non destructive testing methods,	CO6	L2
<b>d</b>	<b>Review Questions</b>	-	-
1	How fly ash concrete gain strength in later age? Explain Mechanism.	CO5	L5
2	Discuss the effects of adding fly ash, silica fume and ground granulated blast furnace slag in concrete.	CO5	L5
3	Explain in detail the composition, physical properties of the mineral admixture GGBS and discuss the benefits of using it in concrete.	CO6	L5
4	Discuss at length the composition, properties of the mineral admixture Fly Ash and write the benefits of using it in concrete.	CO6	L5
5	What is meant by proportioning of concrete?		L2
6	Write the Factors Influencing Consistency.	CO6	L5
7	What are the Factors affecting Strength of Hardened concrete?	CO6	L2
8	What are the principal properties of "good" concrete?	CO6	L2
9	What are the factors influencing the selection of materials?	CO6	L2
10	Explain the method of finding flexural and split tensile strength of concrete.	CO6	L2
11	With a neat graph, explain different modulus of elasticity of concrete	CO6	L2

12	Define Shrinkage cracking	CO6	L2
13	Define Plastic Shrinkage cracking	CO6	L2
14	Define Tension cracking	CO6	L2
15	Define Creep.	CO6	L2
<b>e</b>	<b>Experiences</b>	-	-
1			
2			
3			
4			
5			

## Module – 4

<b>Title:</b>	Concrete mix Proportioning.	<b>Appr Time:</b>	08 Hrs
<b>a</b>	<b>Course Outcomes</b>	-	<b>Blooms Level</b>
-	The student should be able to:	-	
1	Students will be able to design the concrete mix using ACI and IS code methods	CO7	L5
<b>b</b>	<b>Course Schedule</b>		
<b>Class No</b>	<b>Module Content Covered</b>	<b>CO</b>	<b>Level</b>
1	Concept of Mix Design with and without admixtures.	CO7	L5
2	variables in proportioning and Exposure conditions,	CO7	L5
3	Selection criteria of ingredients used for mix design,	CO7	L5
4	Procedure of mix proportioning.	CO7	L5
5	Numerical Examples using IS-10262.	CO8	L5
6	Numerical Examples using IS-10262.	CO8	L5
7	Numerical Examples using IS-10262.	CO8	L5
8	Numerical Examples using IS-10262.	CO8	L5
9	Numerical Examples using IS-10262.	CO8	L2
10	Numerical Examples using IS-10262.	CO8	L2
<b>c</b>	<b>Application Areas</b>	<b>CO</b>	<b>Level</b>
1	Used for mix design for various grades of concrete.	CO7	L5
<b>d</b>	<b>Review Questions</b>	-	-
1	Define Nominal Mixes	CO7	L5
2	Define Standard mixes	CO7	L5
3	What is Designed Mixes?	CO7	L5
4	What are the Factors affecting the choice of mix proportions?	CO7	L5
5	Explain the Design Procedure for IS method of Concrete Mix Design.	CO7	L5
6	Design the concrete mix for grade M20 with suitable conditions. Find the quantities of constituents of the mix for a bag of cement	CO7	L5
7	Design the concrete mix for grade M30 with suitable conditions. Find the quantities of constituents of the mix for a bag of cement.		
8	Design the concrete mix for the following data: characteristic compressive strength = 20MPa, maximum size of aggregate = 20mm (angular), Degree of workability = 0.9 CF, Degree of quality control = good and type of exposure = severe. Water absorption by CA = 0.5% and moisture content in FA = 2.0%. Assume any suitable missing data.		
9	Design the concrete mix for the following data: characteristic compressive strength = 35MPa, maximum size of aggregate = 20mm (angular), Degree of workability		

	= 0.9 CF, Degree of quality control = good and type of exposure =severe. Water absorption by CA = 1% and moisture content in FA = 1.5%. Assume any suitable missing data.		
<b>e</b>	<b>Experiences</b>	-	-
1		CO7	L2
2			
3			
4		CO8	L3
5			

## E2. CIA EXAM – 2

### a. Model Question Paper - 2

Crs Code:	18CV44	Sem:	IV	Marks:	40	Time:	75 minutes	
Course:	Concrete Technology							
-	-	<b>Note: Answer any 1 questions from each module, each carry equal marks.</b>				Marks	CO	Level
		<b>Module-3</b>						
1	a	Explain Maturing concept of concrete?				8	CO5	L2
	b	List and Explain the factors that affect the work ability of concrete?				15	CO5	L2
		<b>OR</b>						
2	a	Explain the factors influencing the strength of concrete?				15	CO6	L2
	b	Write note on 1) creep 2) Shrinkage of concrete.				15	CO6	L2
		<b>Module-4</b>						
1	a	Design the concrete mix for grade M30 with suitable conditions. Find the quantities of constituents of the mix for a bag of cement.				15	CO7	L5
						15		
2	a	Design the concrete mix for the following data: characteristic compressive strength = 35MPa, maximum size of aggregate = 20mm (angular), Degree of workability = 0.9 CF, Degree of quality control = good and type of exposure =severe. Water absorption by CA = 1% and moisture content in FA = 1.5%. Assume any suitable missing data.				07	CO7	L5
						15		

### b. Assignment – 2

Note: A distinct assignment to be assigned to each student.

<b>Model Assignment Questions</b>								
Crs Code:	18CV44	Sem:	IV	Marks:	10	Time:	90 – 120 minutes	
Course:	Concrete Technology							
Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.								
<b>SNo</b>	<b>USN</b>	<b>Assignment Description</b>				<b>Marks</b>	<b>CO</b>	<b>Level</b>
1		How fly ash concrete gain strength in later age? Explain Mechanism.				10	CO7,	L3
2		Discuss the effects of adding fly ash, silica fume and ground granulated blast furnace slag in concrete.				10	CO7,	L3
3		Explain in detail the composition, physical properties of the mineral admixture GGBS and discuss the benefits of using it in concrete.				10	CO7,	L3
4		Discuss at length the composition, properties of the mineral				10	CO7,	L3

		admixture Fly Ash and write the benefits of using it in concrete.			
5		What is meant by proportioning of concrete?	10	CO7,	L3
6		Write the Factors Influencing Consistency.	10	CO7,	L3
7		What are the Factors affecting Strength of Hardened concrete?	10	CO7,	L3
8		What are the principal properties of "good" concrete?	10	CO7,	L3
9		What are the factors influencing the selection of materials?	10	CO7,	L3
10		Explain the method of finding flexural and split tensile strength of concrete.	10	CO7,	L3
11		Define Nominal Mixes	10	CO8	L3
12		Define Standard mixes	10	CO8	L5
13		What is Designed Mixes?	10	CO8	L5
14		What are the Factors affecting the choice of mix proportions?	10	CO8	L5
15		Explain the Design Procedure for IS method of Concrete Mix Design.	10	CO8	L5
16		Design the concrete mix for grade M20 with suitable conditions. Find the quantities of constituents of the mix for a bag of cement	10	CO8	L5
17		Design the concrete mix for grade M30 with suitable conditions. Find the quantities of constituents of the mix for a bag of cement.	10	CO8	L5
18		Design the concrete mix for the following data: characteristic compressive strength = 20MPa, maximum size of aggregate = 20mm (angular), Degree of workability = 0.9 CF, Degree of quality control = good and type of exposure = severe. Water absorption by CA = 0.5% and moisture content in FA = 2.0%. Assume any suitable missing data.	10	CO8	L5
19		Design the concrete mix for the following data: characteristic compressive strength = 35MPa, maximum size of aggregate = 20mm (angular), Degree of workability = 0.9 CF, Degree of quality control = good and type of exposure =severe. Water absorption by CA = 1% and moisture content in FA = 1.5%. Assume any suitable missing data.	10	CO8	L5

### D3. TEACHING PLAN - 3

#### Module – 5

Title:	Special concrete	Appr Time:	08 Hrs
<b>a</b>	<b>Course Outcomes</b>	-	<b>Blooms</b>
-	The student should be able to:	-	<b>Level</b>
1	recommend special concretes depending on their specific applications and special processes and technology for particular types of structure	CO8	L5
<b>b</b>	<b>Course Schedule</b>		



Class No	Module Content Covered	CO	Level
1	RMC- manufacture .	CO8	L5
2	requirement as per QCI-RMCPCS	CO8	L5
3	properties.	CO8	L5
4	advantages and disadvantages.	CO8	L5
5	Self-Compacting concrete- concept, materials, tests, properties	CO8	L5
6	application and typical mix Fiber reinforced concrete – Fibers types, properties,	CO8	L5
7	application of FRC.	CO8	L5
8	Light weight concrete	CO8	L5
9	material properties and types.	CO8	L5
10	Typical light weight concrete mix and applications.	CO8	L5
<b>c</b>	<b>Application Areas</b>	<b>CO</b>	<b>Level</b>
1	Used for application of marine structures, and valuable structures.	CO9	L5
<b>d</b>	<b>Review Questions</b>	-	-
1	Explain in detail about the statistical quality control and acceptance criteria of concrete.	CO8	L5
2	What are the various types of chemical attacks encountered by concrete? What precautions can be taken to ensure good quality concrete in coastal structures?	CO8	L5
3	Give the factors affecting the measurement of Ultrasonic pulse velocity test?	CO8	L5
4	Define Aerated Concrete	CO8	L5
5	What is the general use of Shotcrete?	CO8	L5
6	What are the various methods of underwater construction? Explain.	CO8	L5
7	What are the effects of cold weather concreting and hot weather concreting?	CO8	L5
8	How can high-strength concrete be classified? Explain.	CO8	L5
9	List the differences between polymer – impregnated concrete, polymer – modified concrete, and polymer concrete.	CO8	L2
10	What are the various quality control tests done to ensure good performance of polymer concrete?	CO8	L2
11	What are the basic properties of fibre – reinforced concrete which can be advantageously made use of in the design of structural elements?	CO8	L2
12	In what way can the behaviour of FRC can be used for seismic – resistant design?	CO8	L2
13	Explain in detail the method of design of light weight concreting.	CO8	L2
14	Describe the procedure of mass concrete	CO8	L2
15	Describe the procedure of Grouting.	CO8	L2
16	Explain the properties of polymer Impregnated Concrete.	CO8	L2
17	What are the advantages of using ready mixed concrete instead of site mixed concrete?	CO8	L2
<b>e</b>	<b>Experiences</b>	-	-
1		CO9	L2
2			
3			
4		CO10	L2
5			

### E3. CIA EXAM – 3

#### a. Model Question Paper - 3

Crs Code:	18CV44	Sem:	IV	Marks:	15	Time:	75 minutes	
Course:	Concrete Technology							
-	-	<b>Note: Answer any 1 questions from each module, each carry equal marks.</b>				Marks	CO	Level
		<b>Module-5</b>						



1	a	Explain the materials used for self compacting concrete	8	CO8	L3
	b	State the advantages and dis advantages of RMC	8	CO8	L3
2	a	Explain the fiber types used in Fiber Reinforced Concrete?	8	CO8	L3
	b	State the advantages of Light Weight Concrete?	8	CO8	L3
<b>OR</b>					
3	a	Design the concrete mix for grade M20 with suitable conditions. Find the quantities of constituents of the mix for a bag of cement	16		L6
4	a	Design the concrete mix for grade M30 with suitable conditions. Find the quantities of constituents of the mix for a bag of cement.	16		L6

### b. Assignment – 3

Note: A distinct assignment to be assigned to each student.

#### Model Assignment Questions

Crs Code:	18CV44	Sem:	IV	Marks:	10	Time:	90 – 120 minutes
Course:	Concrete Technology						

Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.

SNo	USN	Assignment Description	Marks	CO	Level
1		Explain in detail about the statistical quality control and acceptance criteria of concrete.	10	CO8	L5
2		What are the various types of chemical attacks encountered by concrete? What precautions can be taken to ensure good quality concrete in coastal structures?	10	CO8	L5
3		Give the factors affecting the measurement of Ultrasonic pulse velocity test?	10	CO8	L5
4		Define Aerated Concrete	10	CO8	L5
5		What is the general use of Shotcrete?	10	CO8	L5
6		What are the various methods of underwater construction? Explain.	10	CO8	L5
7		What are the effects of cold weather concreting and hot weather concreting?	10	CO8	L5
8		How can high-strength concrete be classified? Explain.	10	CO8	L5
9		List the differences between polymer – impregnated concrete, polymer – modified concrete, and polymer concrete.	10	CO8	L2
10		What are the various quality control tests done to ensure good performance of polymer concrete?	10	CO8	L2
11		What are the basic properties of fibre – reinforced concrete which can be advantageously made use of in the design of structural elements?	10	CO8	L2
12		In what way can the behaviour of FRC can be used for seismic – resistant design?	10	CO8	L2
13		Explain in detail the method of design of light weight concreting.	10	CO8	L2
14		Describe the procedure of mass concrete	10	CO8	L2
15		Describe the procedure of Grouting.	10	CO8	L2
16		Explain the properties of polymer Impregnated Concrete.	10	CO8	L2
17		What are the advantages of using ready mixed concrete instead of site mixed concrete?	10	CO8	L2

## F. EXAM PREPARATION

### 1. University Model Question Paper

Course:	Concrete Technology				Month / Year	May /2019		
Crs Code:	18CV44	Sem:	IV	Marks:	100	Time:	180 minutes	
-	Note	Answer all FIVE full questions. All questions carry equal marks.				Marks	CO	Level
<b>Module-1</b>								
1	a.	Write the chemical composition of cement. Write the flow chart for dry process.				8	CO1	L2
	b	Explain the importance of size, shape and texture of the aggregate.				8	CO1	L3
2	a	Explain the role of admixture in concrete technology				8	CO2	L3
	b	Name any 4 types of cement name the properties and applications of any two types of cement				8	CO2	L3
<b>Module-2</b>								
3	a	Define workability? Explain factor influencing workability of concrete				8	CO3	L3
	b	Write a note on Segregation and bleeding.				8	CO3	L3
4	a	Why curing is needed to concrete? Explain curing methods?				8	CO4	L3
	b	Why compaction is required to concrete? Explain compaction method by vibrations?				8	CO4	L3
<b>Module-3</b>								
5	a	Explain the factors influencing strength of concrete?				8	CO5	L3
	b	Write a note on creep, shrinkage of concrete?				8	CO5	L3
6	a	Explain maturity concept of concrete?				8	CO6	L2
	b	Design the concrete mix for grade M30 with suitable conditions. Find the quantities of constituents of the mix for a bag of cement.				8	CO6	L3
<b>Module-4</b>								
7	a	Design the concrete mix for the following data: characteristic compressive strength = 20MPa, maximum size of aggregate = 20mm (angular), Degree of workability = 0.9 CF, Degree of quality control = good and type of exposure = severe. Water absorption by CA = 0.5% and moisture content in FA = 2.0%. Assume any suitable missing data.				16	CO7	L6
8	a	Design the concrete mix for the following data: characteristic compressive strength = 35MPa, maximum size of aggregate = 20mm (angular), Degree of workability = 0.9 CF, Degree of quality control = good and type of exposure =severe. Water absorption by CA = 1% and moisture content in FA = 1.5%. Assume any suitable missing data.				16	CO7	L6
<b>Module-5</b>								
9	a	Explain the materials used for self compacting concrete?				8	CO8	L3
	b	State the advantages and disadvantages of RMC?				8	CO8	L3
10	a	Explain the Fiber types used in the fiber reinforced concrete?				8	CO8	L3
	b	State the advantages of light weight concrete?				8	CO8	L3

## 2. SEE Important Questions

Course:		Concrete Technology			Month / Year	MAY/2020			
Crs Code:		18cv44	Sem:	IV	Marks:	100	Time:	180 minutes	
	<b>Note</b>	Answer all FIVE full questions. All questions carry equal marks.					-	-	
Module	Qno.						Marks	CO	Year
1	a.	Write the chemical composition of cement. Write the flow chart for dry process.					8	CO1	L2
	b	Explain the importance of size, shape and texture of the aggregate.					8	CO1	L3
2	a	Explain the role of admixture in concrete technology					8	CO2	L3
	b	Name any 4 types of cement name the properties and applications of any two types of cement					8	CO2	L3
<b>Module-2</b>									
3	a	Define workability? Explain factor influencing workability of concrete					8	CO3	L3
	b	Write a note on Segregation and bleeding.					8	CO3	L3
4	a	Why curing is needed to concrete? Explain curing methods?					8	CO4	L3
	b	Why compaction is required to concrete? Explain compaction method by vibrations?					8	CO4	L3
<b>Module-3</b>									
5	a	Explain the factors influencing strength of concrete?					8	CO5	L3
	b	Write a note on creep, shrinkage of concrete?					8	CO5	L3
6	a	Explain maturity concept of concrete?					8	CO6	L2
	b	Design the concrete mix for grade M30 with suitable conditions. Find the quantities of constituents of the mix for a bag of cement.					8	CO6	L3
<b>Module-4</b>									
7	a	Design the concrete mix for the following data: characteristic compressive strength = 20MPa, maximum size of aggregate = 20mm (angular), Degree of workability = 0.9 CF, Degree of quality control = good and type of exposure = severe. Water absorption by CA = 0.5% and moisture content in FA = 2.0%. Assume any suitable missing data.					16	CO7	L6
8	a	Design the concrete mix for the following data: characteristic compressive strength = 35MPa, maximum size of aggregate = 20mm (angular), Degree of workability = 0.9 CF, Degree of quality control = good and type of exposure = severe. Water absorption by CA = 1% and moisture content in FA = 1.5%. Assume any suitable missing data.					16	CO7	L6
<b>Module-5</b>									
9	a	Explain the materials used for self compacting concrete?					8	CO8	L3
	b	State the advantages and disadvantages of RMC?					8	CO8	L3

### Course Outcome Computation

Academic Year:

Odd / Even semester

INTERNAL TEST		T1				T2				T3						
Course Outcome	CO1	CO2		CO3		CO4		CO5		CO6		CO7		CO8		
QUESTION NO	Q1	LV	Q2	LV	Q3	LV	Q1	LV	Q2	LV	Q3	LV	Q1	LV	Q2	LV
MAX MARKS																
USN-1																
USN-2																
USN-3																
USN-4																
USN-5																
USN-6																
Average Attainment	CO															

**LV Threshold : 3:>60%, 2:>=50% and <=60%, 1: <=49%**

**CO1 Computation : (2+2+2+3)/4 = 10/4=2.5**

### PO Computation

Program Outcome	PO1	PO3		PO3		PO1		PO12		PO12		PO6		PO1		
Weight of CO - PO																
Course Outcome	CO1	CO2		CO3		CO4		CO5		CO6		CO7		CO8		
Test/Quiz/Lab		T1				T2				T3						
QUESTION NO	Q1	L	Q2	LV	Q3	LV	Q1	LV	Q2	LV	Q3	LV	Q1	LV	Q2	LV
MAX MARKS																
USN-1																
USN-2																
USN-3																
USN-4																
USN-5																
USN-6																
Average Attainment	CO															