


Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bengaluru

	Course Title: MATERIALS OF CONSTRUCTION		
	Scheme (L:T:P) : 4:0:0	Total Contact Hours: 52	Course Code: 15CE11T
	Type of Course: Lectures, Self Study & Quiz	Credit : 04	Core/ Elective: Core
CIE- 25 Marks		SEE- 100 Marks	

Prerequisites: Knowledge of basic Science in Secondary Education.

Course Objectives:

1. Understand properties of various materials.
2. Select suitable materials for appropriate engineering applications.

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

Course Outcome		CL	Linked PO	Teaching Hrs
CO1	Identify the types, origin, properties, manufacturing, qualities, uses of building element (Stones, Bricks & blocks) as per IS code requirements.	R/U	1,2,3,4,5,7	21
CO2	Comprehend about timber and able to select different market forms for appropriate field application.	R/U	1,5	10
CO3	Explain about composition, functions, manufacturing, tests, types, uses and storage of cement as per IS codes.	R/U	1,2,3,4,5	8
CO4	Summarize about paints, varnishes & distemper and recognize its good qualities	R/U	1,5	4
CO5	Compare the types, properties, uses and market forms of ferrous, nonferrous metals and their alloys.	R/U	1,2,5	9
Total sessions				52

Legend- R; Remember U: Understand

Programme outcome Attainment Matrix

Course	Programme Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
	Basic knowledge	Discipline knowledge	Experiments a practice	Engineering Tools	Engineer and society	Environment & Sustainability	Ethics	Individual and Team work	Communication	Life long learning
MATERIALS OF CONSTRUCTION	3	3	3	3	3	-	3	-	-	-

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

If $\geq 40\%$ of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3

If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2

If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1

If $< 5\%$ of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

COURSE CONTENT

UNIT I-STONES

Classification of rocks, Quarrying of stones by wedging & blasting, Tests on stone (Acid test, Attrition, crushing, impact & water absorption), Characteristics of a good building stone, Deterioration & Preservation of stones

UNIT II-BRICKS

Composition of good brick earth & harmful ingredients, Manufacture of bricks, Burning of bricks by clamps-intermittent (down draught) and continuous kiln (Hoffman's), Classification of bricks as per I S, Test on bricks (Field tests, Crushing strength, absorption, shape & size, efflorescence test), Requirements of good bricks, Substitutes for bricks – Cement concrete blocks (solid), Production process of solid blocks. Fire clay/Refractory bricks, Calcium Silicate Bricks (properties and uses).

UNIT-III-TIMBER

Classification of timber based on mode of growth, Cross- section of an exogenous tree, Properties of good timber, Defects in timber, Preservation of Timber, Seasoning of Timber, Conversion of timber and Market forms(types and uses).

UNIT-IV-CEMENT

Composition of ordinary Portland cement, Functions of ingredient of cement, Manufacture of OPC (Mixing of raw materials by dry process, Burning & Grinding), Storage of cement, Field tests on cement, Types of cement and its uses.

UNIT-V-PAINTS, VARNISH & DISTEMPER

Objects, characteristics & Ingredients of paints, varnishes & distemper

UNIT-VI-FERROUS, NONFERROUS AND ALLOY

FERROUS METALS: Properties & uses of Cast iron, Wrought iron, Mild steel Tor steel, TMT, High tensile steel, Market forms of structural steel
NONFERROUS METALS:- Properties & uses of Copper, Aluminum, Zinc and Tin
ALLOY: - Types, properties & uses - aluminum alloy, copper alloy & steel alloy

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TEXT BOOKS

1. Engineering Materials by SC Rangwala
2. Building Materials by S SBhavikatti

REFERENCES

1. Engineering Materials by GJ Kulkarni
2. Engineering Materials by Sushil Kumar
3. Engineering Materials by Duggal
4. Engineering Materials by Gurucharan Singh
5. Materials of construction by TTTI Publication (Oxford university madras)
6. Building Materials by- P.C.Varghese (Prentice Hall)
7. Materials of construction -I byH.S.Vishwanath- Sapna Publications
8. Civil Engineering handbook byKhanna

Course content and blue print of marks for SEE

Unit	Major Topics	Hours Allotted	Questions to be set for SEE		Marks weightage	weightage (%)	A*	B*
			Cognitive Levels					
			R	U				
1	STONES	10	50%	50%	28	19	2	2
			14	14				
2	BRICKS	11	50%	50%	31	21	2	2
			15	15				
3	TIMBER	10	65.0%	35.0%	28	19	1	2
			18	10				
4	CEMENT	8	65.0%	35.0%	22	15	1	2
			15	8				
5	PAINTS, VARNISH & DISTEMPER	4	50.00%	50.00%	11	8	2	-
			6	6				
6	FERROUS, NONFERROUS AND ALLOY	9	65.00%	35.00%	25	17	1	2
			16	9				
Total		52	57.5%	42.5%	145	100	9	10
			83.79	61.21				

Legend- R: Remember U: Understand

A*-SEE questions to be set for (05 marks) in Part – A

B*- SEE questions to be set for (10 marks) in Part – B

Questions for CIE and SEE will be designed to evaluate the various educational components such as:

Sl. No	Bloom's taxonomy	% in Weightage
1	Remembering and Understanding	100

Course Delivery: The course will be delivered through lectures and Power point presentations/ Videos

Course Assessment and Evaluation Scheme:

	What		To whom	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes
Direct Assessment civil	CIE*	IA	Students	Three IA tests(Average of three tests will be computed)	Test 1	Blue books	CO1
					Test 2		CO2, CO3
					Test 3		CO4, CO5
	Written Quiz (MCQ)	05		Quiz Sheets	1,2,3,4,5		
SEE*	End Exam		End of the course	100	Answer scripts at BTE	1,2,3,4,5	
Indirect Assessment	Student Feedback on course		Students	Middle of the course		Feedback forms	1 & 2 Delivery of course
	End of Course Survey			End of the course		Questionnaires	1,2,3,4,5 Effectiveness of Delivery of instructions & Assessment Methods

***CIE – Continuous Internal Evaluation *SEE – Semester End Examination**

Note: I.A. test shall be conducted for 20 marks. Average marks of three tests shall be rounded off to the next higher digit.

MODEL OF RUBRICS / CRITERIA FOR ASSESSING STUDENT ACTIVITY (Course Coordinator)

Dimension	Scale					Students score (Group of five students)				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary	1	2	3	4	5
1	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	3				
2	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	2				
3	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	5				
4	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	4				
<p align="center">Note: Concerned faculty (Course coordinator) must devise appropriate rubrics/criteria for assessing Student activity for 5 marks One activity on any one CO (course outcome) may be given to a group of FIVE students</p>						14/4 =3.5				
Grand Average/Total										

• MODEL OF RUBRICS /CRITERIA FOR ASSESSING STUDENT ACTIVITY

RUBRICS FOR ACTIVITY(5 Marks)						
Dimension	Unsatisfactory	Developing	Satisfactory	Good	Exemplary	Student Score
	1	2	3	4	5	
Collection of data	Does not collect any information relating to the topic	Collects very limited information; some relate to the topic	Collect much information; but very limited relate to the topic	Collects some basic information; most refer to the topic	Collects a great deal of information; all refer to the topic	Ex: 4
Fulfil team's roles & duties	Does not perform any duties assigned to the team role	Performs very little duties but unreliable.	Performs very little duties	Performs nearly all duties	Performs all duties of assigned team roles	5
Shares work equally	Always relies on others to do the work	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Normally does the assigned work	Always does the assigned work without having to be reminded.	3
Listen to other Team mates	Is always talking; never allows anyone else to speak	Usually does most of the talking; rarely allows others to speak	Talks good; but never show interest in listening others	Listens, but sometimes talk too much	Listens and speaks a fair amount	2
Average / Total marks=(4+5+3+2)/4=14/4=3.5=4						

Note: This is only an example. Appropriate rubrics/criteria may be devised by the concerned faculty (Course Coordinator) for assessing the given activity.

FORMAT OF I A TEST QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks			
Ex: I test/6 th weak of sem 10-11 Am	I/II SEM		20			
	Year:					
Name of Course coordinator : CO's: _____			Units: __			
Question no	Question	MARKS	CL	CO	PO	
1						
2						
3						
4						

Note: Internal choice may be given in each CO at the same cognitive level (CL).

MODEL QP FOR CIE (TESTS)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks					
Ex: I test/6 th weak of sem 10-11 Am	III SEM	Materials Of Construction	20					
	Year: 2015-16	Course code:15ME3011						
Name of Course coordinator : Note: Answer all questions			Units:1,2 Co: 1,2					
Questions	M	CL	CO	PO				
1	Discuss the geological classification of rocks?				5	R	1	1,2
2	Explain acid test & attrition test conducted on stone? OR Explain acid test & attrition test conducted on stone?				5	U	1	1,2
3	List the harmful ingredients of good brick earth?				5	R	1	1,2
4	Explain the IS test conducted on bricks OR Explain burning of bricks in clamp with a neat sketch?				5	U	1	1,2

MODEL QUESTION PAPER

Code: **15CE11T**

I- Semester Diploma Examination
MATERIALS OF CONSTRUCTION

Time: **3 Hours**]

[Max Marks: **100**

Note: Answer any SIX from Part A and any SEVEN from Part B

PART-A

6x5=30 marks

1. What are the characteristics of good stone?
2. Write short notes on preservation of stones?
3. Explain the burning of bricks in a clamp with a neat sketch?
4. Give comparison between burning bricks in a kiln & clamp?
5. Explain the Cross- section of an exogenous tree with a neat sketch?
6. List market forms of timber?
7. List the functions of ingredient of cement?
8. Briefly explain the field tests conducted on cement?
9. Write the properties of cast iron?

PART-B

7x10=70 marks

10. Explain the process of quarrying by wedging?
11. Briefly explain the physical & chemical classification of rocks?
12. Explain the Crushing strength test & absorption test conducted on brick?
13. Explain burning of bricks in Hoffman's kiln with a neat sketch?
14. Explain classification of timber based on mode of growth?
15. Explain the defects in timber due to natural forces?
16. Explain the burning process of ordinary Portland cement?
17. What are the characteristics of paints & varnish?
18. a) List the properties & uses of TMT bars?
b) List the properties & uses of Zinc?
19. Explain the alloy of copper & aluminium?

MODEL QUESTION BANK

Diploma in civil Engineering

1st Semester

Course title: Materials of Construction, Course Code:15CE11T

CO1 : Know the origin, types, properties, manufacturing, qualities, uses of building element (Stones, Bricks & blocks) as per IS code requirements.

REMEMBER LEVEL QUESTIONS

1. List the classification of stones?
2. List the characteristics of good stone?
3. Describe preservation of stones
4. List the useful & harmful ingredients of good brick earth
5. List the properties of good building bricks
6. State any five different Substitutes for bricks

UNDERSTANDING LEVEL QUESTIONS

1. Discuss the geological classification of rocks?
2. Explain the physical & chemical classification of rocks
3. Explain the method of quarrying by blasting?
4. Explain the process of quarrying by wedging?
5. Describe the deterioration of stones?
6. Explain acid test & attrition test conducted on stone?
7. Explain crushing strength & water absorption test conducted on stones?
8. Explain the process of manufacture of bricks
9. Explain the burning of bricks in a clamp with a neat sketch?
10. Explain burning of bricks in intermittent down draught kiln with neat sketch
11. Explain burning of bricks in Hoffman's kiln with a neat sketch?
12. Explain with a neat sketch any method of burning bricks in continuous kiln?
13. Distinguish burning bricks in a kiln & clamp?
14. Explain the classification of bricks?
15. Explain the field test conducted on bricks?
16. Describe cement concrete blocks?
17. Explain production process of cement concrete blocks?
18. Explain the Crushing strength test & absorption test conducted on brick
19. Explain shape & size test & efflorescence test conducted on brick

CO 2 : Comprehend about timber and able to select different market forms for appropriate field application..

REMEMBER LEVEL QUESTIONS

1. State the classification of timber based on mode of growth
2. List the properties of good timber
3. Describe the preservation of Timber
4. List the market forms of timber

UNDERSTANDING LEVEL QUESTIONS

1. Explain the Cross- section of an exogenous tree with a neat sketch
2. Explain the defects in timber due to natural forces
3. Explain the defects in timber due to Fungi
4. Discuss the defects in timber due to Seasoning
5. Explain the defects in timber due to conversion
6. Explain the defects in timber due to Insects
7. Explain the importance of Seasoning of Timber
8. Illustrate the conversion of timber

CO 3 : Know about composition, functions, manufacturing, tests, types, uses and storage of cement as per IS codes

REMEMBER LEVEL QUESTIONS

1. List the functions of ingredient of cement
2. List the varieties of cement
3. List the precautions to be taken in storing of cement
4. List field tests conducted on cement.

UNDERSTANDING LEVEL QUESTIONS

7. Explain the composition of ordinary Portland cement
8. With flow diagram explain Dry process of mixing the raw materials for manufacture of ordinary Portland cement
9. With a neat sketch explain burning of cement in Rotary kiln.
10. Explain the grinding process of cement?

CO 4 : Know about paints, varnishes & distemper and recognize its good qualities

REMEMBER LEVEL QUESTIONS

1. State the objects of paints
2. List the characteristics of good paint
3. State the objects of varnish
4. List the characteristics of varnish
5. State the objects of distemper

6. List the characteristics of distemper

UNDERSTANDING LEVEL QUESTIONS

1. Explain the ingredients of paint?
2. Explain the ingredients of varnish?
3. Explain the ingredients of distemper?

CO 5 : Understand types, properties, uses and market forms of ferrous, nonferrous metals and their alloys

REMEMBER LEVEL QUESTIONS

1. List the types of cast iron
2. List the types of wrought iron
3. List the types of mild steel
4. State properties & uses of cast iron
5. List the properties & uses of wrought iron
6. List the properties & uses of mild steel
7. State the properties & uses of Tor steel
8. Tabulate the properties & uses of Tiscon steel
9. List the properties & uses of Tor steel & Tiscon steel
10. State the properties & uses of deformed bars
11. List the properties & uses of copper
12. List the properties & uses of zinc
13. State the types of aluminium alloy
14. List the types of steel alloy
15. List the properties & uses of steel alloy

UNDERSTANDING LEVEL QUESTIONS

1. Discuss the properties & uses of TMT bars?
1. Discuss the properties & uses of High tensile steel?
2. Describe the properties & uses of aluminium?
3. Discuss the properties & uses of tin?
4. Explain the types of copper alloy?
5. Explain the properties & uses of aluminium alloy?
6. Explain the properties & uses of copper alloy?

