Ref No:

SRI KRISHNA INSTITUTE OF TECHNOLOGY



COURSE PLAN

Academic Year 2019 - 2020

Program:	B E – Civil Engineering
Semester :	6
Course Code:	17CV62
Course Title:	Design of Steel Structural Elements
Credit / L-T-P:	4 / 4-0-0
Total Contact Hours:	50
Course Plan Author:	SHIVASHANKAR R

Academic Evaluation and Monitoring Cell

Sri Krishna Institute of Technology #29 Hesaraghatta main road, Chimney hills, Chikkabanavara Bangalore 560090. Ph 080-23721477 www.skit.org Email: skitprinci1@gmail.com

Table of Contents

A. COURSE INFORMATION	3
1. Course Overview	
2. Course Content	
3. Course Material	4
4. Course Prerequisites	4
5. Content for Placement, Profession, HE and GATE	4
B. OBE PARAMETERS	5
1. Course Outcomes	
2. Course Applications	6
3. Mapping And Justification	6
4. Articulation Matrix	8
5. Curricular Gap and Content	9
6. Content Beyond Syllabus	9
C. COURSE ASSESSMENT	9
1. Course Coverage	9
2. Continuous Internal Assessment (CIA)	10
D1. TEACHING PLAN - 1	10
Module - 1	
Module – 2	
E1. CIA EXAM – 1	13
a. Model Question Paper - 1	
b. Assignment -1	13
D2. TEACHING PLAN - 2	18
Module – 3	
Module – 4	
E2. CIA EXAM – 2	20
a. Model Question Paper - 2	
b. Assignment – 2	21
D3. TEACHING PLAN - 3	28
Module – 5	
E3. CIA EXAM – 3	29
a. Model Question Paper - 3	
b. Assignment – 3	
F. EXAM PREPARATION	
1. University Model Question Paper	
2. SEE Important Questions	
G. Content to Course Outcomes	
1. TLPA Parameters	
2. Concepts and Outcomes:	

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:	CV
Year / Semester :	6	Academic Year:	2019-20
Course Title:	Design Of Steel Structural Elements	Course Code:	17CV62
Credit / L-T-P:	4/4-0-0	SEE Duration:	180 Minutes
Total Contact Hours:	50	SEE Marks:	60 Marks
CIA Marks:	40	Assignment	1 / Module
Course Plan Author:	Shivashankar R	Sign	Dt:
Checked By:		Sign	Dt:
CO Targets	CIA Target : 73%	SEE Target:	45 %

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.

Mod	Content	Teachi	Identified Module	Blooms
ule		ng	Concepts	Learning
		Hours		Levels
1	Introduction Advantages and Disadvantages of Steel	10	Limit State	L4
	Structures, Limit		Standards	Analysis
	state method Limit State of Strength, Structural Stability,			-
	Serviceability Limit states, Failure Criteria of steel, Design		Plastic Moment	
	Consideration, Loading and load combinations, IS code			
	provisions, Specification and Section classification.		Plastic Hinge	
	Introduction, Plastic theory, Plastic Hinge Concept, Plastic			
	collapse load, load factor, Shape factor, Theorem of plastic			
	collapse, Methods of Plastic analysis, Plastic analysis of			
	Continuous Beams.			
2	Introduction, Types of Bolts, Behaviour of bolted	10	Bolt Valve	L5
	joints, Design of High Strength friction Grip(HSFG) bolts,			Design
	Design of Simple bolted Connections (Lap and Butt joints),		Strength of Weld	
	Moment Resistant Connections.		Size of Weld	
	Introduction, Types and properties of welds, Effective areas			
	or welds, weld Derects, Simple welded joints for truss			
	Memori resistant Connections, Advantages and			
	Disadvantages of Bolted and Welded Connections			
2	Introduction Failure modes Behaviour of compression	10	Effective	15
5	members. Sections used for compression members. Effective	10	Slenderness	Design
	length of compression members. Design of compression		Ratio	Design
	members and built up Compression members. Design of			
	Laced and Battened Systems.		Flexural Buckling	
	,		stress & Strength	
4	Introduction, Types of Tension members, Slenderness ratio,	10	Yield Strength of	L5
	Modes of Failure, Factors affecting the strength of tension		Plates	Design
	members, Design of Tension members and Lug angles,			
	Splices, Gussets.		Rupture of Plates	
	Design of Simple Slab Base and Gusseted Base.			
			Block Shear	
5	Introduction, Beam types, Lateral Stability of beams, factors	10	Moment Capacity	L5
	affecting lateral stability, Behaviour of Beams in Bending,			Design
	Design strength of laterally supported beams in Bending,		Web Bucking	
	Design of Laterally unsupported Beams INo Numerical			
	Problemsi, Shear Strength of Steel Beams. Beam to Beam		web Crippling	
	Connections, Beam to Column Connection and Column		Choor Deflection	
	splices		Snear Deflection	

	[No Numerical Problems]			
-	Total	50	-	-

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.

Modul	Details	Chapters	Available
е			
1	Text books		
1	N Subramanian., "Design of Steel Structures" (2016), Oxford University Press, New Delhi.	1,2,3,4,5	In Dept
2	Duggal S K., "Limit State Method of Design of Steel Structures", Tata McGraw Hill, New Delhi	1,2,3,4,5	In Dept
2	Reference books		
1	Dayarathnam P, "Design of Steel Structures", S Chand and Company Ltd., New Delhi.	1,2,3,4,5	In Lib
2	Kazim S M A and Jindal R S, "Design of Steel Structures", Prentice Hall of India, New Delhi.	1,2,3,4,5	In Lib
3	IS 800-2007: General Construction in Steel Code Practice (Third revision), Bureau of Indian Standards, New Delhi	1,2,3,4,5	In Lib
3	Others (Web, Video, Simulation, Notes etc.)		
C1	http://nptel.ac.in/courses.php?disciplineID=111		
C2	http://wwww.khanacademy.org/		
C3	RCChttp://www.class-central.com/subject/-Drawings		

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.

Stude	sudents must have team the following Courses / Topics with described Content								
Mod	Course	Course Name	Topic / Description	Sem	Remarks	Blooms			
ules	Code					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.

Mod	Topic / Description	Area	Remarks	Blooms
ules				Level
3	Knowledge on analyzing Steel structure	s Higher		Understa
		Study		nd L2

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.

Mod ules	Course Code.#	Course Outcome At the end of the course, student should be able to	Teach. Hours	Concept	Instr Method	Assessmen t Method	Blooms' Level
1	17CV62.1	understand the knowledge of stell structures, different stell members by using IS steel tables and apply the different loads on the structure by using IS 800-2007	5	Limit State Standards IS Steel Sections	Lecture	CIA and Assignmen t	L3 Apply
1	17CV62.2	posses a knowledge of Plastic Behavior on beams by using plastic theory	5	Plastic Moment Plastic Hinge	Lecture	CIA and Assignmen t	L4 Analysis
2	17CV62.3	understand the bolted connections on steel structures	5	Bolt Value	Lecture	CIA and Assignmen t	L5 Design
2	17CV62.4	understand the welded connections on steel structures	5	Strength of Weld Size of Weld	Lecture	CIA and Assignmen t	L5 Design
3	17CV62.5	Design the compression members as per IS 800-2007	5	Effective Slendernes s Ratio	Lecture	CIA and Assignmen t	L5 Design
3	17CV62.6	Design the built up compression members (Laced & Battened Systems) as per IS 800-2007	5	Flexural Buckling stress & Strength	Lecture	CIA and Assignmen t	L5 Design
4	17CV62.7	Design the tension members such as plates, angels (single and double), Tie members ,lug angle.	5	Yield Strength of Plates Rupture of Plates Block Shear	Lecture	CIA and Assignmen t	L5 Design
4	17CV62.8	Students should be able to understand the concept of simple slab base and gusset base.	5	S.B.C of soil , Size of plate and cleat angle	Lecture	CIA and Assignmen t	L5 Design
5	17CV62.9	Design the Strength of Laterally Supported Beams in bending as per IS 800-2007	5	Moment Capacity Web Bucking	Lecture	CIA and Assignmen t	L5 Design
5	17CV62.10	understand the concept of column splices, beam to beam , beam to	5	Web Crippling	Lecture	CIA and Assignmen	L5 Design

		column connections .				t	
				Shear			
				Deflection			
-	-	Total	50	-	-	-	L3-L5

2. Course Applications

Write 1 or 2 applications per CO.

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

Mod	Application Area	CO	Level
ules	Compiled from Module Applications.		
1	Select the suitable loads and steel sections in different steel structures like roof	CO1	L3
	truss, gantry girder, plate girder , welded girder and bridges		
1	Beams are used in different steel structures like roof truss, gantry girder, plate	CO2	L4
	girder , welded girder and bridges		
2	Bolts and bolt connections are used in different steel structures like roof truss,	CO3	L5
	gantry girder, plate girder , welded girder and bridges		
2	welds and welded connections are used in different steel structures like roof truss,	CO4	L5
	gantry girder, plate girder , welded girder and bridges		
3	Compression members are used in different steel structures like roof truss, gantry	CO5	L5
	girder, plate girder , welded girder and bridges		
3	Compression members are used in different steel structures like roof truss, gantry	CO6	L5
	girder, plate girder , welded girder and bridges		
4	Tension members are used in different steel structures like roof truss, gantry girder,	CO7	L5
	plate girder , welded girder and bridges		
4	Tension members are used in different steel structures like roof truss, gantry girder,	CO8	L5
	plate girder , welded girder and bridges		
5	Beams are used in different steel structures like roof truss, gantry girder, plate	CO9	L5
	girder , welded girder and bridges		
5	Beams are used in different steel structures like roof truss, gantry girder, plate	CO10	L5
	girder , welded girder and bridges		

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	Map	ping	Mapping	Justification for each CO-PO pair	Lev
ules			Level		el
-	СО	PO	-	'Area': 'Competency' and 'Knowledge' for specified 'Accomplishment'	-
1	CO1	PO1	1	Applies knowledge of mathematics, science & fundamentals Engineering specialization to the solution of complex engineering problems. Different loads and loads combinations considered in the structures based on limit state method of design	L2
1	CO1	PO2	1	Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. Identify, formulate, review research literature and analyze complex.	L2
1	CO1	PO3	1	Design solutions for complex engineering problems and design system components. processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental consideration	L2
1	CO2	PO1	1	Applies knowledge of mathematics, science & fundamentals Engineering specialization to the solution of complex engineering problems.	L3
1	CO2	PO2	1	Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. Identify, formulate, review research literature and analyze complex. Analysis of the beam under the Plastic moment and plastic hinge concept, shape factor	L3
1	CO2	PO3	1	Design solutions for complex engineering problems and design system components. processes that meet the specified needs with appropriate	L3

				consideration for the public health and safety, and the cultural, societal,	
	<u> </u>		4	And environmental consideration	
2	03	PUI	T	Applies knowledge of mainematics, science & fundamentals Engineering	L5
2	COn	DOn	1	Engineering problems reaching substantiated conclusions using first	
2	003	PU2	1	principles of mathematics, natural sciences, and engineering sciences	L5
				Identify formulate, review research literature and analyze complex	
2	0.03	PO3	1	Design solutions for complex engineering problems and design system	15
	005	105	-	components, processes that meet the specified needs with appropriate	
				consideration for the public health and safety, and the cultural, societal,	
				and environmental consideration and solution of designing of bolted	
				connections.	
2	CO4	PO1	1	Applies knowledge of mathematics, science & fundamentals Engineering	L5
				specialization to the solution of complex engineering problems.	
2	CO4	PO2	1	Engineering problems reaching substantiated conclusions using first	L5
				principles of mathematics, natural sciences, and engineering sciences.	
	<u> </u>	DOa		Identify, formulate, review research literature and analyze complex.	
2	CO4	PO3	1	Design solutions for complex engineering problems and design system	L5
				consideration for the public health and safety and the cultural societal	
				and environmental consideration and solution of designing of welded	
				connections.	
3	CO5	PO1	1	Applies knowledge of mathematics, science & fundamentals Engineering	L5
				specialization to the solution of complex engineering problems.	
3	CO5	PO2	1	Engineering problems reaching substantiated conclusions using first	L5
				principles of mathematics, natural sciences, and engineering sciences.	
2	COF	DOn	1	Design colutions for complex engineering problems and design system	
3	005	PU3	1	components processes that meet the specified needs with appropriate	L9
				consideration for the public health and safety, and the cultural, societal.	
				and environmental consideration and solution of designing of	
				compression members	
3	CO6	PO1	1	Applies knowledge of mathematics, science & fundamentals Engineering	L5
				specialization to the solution of complex engineering problems.	
3	CO6	PO2	1	Engineering problems reaching substantiated conclusions using first	L5
				principles of mathematics, natural sciences, and engineering sciences.	
2	C06	DOo	1	Design colutions for complex angineering problems and design system	
3	000	PU3	1	components processes that meet the specified needs with appropriate	L5
				consideration for the public health and safety, and the cultural, societal.	
				and environmental consideration solution of designing of tension	
				members	
4	CO7	PO1	1	Applies knowledge of mathematics, science & fundamentals Engineering	L5
				specialization to the solution of complex engineering problems.	
4	CO7	PO2	1	Engineering problems reaching substantiated conclusions using first	L5
				principles of mathematics, natural sciences, and engineering sciences.	
4	C07	DOa		Design colutions for complex engineering problems and design system	
4	00/	PU3	1	components processes that meet the specified needs with appropriate	L5
				consideration for the public health and safety and the cultural societal	
				and environmental consideration solution of designing of beams	
4	CO8	PO1	1	Applies knowledge of mathematics, science & fundamentals Engineering	L5
				specialization to the solution of complex engineering problems.	
4	CO8	PO2	1	Engineering problems reaching substantiated conclusions using first	L5
				principles of mathematics, natural sciences, and engineering sciences.	
				Identify, formulate, review research literature and analyze complex.	
4	CO8	PO3	1	Design solutions for complex engineering problems and design system	L5
				components. processes that meet the specified needs with appropriate	

				consideration for the public health and safety, and the cultural, societal,	
E	COO	DO1	1	Annual consideration solution of designing of beams	15
5	COg	FOI	1	specialization to the solution of complex engineering problems	L2
	<u> </u>	DOa		Engineering problems reaching substantiated eanalurians using first	
5	CUG	P02	L	Engineering problems reaching substantiated conclusions using first	L5
				principles of mathematics, natural sciences, and engineering sciences.	
				Identify, formulate, review research literature and analyze complex.	
5	CO9	PO3	1	Design solutions for complex engineering problems and design system	L5
				components. processes that meet the specified needs with appropriate	
				consideration for the public health and safety, and the cultural, societal,	
				and environmental consideration solution of designing of beams	
5	CO10	PO1	1	Applies knowledge of mathematics, science & fundamentals Engineering	L5
				specialization to the solution of complex engineering problems.	
5	CO10	PO2	1	Engineering problems reaching substantiated conclusions using first	L5
				principles of mathematics, natural sciences, and engineering sciences.	
				Identify, formulate, review research literature and analyze complex.	
5	CO10	PO3	1	Design solutions for complex engineering problems and design system	L5
				components. processes that meet the specified needs with appropriate	
				consideration for the public health and safety, and the cultural, societal,	
				and environmental consideration solution of designing of beams	
	1				1

4. Articulation Matrix

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

-	-	Course Outcomes					Ρ	rog	ram	n Ot	utco	ome	es					-
Mod	CO.#	At the end of the course	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PS	PS	PS	Lev
ules		student should be able to	1	2	3	4	5	6	7	8	9	10	11	12	O1	02	03	el
1	17CV62.1	understand the knowledge of stell structures, different stell members by using IS steel tables	3	3	3	-	-	-	-	-	-	-	-	-				L3
		and apply the different loads on the structure by using IS 800- 2007																
1	17CV62.2	posses a knowledge of Plastic Behavior on beams by using plastic theory	с	3	3	-	-	-	-	-	-	-	-	-				L4
2	17CV62.3	understand the bolted connections on steel structures	3	3	3	-	-	-	-	-	-	-	-	-				L5
2	17CV62.4	understand the welded connections on steel structures	3	3	3	-	-	-	-	-	-	-	-	-				L5
3	17CV62.5	Design the compression members as per IS 800-2007	3	3	3	-	-	-	-	-	-	-	-	-				L5
3	17CV62.6	Design the built up compression members(Laced & Battened Systems) as per IS 800-2007	3	3	3	-	-	-	-	-	-	-	-	-				L5
4	17CV62.7	Design the tension members such as plates, angels (single and double), Tie members ,lug angle.	3	3	3	-	-	-	-	-	-	-	-	-				L5
4	17CV62.8	Students should be able to understand the concept of simple slab base and gusset base.	3	3	3	-	-	-	-	-	-	-	-	-				L5
5	17CV62.9	Design the Strength of Laterally Supported Beams in bending as per IS 800-2007	3	3	3	-	-	-	-	-	-	-	-	-				L5

5	17CV62.10	understand the concept of	3	3	3	-	-	-	-		- -	-	-				L5
		column splices, beam to beam ,															
		beam to column connections .															
-	17CV62PC	Average attainment (1, 2, or 3)	3	3	3												-
-	PO, PSO	1.Engineering Knowledge; 2.Prob	lem	Ar	naly	sis;	3.D	esi	gn	/ D	evelo	opm	ent	of	Sc	luti	ons;
		4.Conduct Investigations of Comp	lex i	Prol	bler	ns;	5.Mc	odei	rn T	ool l	Jsag	e; 6	The	e En	gin	eer	and
		Society; 7.Environment and Si	ustc	aina	bilit	ty;	8.Et	thics	S;	9.Inc	lividu	ıal	an	d	Теа	тw	vork;
		10.Communication; 11.Project N	Лап	age	eme	ent	an	d	Find	ance	; 12	2.Life	e-lo	ng	Le	earr	ning;
		S1.Software Engineering; S2.Data E	Base	e Mo	ana	igen	nent	t; S3	.We	eb De	esign	-		-			-

5. Curricular Gap and Content

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

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

A 4					P	
Mod	Gap Topic	Area	Actions Planned	Schedule	Resources	PO Mapping
uloc				Dlannod	Dorcon	
ules				Flaimeu	Person	
1						
1						
2						
2						
3						
3						
4						
4						
5						
5						

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	Title	Teachi		No. o	f quest	ion in	Exam		CO	Levels
ule		ng	CIA-1	CIA-2	CIA-3	Asg	Extra	SEE		
#		Hours					Asg			
1	Introduction	10	2	-	-	1	1	2	CO1	L4
	Plastic Behaviour of Structural								CO2	
	Steel									
2	Bolted Connections	10	2	-	-	1	1	2	CO3	L5
	Welded Connections								CO4	

3	Design of Compression Members	10	-	2	-	1	1	2	CO5 CO6	L5
4	Design of Tension Members	10	-	2	-	1	1	2	CO7 CO8	L5
	Design of Column Bases									
5	Design of Beams	10	-	-	4	1	1	2	CO9 CO10	L5
-	Total	50	4	4	4	5	5	10	-	-

2. Continuous Internal Assessment (CIA)

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

Mod	Evaluation	Weightage in	СО	Levels
ules		Marks		
1,2	CIA Exam – 1	15	CO1, CO2, CO3, CO4	L2, L3, L2, L4
3,4	CIA Exam – 2	15	CO5, CO6, CO7, C08	L2, L4, L2, L4
5	CIA Exam – 3	15	CO9, CO10	L2, L4
1,2	Assignment - 1	05	CO1, CO2, CO3, CO4	L2, L3, L2, L4
3,4	Assignment - 2	05	CO5, CO6, CO7, CO8	L2, L4, L2, L4
5	Assignment - 3	05	CO9, CO10	L2, L4
	Final CIA Marks	40	-	-

D1. TEACHING PLAN - 1

Module - 1

Title:	Introduction	Appr	10Hrs
	Plastic Behaviour of Structural Steel	Time:	
a	Course Outcomes	-	Blooms
-	The student should be able to:	-	Level
1	understand the knowledge of stell structures, different stell members by using	CO1	L3
	IS steel tables and apply the different loads on the structure by using IS 800- 2007		
2	posses a knowledge of Plastic Behavior on beams by using plastic theory	CO2	L4
b	Course Schedule	-	-
Class No	Module Content Covered	СО	Level
1	Introduction to steel structures	CO1	L3
2	Advantages and Disadvantages of Steel Structures,	CO1	L3
3	Limit state method Limit State of Strength,	CO1	L3
4	Structural Stability, Serviceability Limit states,	CO1	L3
5	Failure Criteria of steel, Design Consideration, Loading and load combinations,	CO1	L3
6	Introduction, Plastic theory,	CO2	L4
7	Plastic Hinge Concept,	CO2	L4
8	Plastic collapse load, load factor, Shape factor,	CO2	L4
9	Theorem of plastic collapse,	CO2	L4
10	Methods of Plastic analysis, Plastic analysis of Continuous Beams.	CO2	L4
С	Application Areas	CO	Level
1	Select the suitable loads and steel sections in different steel structures like		
	roof truss, gantry girder, plate girder , welded girder and bridges		
2	Beams are used in different steel structures like roof truss, gantry girder, plate		
	girder , welded girder and bridges		
d	Review Questions	-	-
1	Explain working stress method, limit state method of RCC design	CO1	L2

2	Distinguish between balanced, under reinforced and over reinforced section of RCC design.	CO1	L3
3	Derive the expression for depth of NA y — = 0.42x u , in the case of rectangular RCC beam design	CO1	L3
4	Obtain an expression for limiting percentage of steel for a rectangular RCC section with M20 concrete and Fe500 steel.	CO1	L3
5	Enlist the reasons for adopting partial safety factors for loads and material strength.	CO1	L3
6	Briefly explain singly and doubly reinforced RCC beam. Enlist the situations where doubly reinforced RCC beam adaptation required.	CO1	L3
7	Explain different limit states to be considered in the design of RCC beam and derive the expression for stress block parameter.	CO1	L3
8	Explain short term and long term deflections.	CO2	L3
9	Dfferentiate between working stress method and limit state method of RCC design	CO2	L3
10	Define: i)Partial safety factor for load and materials. ii)Characteristic load. iii) Characteristic strength.	CO2	L3
11	Derive the expression for stress block parameter for compresive force ci tens i le force Tu and locate the depth of neutral axis y = 0.42 xu from top of the beam	CO2	L3
12	Explain briefly under reinforced, over reinforced and balanced sections with sketch.	CO2	L2
13	Explain briefly under reinforced, over reinforced and balanced sections with sketch.	CO2	L3
е	Experiences		
1			
2			
3			

Module – 2

Title:	Bolted Connections	Appr	10 Hrs
	Welded Connections	Time:	
a	Course Outcomes		Blooms
-	The student should be able to:	-	Level
1	Students should be able to understand the bolted connections on steel	CO3	L5
	structures		
2	Students should be able to understand the welded connections on steel	CO4	L5
	structures		
b	Course Schedule	-	-
Class No	Module Content Covered	CO	Level
11	Introduction, to Bolted Connections	CO3	L5
12	Types of Bolts, Behaviour of bolted joints,	CO3	L5
13	Design of High Strength friction Grip(HSFG) bolts	CO3	L5
14	Design of Simple bolted Connections (Lap and Butt joints)	CO3	L5
15	Design of Simple bolted Connections (Lap and Butt joints)	CO3	L5
16	Introduction, to Welded Connections	CO4	l5
17	Advantages and Disadvantages of Bolted and Welded Connections	CO4	l5
18	Types and properties of welds, Effective areas of welds,	CO4	l5
19	Weld Defects, Simple welded joints for truss member	CO4	l5
20	Moment resistant Connections	CO4	l5
С	Application Areas	CO	Level

1	Bolts and bolt connections are used in different steel structures like roof truss, gantry girder, plate girder , welded girder and bridges	CO3	L5
2	welds and welded connections are used in different steel structures like roof truss, gantry girder, plate girder , welded girder and bridges	CO4	L5
d	Review Questions	-	-
12	A singly RCC beam of dimensions 230x500 mm overall, simply supported over a span of 5 m (effective). The beam consists of 4 # 16mm diameter bars in tension zone use M20 and Fe-415 grade. Calculate the UDL the beam can carry. Take clear cover 25 mm.	CO3	L4
13	Determine the moment of resistance of the T-beam having following section properties: Effective width of flange = 1100 mm Thickness of flange= 110 mm Width of rib = 250 mm Effective depth = 450 mm Area of steel = 5 # 20 mm diameter. Use M-25 grade concrete and Fe-415 grade steel.	CO3	L4
14	simply supported beam of rectangular section spanning over 6m has a width of 300mm and overall depth 600mm. The beam is reinforced with 4-25mm bars on tension side. The beam is subjected to moment of 160kNm. Check the beam for serviceability limit state of cracking. Assume M25 and Fe415.	CO3	L4
15	simply supported beam of rectangular section 250mm wide by 450mm overall depth is used over an effective span of 4m. the beam is reinforced with 3 bars of 20mm. Two hanger bars of 10mm diameter are provided. The self weight of the beam is 4kN/m and service loadis 10kN/m. Assume M20, Fe415. Compute: i) Short term deflection; ii) Long term deflection.	CO4	L4
16	Define simply and doubly reinforced beams, list the situations when they are adopted.	CO4	L4
17	Determine moment of resistance of T-beam for the following data: Width of the flange = 2500mm, effective depth = 800mm, width of the web = 300mm, number of bars = 8 of 25mm diameter, depth of flange = 150mm. Assume M20 and Fe415 steel.	CO4	L4
18	simply reinforced concrete beam 250 x 450mm deep upto the centre of reinforcement is reinforced with 3-16mm bars with an effective cover of 50mm. The effective span of the beam is 6m. Determine the central point load that the beam can carry excluding self weight. Assume M7.0 and Fe415.	CO4	L4
19	A doubly reinforced beam is 250mm wide and 450mm deep to the centre of tensile reinforcement. It is reinforced with 2-16 compression reinforcement and 4-25 as tensile reinforcement. Calculate the ultimate moment of resistance of the beam. Assume M15 and Fe250 steel	CO4	L4
е	Experiences	-	-
1			
2			
3			
4			

E1. CIA EXAM – 1

a. Model Question Paper - 1

Crs (Code:	le: 17CV62 Sem:6 I Marks: 30 Time: 75 minutes								
Cou	Course: Design Of Steel Structural Elements									
-	-	Note: Answ	er any ONE I	FULL question	on from each	Module		Marks	CO	Level
1	a	What are th	What are the advantages and disadvantages of using steel structures.							L3
	b	Identify plas propped ca span.	stic hinge dis ntilever bea	stance 'X' is m supportin	0.414E from Ig a UDL of v	the simple s w kN/m ove	support of a r the entire	10	CO2	L4

		OR			
2	a	What are rolled steel sections? Mention any six shapes used as structural	5	CO1	L3
		elements with sketches.			
	b	Calculate Mp for the continuous beam if load factor is 3.2.	10	CO2	L4
		MODULE-2 (15 marks)			
3	а	Explain the various modes of failure of bolted connections with neat sketch.	5	CO3	L3
	b	Find the maximum force which can be transmitted through the lap joint shown in the Fig 1(b). Find also the efficiency of the joint. Take fu of plate as 410MPa and assume 4.6 grade bolts.	10	CO4	L5
		OR			
4	a	Explain lap joint and butt joint with neat sketch.	5	CO3	L3
	b	Find the maximum load which can be transmitted through the double cover butt joint shown in fig 3(b). Find also the efficiency of the joint. Use 20mm diameter common bolts.	10	CO4	L5

b. Assignment -1

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

		0		Mo	del Assignmer	nt Questi	ions					
Crs C	ode:	17CV62	Sem:	6th	Marks:	10	Т	ime:	90	– 120 r	minutes	5
Cours	se:	Design Of	Steel Str	uctural Ele	ements							
Note:	Each	student to	answer 2	2-3 assignr	nents. Each as	signmer	nt carrie	es equal m	ark.			
SNo				Assigr	ment Descrip	tion			1	Marks	СО	Level
1		Explain wo	orking stre	ess method	d, limit state m	ethod of	RCC d	esign		5	CO1	L2
2		Distinguisł section of	n betwee RCC desig	n balance gn.	d, under reint	forced a	ind ove	er reinforce	∋d	5	CO2	L3
3		Derive the rectangula	e expressi ar RCC be	on for der am design	oth of NA y —	- = 0.42x	cu,in	the case	of	5	CO2	L3
4		Obtain an RCC sectic	expression with Ma	on for limit 20 concret	ing percentag e and Fe500 s	e of ste teel.	el for a	rectangul	lar	5	CO1	L3
5		Enlist the material st	reasons rength.	for adopt	ing partial sa	fety fac	tors fo	r loads ar	nd	5	CO1	L2
6		Briefly exp situations v	fly explain singly and doubly reinforced RCC beam. Enlist the 5 CO2 L3 ations where doubly reinforced RCC beam adaptation required.									
7		Explain different limit states to be considered in the design of R beam and derive the expression for stress block parameter.						sign of RC	CC	5	CO2	L3
8		Explain short term and long term deflections.							5	CO1	L3	
9		Dfferentiat RCC desig	e betwee n.	n working	stress metho	d and lir	nit stat	e method	of	5	CO1	L2
10		Define: i)Partial saf ii)Characte iii) Charact	fety factor ristic loac eristic stre	r for load a l. ength.	nd materials.					5	CO2	L3
11		Derive the tens i le fo top of the	expressio prce Tu ar beam	on for stres nd locate f	s block param he depth of n	eter for o eutral ax	compre xis y = (esive force 0.42 xu fro	ci m	5	CO2	L3
12		Explain bri with sketcl	iefly unde h.	r reinforce	ed, over reinfor	rced and	l balano	ced sectio	ns	5	CO1	L3
13		Explain bri with sketcl	iefly unde h.	r reinforce	ed, over reinfor	rced and	l balano	ced sectio	ns	5	CO1	L2
14		A singly supported 16mm diar Fe-415 gra 25 mm.	RCC bea over a s meter bar ide. Calcu	nm of dir pan of 5 s in tension llate the U	nensions 230 m (effective). n zone use M2 JDL the beam	x500 m The bea 0 and can carr	nm ove am con ry. Take	erall, simp isists of 4 e clear cov	vly # ver	5	CO2	L3
15		Determine	the mor	nent of re	sistance of th	e I-beai	m havii	ng tollowir	ng∣	5	CO2	L3

Copyright ©2017. cAAS. All rights reserved.

section properties: Effective width of flange = 1100 mm Thickness of flange = 110 mm Width of rib = 250 mm Effective depth = 450 mm Area of steel = 5 # 20 mm diameter. Use M-25 grade concrete and Fe-415 grade steel.		
Use M-25 grade concrete and Pe-415 grade steet.		

D2. TEACHING PLAN - 2

Module – 3

Title:	Design of Compression Members	Appr	10Hrs
		Time:	
a	Course Outcomes	-	Blooms
-	The student should be able to:	-	Level
1	Students should be able to Design the compression members and built up	CO5	L5
	compression members (Laced & Battened Systems) as per IS 800-2007		
b	Course Schedule		
Class No	Module Content Covered	CO	Level
1	Introduction to compression member	CO5	L5
2	Failure modes,	CO5	L5
3	Behaviour of compression members	CO5	L5
4	Sections used for compression members,	CO5	L5
5	Effective length of compression members	CO5	L5
6	Design of compression members	CO5	L5
7	Design of compression members and built up Compression members,	CO5	L5
8	Design of built up Compression members,	CO5	L5
9	Design of Laced	CO5	L5
10	Design of Battened Systems.	CO5	L5
С	Application Areas	СО	Level
1	Compression members are used in different steel structures like roof truss,	CO5	L5
	gantry girder, plate girder , welded girder and bridges		
d	Review Questions	-	-
1	Design a reinforced concrete beam of rectangular section using the following	CO3	L5
	data: Effective span = 5m, width of the beam — 250mm, overall depth =		
	500mm,		
2	T beam slab floor of an office comprises of a slab 150mm thick resting on	CO3	L5
	beams 3m c/c. The effective span of beam is 8m. Assume live load on the		
	TLOOR as 4KIV/m2. Use M20 an dFe415. Design one of the intermediate f beams.	001	
3	reinforced concrete beam over an effective span 5m carries a load of 8kin/m	CO3	L5
	Inclusive of sell weight. Assume M20 and Fe415. Design the beam to satisfy the		
	Collapse and serviceability limit states	<u> </u>	1.5
4	A cantilever beam of an span carries a load of 401(17/11). The width of the	03	L5
	reinforcement Assume M20		
E	A Pectangular beam is to be simply supported on supports of 220 mm width	CO2	15
5	The clear span of the beam is 6m. The beam is to have width of 200 mm. The	003	L9
	super imposed load is 12 IcNini. Using M20 concrete and Fe/15 steel. Design		
	the beam Apply check for deflection		
6	Design a rectangular beam of section 220 mm x 600 mm of effective span 6m	CO3	15
Ŭ	Effective cover of reinforcement should be kept as 50 mm. Imposed load on	005	-5
	the beam is 40 kN/m. Use M20 concrete and Fe 415 steel.		
7	simply supported RCC beam of size 300 x 600 mm carries a udl live load of	CO3	L5
	250 kN/m and superimposed dead load 12 kN/m over an effective span of 5		
	m. It is reinforced with 4#16 mm diameter bars. The effective cover is 50 mm		
	calculate the short term and long		
·			

	term deflection of beam tcs = 0.003 and creep coefficient = 1.6.		
8	A R.C.C beam of rectangular section 300x600mm is reinforced with 4 bars of 20mm dia with an effective cover 50mm, effective span of the beam is 6m. Assuming M20 concrete and Fe250 steel. Determine the central concentrated P, that can be carried by the beam in addition to its self weight.	CO3	L5
9	A rectangular simply supported beam of span 5m is 300mmx650mm in cross section and is reinforced with 3 bars of 20mm on tension side at an effective cover of 50mm. Determine the shaft term defection due to an imposed working load of 201.1\L/m (excluding self wt). Assume grade of concrete M20 and grade of steel Fe415.	CO3	L5
10	A T-Beam slab floor has 125mm thick slab forming part of T — beam which are of 8m clearspan. The end bearing are 450mm thick. Spacing of T-beams is 3.5m. The live load on the floor is $3kN/m2$. Design one of the intermediate beams. Use M20 concrete and Fe415 steel.	CO3	L5
е	Experiences	-	-
1			
2			
3			

Module – 4

Title:	Design of Tension Members	Appr	10Hrs
	Design of Column Bases	Time:	
a	Course Outcomes	-	Blooms
-	The student should be able to:	-	Level
1	Students should be able to Design the tension members, lug angles, Splices,		
	Gussets and Column Bases (Simple Slab Base & Gussested Base) as per IS		
	800-2007		
b	Course Schedule		
Class No	Module Content Covered	CO	Level
1	Introduction to tension members	CO6	L5
2	Types of Tension members	CO6	L5
3	Slenderness ratio	CO6	L5
4	Modes of Failure	CO6	L5
5	Factors affecting the strength of tension members	CO6	L5
6	Design of Tension members	CO6	L5
7	Design of Lug angles	CO6	L5
8	Design of Splices,	CO6	L5
9	Design of Gussets.	CO6	L5
10	Design of Simple Slab Base and Gusseted Base.	CO6	L5
С	Application Areas	СО	Level
1	Tension members are used in different steel structures like roof truss, gantry	CO6	L5
	girder, plate girder , welded girder and bridges		
d	Review Questions	-	-
1	Distinguish between one way slab and two way slab.	CO4	L2
2	Explain the importance of bond, anchorage length.		
3	Design a two way slab for an office floor of 3.5 x 4.5m simply supported on all	CO4	L5
	sides with ',corners prevented from lifting. Take live load of 4kN/m2. Assume		
	M20 and Fe415.		
4	What is development length? Write the expression for development length,	CO4	L5
5	Design one of the flights of dog logged stair case spanning between landing	CO5	L5
	beams using the		
	following dataNumber of steps in the flight = 10= 300mm Tread = 150mm Rise		
	Width of landing beams= 300mm Assume M20 and Fe415		
6	Design a continuous RC slab for a class room 7m wide and 14 m long. The roof	CO4	L5
	is to be supported on RCC beams spaced at 3.5 m intervals. The width of beam		
	should be kept 230 mm. The super imposed load is 3 kN/m2 and furnishing		

	load expected is 1 kN/m2. Use M20 concrete and Fe415 steel.		
7	Design a dog legged stairs for an office building in a room measuring 2.8m * 5.8 m clear. Vertical distance between the floor is 3 6in. Width of flight is to be 1.25 m. Allow a live load of 3 kN/m2. Sketch the details of reinforcement. Use M20 concrete and Fe 415 steel. Assume the stairs are supported on 230 mm walls at the end of outer edges of landing slabs	CO5	L5
8	Design a waist 4b type dog legged staircase for an office building given the following data Clear dither** of room = 2.6 m x 4.75 m Height of 000 = 3.2 m Rise = 160mm, Tread = 250 mm Width, of flight = 1.25 m Use M-20 grade concrete and Fe-415 grade steel. Landing slab spans in the same direction of the staircase. Assume wall thickness 230 mm. Take live load = 3 kN/m2 and floor finish = 1 kN/m2.	CO4	L5
9	Design a corner rectangular slab panel of size 4m x 5.5m. Assume that slab supports an imposed load of 3 kN/m2 and floor finish 1 IN/m2. The slab is subjected to moderate exposure condition and is made of M-25 grade concrete, Fe-415 grade steel. Wall support is 230 mm.	CO5	L5
10	Design a slab for a room of clear dimensions 3mx5m supported on wall of 300mm thickness with corners held down. Two adjacent sides of the slab are continuous and other discontinuous. LL on slab is 3kN/m2 . Assume floor finish of lkN/m2 . Use M20 concrete and Fe415 steel. Sketch the details of reinforcement.	CO5	L5
11	Design a dog-legged stairs for an building in a room measuring 3.6x5.2m clear. The vertical distance between the Floors is 3.2m. Consider LL 3kN/m2 . Use M20 concrete and Fe415 grade of steel. Assume stairs are supported on 300mm wall at the outer edges of landing slabs. Consider Rise = 160mm, and Tread 300mm.	CO5	L5
•	Experiences	_	_
1			
2			
3			
4			

E2. CIA EXAM – 2

a. Model Question Paper - 2

Crs (Code	17CV62	Sem:	6	Marks:	30	Time:	75 minute	S	
Cour	rse:	Design Of	Steel Struct	ural Element	ts					
-	-	Note: Ansv	ver any ONE	FULL questi	on from eacl	n Module		Marks	со	Level
1	а	Define one	e way slab ar	nd Two way s	slab.			03	CO4	L1
	b	Design a s 230mm thi corners are 1kn/m². If reinforcem	esign a slab over a room of internal dimension 4m×5m supported on 30mm thick brick wall. All the four edges are discontinuous. (All the fou orners are prevented from lifting) Use live load 3kn/m ² . Floor finish <n m<sup="">2. If concrete is M20 and steel is Fe415. Also sketch the einforcementdetails.</n>						CO4	L5
2	а	Distinguish	n between o	ne way slab a	and two wa	y slab with ne	eat sketch.	03	CO4	L1
	b	Design a s beams of 2 load on sla is Fe415. A	lab over a rc 230mm widt ab 3kn/m². Ilso sketch t	om of intern h. Two adjac Floor finish ne reinforcer	al dimensio ent edges a 1 1kn/m². If ment details	n 4.5m×5.5m ire discontinu concrete is ;.	supported or Jous. Use live M20 and stee	n e 12 el	CO4	L5
3	а	Define Dog	g-legged sta	ircase and o	pen-well st	aircase.		03	CO5	L1,

	b	Design a dog legged staircase for a public building. Given the following data. Clear dimensions of staircase hall is 3m×5m, Height between the floors= 3.5m, Rise =150mm, Tread =280mm, Width of flight = landing width =1.45m Assume the stairs to be supported on 230mm thick masonry wall at the outer edges of the landings, Parallel to rises. Use M 20 concrete & Fe 415 steel. Sketch the details of reinforcement.	12	CO5	L5
4	а	Distinguish between Dog-legged staircase and open-well staircase with neat sketch.	03	CO5	L1
	b	Design an open well staircase for a public building. The staircase room has clear dimensions of 6000×4500mm. The height between the floors is 4500 mm. The stairs are supported at the outer edges of the landing parallel to the rises. Use M 25 concrete & Fe 500 steel. Sketch the details of reinforcement. wall thickness 230mm	12	CO5	L5

b. Assignment – 2

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

				Mo	del Assignm	nent Que	estions					
Crs C	ode:	17CV62	Sem:	6th	Marks:	5		Time:	90 - 12	20 m	inutes	5
Cours	se:	Design Of	Steel Str	ructural Ele	ements	Mo	dule : 3,	4				
Note:	Each	student to	answer	2-3 assignr	nents. Each	assignm	ient car	ries equal m	ark.			
SNo				Assign	nment Desc	ription			Mar	ks	CO	Level
1		following data: Effective span = 5m, width of the beam — 250m overall depth = 500mm,									CO3	L5
2		T beam slab floor of an office comprises of a slab 150mm thick restir on beams 3m c/c. The effective span of beam is 8m. Assume live loa on the floor as 4kN/m2. Use M20 and Fe415. Design one of the intermediate f beams.									CO3	L5
3		reinforced concrete beam over an effective span 5m carries a load of 8kN/m inclusive of self weight. Assume M20 and Fe415. Design the beam to satisfy the collapse and serviceability limit states									CO3	L5
4		A cantilever beam of 4m span carries a load of 401(N/m. The width of the beam is 230mm. Design the beam for flexure and shear. Sketch the details of reinforcement. Assume M20						of 5 ne		CO3	L5	
5		A Rectang width. The of the bea imposed l the beam.	ular bear clear spa m is 6m oad is 12 Apply ch	n is to be s an The bean IcNini. Usi eck for def	simply supp n is to have ng M20 con lection.	orted or width o crete an	n suppo f 300 m Id Fe41g	rts of 230 m nm. The sup 5 steel. Desig	m 5 er gn		CO3	L5
6		Design a r span 6m. Imposed l steel.	rectangul Effective oad on th	ar beam o cover of r ne beam is	f section 23 einforcemer 5 40 kN/m. (0 mm x nt should Jse M20	600 m d be ke concre	m of effecti pt as 50 m ete and Fe 4	ve 5 m. 15		CO3	L5
7		simply sup load of 24 effective s 4#16 mm short term coefficient	ported F 50 kN/m pan of 5 r diameten and lor = 1.6.	RCC beam and supe n. It is reinf r bars. The ng term de	of size 300 erimposed of orced with e effective c eflection of	x 600 dead loa over is beam to	mm car ad 12 k 50 mrn cs = 0.0	ries a udl li N/m over a calculate tl 03 and cree	ve 5 an ne ep		CO3	L5
8		A R.C.C be bars of 20 beam is 6r and Fe250	eam of re mm dia n. Assum o steel. E	ectangular with an effe ing M20 cc Determine	section 300 ective cover oncrete the central	x600mr 50mm, concen	n is reir effectiv trated F	nforced with ve span of t P, that can I	45 ne		CO3	L5

	carried by the beam in addition to its self weight.			
9	A rectangular simply supported beam of span 5m is 300mmx650mm in cross section and is reinforced with 3 bars of 20mm on tension side at an effective cover of 50mm. Determine the shaft term defection due to an imposed working load of 201.1\l/m (excluding self wt). Assume grade of concrete M20 and grade of steel Fe415.	5	CO3	L5
10	A T-Beam slab floor has 125mm thick slab forming part of T — beam which are of 8m clear span. The end bearing are 450mm thick. Spacing of T-beams is 3.5m. The live load on the floor is 3kN/m2. Design one of the intermediate beams. Use M20 concrete and Fe415 steel.	5	CO3	L5
11	Distinguish between one way slab and two way slab.	5	CO3	L2
12	Explain the importance of bond, anchorage length.	5	CO3	L2
13	Design a two way slab for an office floor of 3.5 x 4.5m simply supported on all sides with ',corners prevented from lifting. Take live load of 4kN/m2. Assume M20 and Fe415.			
14	What is development length? Write the expression for development length,	5	CO4	L3
15	Design one of the flights of dog logged stair case spanning between landing beams using the following data: Number of steps in the flight = 10 = 300mm Tread = 150mm Rise Width of landing beams= 300mm Assume M20 and Fe415	5	CO4	L5

D3. TEACHING PLAN - 3

Module – 5

Title:	Design of Beams	Appr	10Hrs
		Time:	
a	Course Outcomes	-	Blooms
-	The student should be able to:	-	Level
1	Students should be able to Design the Strength of Laterally Supported		
	Beams in bending as per IS 800-2007		
b	Course Schedule		
Class No	Module Content Covered	CO	Level
1	Introduction to beams	CO7	L5
2	Beam types,	CO7	L5
3	Lateral Stability of beams,	C07	L5
4	factors affecting lateral stability	CO7	L5
5	Behaviour of Beams in Bending	CO7	L5
6	Design strength of laterally supported beams in Bending,	CO7	L5
7	Design of Laterally unsupported Beams	CO7	L5
	[No Numerical Problems],		
8	Shear Strength of Steel Beams	CO7	L5
9	Beam to Beam Connections	CO7	L5
10	Beam to Column Connection and Column Splices	CO7	L5
	[No Numerical Problems]		

С	Application Areas	CO	Level
1	Beams are used in different steel structures like roof truss, gantry girder, plate girder , welded girder and bridges	CO7	L5
d	Review Questions	-	-
1	What is the role of transverse reinforcement in columns? What are the codal provisions to design the transverse reinforcement?	CO6	L3
2	Design the reinforcement for a column of size 300 x 500mm to support a factored load of 500kN and a factored moment of 200 kNm. Assume M20 and Fe415. Sketch the reinforcement details.	CO6	L3
3	Explain the different between short columns and long columns. Why is reduction coefficient applied to long column?	CO6	L3
4	Design a isolated forting for a rectangular column of 300mm x 500mm supporting an axial load of 15001(N factored. Assume SBC of soil as 185 kN/m2. Use M20 and Fe415. Sketch the reinforcement and perform the necessary checks.	CO7	L5
5	A corner column 400 * 400 mm, is subjected to the factored loads Pt, = 1300 Kn, Mu. = 190 kN-m and Muy = 110 kN-m. Design the reinforcement in the column, assuming M25 concrete and Fe 415 steel and effective cover of 60 mm. Assume it as short column.	CO7	L5
6	Design a square footing for a short axially loaded column of size 300 mm * 300 mm carrying 600 kN load. Use M20 concrete and Fe415 steel. SBC of soil is 180 kN/m2. Sketch the details of reinforcement.	CO7	L5
7	Design a footing for a column of size 300mm x 300mm, carrying a load of 1200 kN. Take SBC of sail as 180 kN/m2. Use M20, grade concrete and Fe- 415 grade steel. Sketch the reinforcement details.	CO7	L5
8	Design the reinforcement in a column of size 400mm x 500mm subjected to an axial load of 2000 kN. The column has unsupported length of 3.3m and is held in position at both the ends, restrained against rotation at one end. Use M-25 grade concrete and Fe-415 grade steel.	CO7	L5
9	Design the reinforcement for a axially loaded square column of size 450rrim x 450mm to support a load of 1500 kN. Use M20 concrete and Fe415 steel.	CO7	L5
10	column size of 300x400mm has effective length of 3.6m and is subjected to P and Mu = 150 kN-m, about the major axies. Assume the bars on two side, design the column using M25 concrete and Fe415 steel.	CO7	L5
11	Design on Isolated rectangular Footing of uniform depth for the column size of 230mmx300mm supporting an axial service load of 850kN. he safe bearing capacity of soil is 150kN/m2 . Adopt M20 grade concrete and Fe415 grade steel. Sketch the reinforcement details.	CO7	L5
е	Experiences	_	_
1		CO10	L2
2			
3			
4		CO9	L3
5			

E3. CIA EXAM – 3

a. Model Question Paper - 3

Crs	Code	ode:17CV62 Sem: 5 Marks: 30 Time: 75							S				
Cou	Course: Design Of Steel Structural Elements												
-	-		Answer any ONE FULL question from each Module Marks CO Leve										
1	a	Determine ⁻	the reinforce	g 15	CO6	L5							

		data. Column size is 400×600 mm, Pu=2000KN, Mux=160 kn-mt, Muy=120 kn-mt. Assuming M20 grade concrete and Fe415 steel. The column is subjected to biaxial bending. Assuming moments due to minimum eccentricity are less than the values given above. Also sketch the reinforcement details. Use SP16 charts.			
2	а	A rectangular column is subjected to a service load of 2000KN. If the unsupported height of the column is 5m. Design the column. Columns are hinged at ends. Sketch the details. Width of column= 300mm. Use M25 concrete and Fe415 steel. Use limit state method of design. Use SP16 charts.	15	CO6	L5
3	a	A column 450×450 mm in size with 8 steel bars of 18mm diameter transfers a dead load of 620 KN and a live load of 860 KN to the footing. The bearing capacity of soil is 120 kn/m ² . M20 grade of concrete and HYSD steel bars of Fe 415 shall be used. Design a square footing to support the column.	15	CO7	L5
4	a	A rectangular column450×600 mm transfer a dead load of 880 KN & a live load of 1420 KN without any movement & there is no overburden. The safe bearing capacity of soil is 140 KN/m ² . M20 grade of concrete and HYSD steel bars of Fe 415 shall be used. Design a rectangular footing to support the column.	15	CO7	L5

b. Assignment – 3

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

				Mo	odel Assig	<u>inment</u>	Quest	ions				
Crs Co	ode:	17CV62	Sem:	5	Marl	KS:	5	Ti	me:	90 - 120	minute	S
Cours	ie:	Design C	of Steel St	tructural El	ements							
Note:	Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.											
SNo				Α	ssignme	nt Desc	riptio	n		Marks	СО	Level
1			What is th are the reinforcer	ne role of ti codal ment?	ransverse provisior	reinfor 1s too	cemer design	nt in colu 1 the	mns? Wh transver	at 5 se	CO6	L5
2			Design th support a 200 kNm details.	e reinforce a factored 1. Assume	ment for a load of 50 M20 and	a colun DokN a Fe415.	nn of s nd a f Sketcl	ize 300 > actored n the rei	500mm moment nforceme	to 5 of nt	CO6	L5
3			Explain the different between short columns and long columns. Why is reduction coefficient applied to long column?								CO7	L5
4			Design a 500mm s SBC of s reinforcer	isolated fo supporting oil as 185 ment and p	rting for a an axial lo kN/m2. l perform th	rectan bad of Jse M2 e nece	gular (15001(20 and ssary (column c N factore 1 Fe415. checks.	of 300mm ed. Assun Sketch tl	i x 5 ne ne	CO7	L5
5			A corner loads Pt, Design th M25 cond Assume i	column 40 = 1300 kN he reinforce crete and F t as short c	00 * 400 r I, Mu. = 1 ment in th e 415 ste olumn.	mm, is 90 kN ne colu el and	subjec -m an mn, as effecti	cted to the d Muy = ssuming ve cover	ne factore 110 kN-i	ed 5 m. m.	CO6	L5
6			Design a size 300 concrete details of	square foo mm * 30 and Fe415 reinforcem	oting for a 0 mm ca steel. SB0 nent.	a short arrying C of soi	axially 600 l is 180	y loaded kN load) kN/m2.	column . Use Mi Sketch tl	of 5 20 1e	CO7	L5
7			Design a carrying a	footing footin	or a colu 00 kN. Ta	ımn of ke SBC	size of sai	300mm l as 180 k	x 300mi xN/m2. U	n, 5 se	C06	L5

	M20, grade concrete and Fe-415 grade steel. Sketch the reinforcement details.			
8	Design the reinforcement in a column of size 400mm x 500mm subjected to an axial load of 2000 kN. The column has unsupported length of 3.3m and is held in position at both the ends, restrained against rotation at one end. Use M-25 grade concrete and Fe-415 grade steel.	5	CO6	L5
9	Design the reinforcement for a axially loaded square column of size 450rrim x 450mm to support a load of 1500 kN. Use M20 concrete and Fe415 steel.	5	CO6	L5
10	column size of 300x400mm has effective length of 3.6m and is subjected to P and Mu = 150 kN-m, about the major axies. Assume the bars on two side, design the column using M25 concrete and Fe415 steel.	5	CO6	L5
11	Design on Isolated rectangular Footing of uniform depth for the column size of 230mmx300mm supporting an axial service load of 850kN. he safe bearing capacity of soil is 150kN/m2 . Adopt M20 grade concrete and Fe415 grade steel. Sketch the reinforcement details.	5	CO7	L5
12	What is the role of transverse reinforcement in columns? What are the codal provisions todesign the transverse reinforcement?	5	CO6	L5
13	Design the reinforcement for a column of size 300 x 500mm to support a factored load of 500kN and a factored moment of 200 kNm. Assume M20 and Fe415. Sketch the reinforcement details.	5	CO6	L5
14	Explain the different between short columns and long columns. Why is reduction coefficient applied to long column?	5	C07	L5
15	Design a isolated forting for a rectangular column of 300mm x 500mm supporting an axial load of 15001(N factored. Assume SBC of soil as 185 kN/m2. Use M20 and Fe415. Sketch the reinforcement and perform the necessary checks.	5	CO7	L5

F. EXAM PREPARATION

1. University Model Question Paper

Cour	rse:	Design of S	teel Structura	l Element	S		Month /	∕ Year	May 20	018
Crs (Code:	17CV62		180 m	inutes					
-	Note	Answer all I	FIVE full ques	tions. All c	questions carry eq	ual marks.		Marks	CO	Level
1	а	What are th	06	CO1	L3					
	b	Identify pla propped ca span.	10	CO2	L4					
					OR					
2	а	What are ro elements w	olled steel sec /ith sketches.	tions? Me	ention any six shap	es used as	s structural	06	CO1	L3
	b	Calculate M	1p for the con	tinuous be	eam if load factor	is3.2.		10	CO2	L4
3	а	Explain the sketch.	various mode	es of failur	e of bolted conne	ctions with	neat	06	CO3	L5
	b	Find the m shown in th Take fu of p	10	CO4	L5					
4	а	Explain lap	joint and butt	joint with	neat sketch.			06	CO3	L5

	b	Find the maximum load which can be transmitted through the double cover butt joint shown in fig 3(b). Find also the efficiency of the joint. Use 20mm diameter common bolts.	10	CO4	L5
					L5
5	а	Define one way slab and Two way slab.	04	CO5	
	b	Design a slab over a room of internal dimension 4m×5m supported on 230mm thick brick wall. All the four edges are discontinuous. (All the four corners are prevented from lifting) Use live load 3kn/m ² . Floor finish 1kn/m ² . If concrete is M20 and steel is Fe415. Also sketch the reinforcementdetails.	12	CO6	L5
		OR			L5
6	а	Distinguish between one way slab and two way slab with neat sketch.	04	CO5	L5
	b	Design a slab over a room of internal dimension 4.5m×5.5m supported on beams of 230mm width. Two adjacent edges are discontinuous. Use live load on slab 3kn/m ² . Floor finish 1kn/m ² . If concrete is M20 and steel is Fe415. Also sketch the reinforcement details.	12	CO6	L5
					L5
7	a	Define Dog-legged staircase and open-well staircase.	04	CO7	L5
	b	Design a dog legged staircase for a public building. Given the following data. Clear dimensions of staircase hall is 3m×5m, Height between the floors= 3.5m, Rise =150mm, Tread =280mm, Width of flight = landing width =1.45m Assume the stairs to be supported on 230mm thick masonry wall at the outer edges of the landings, Parallel to rises. Use M 20 concrete & Fe 415 steel. Sketch the details of reinforcement.	12	CO8	L5
		OR			
8	a	Distinguish between Dog-legged staircase and open-well staircase with neat sketch.	04	CO7	L5
	b	Design an open well staircase for a public building. The staircase room has clear dimensions of 6000×4500mm. The height between the floors is 4500 mm. The stairs are supported at the outer edges of the landing parallel to the rises. Use M 25 concrete & Fe 500 steel. Sketch the details of reinforcement. wall thickness 230mm	12	CO8	L5
9	а	What are the advantages and disadvantages of using steel structures.	06	CO9	L5
	b	Identify plastic hinge distance 'X' is 0.414E from the simple support of a propped cantilever beam supporting a UDL of w kN/m over the entire span.	10	CO10	L5
		OR			
10	а	What are rolled steel sections? Mention any six shapes used as structural elements with sketches.	06	CO9	L5
	b	Calculate Mp for the continuous beam if load factor is 3.2.	10	CO10	L5

2. SEE Important Questions

se:	Design of Steel	Month	/ Year	May /2	2018				
Code:	17CV62	Sem:	5	Marks:	80	Time:		180 mi	nutes
Note Answer all FIVE full questions. All questions carry equal marks.								-	
Qno.	Important Ques	Marks	СО	Year					
а	What are the a	dvantages a	nd disadvanta	ges of using :	steel structu	res.	06	CO1	L3
b	Identify plastic	ofa	10	CO2	L4				
	se: iode: Note Qno. a	se: Design of Steel ode: 17CV62 Note Answer all FIVE Qno. Important Ques a What are the a b Identify plastic	se: Design of Steel Structural E code: 17CV62 Sem: Note Answer all FIVE full questio Qno. Important Question a What are the advantages ar b Identify plastic hinge distan	se: Design of Steel Structural Elements iode: 17CV62 Sem: 5 Note Answer all FIVE full questions. All question Qno. Important Question a What are the advantages and disadvanta b Identify plastic hinge distance 'X' is 0.414E	See: Design of Steel Structural Elements iode: 17CV62 Sem: 5 Marks: Note Answer all FIVE full questions. All questions carry equation Qno. Important Question a What are the advantages and disadvantages of using stance 'X' is 0.414E from the sim	se: Design of Steel Structural Elements iode: 17CV62 Sem: 5 Marks: 80 Note Answer all FIVE full questions. All questions carry equal marks. Qno. Important Question a What are the advantages and disadvantages of using steel structure b Identify plastic hinge distance 'X' is 0.414E from the simple support	se: Design of Steel Structural Elements Month iode: 17CV62 Sem: 5 Marks: 80 Time: Note Answer all FIVE full questions. All questions carry equal marks. Ono. Important Question Important Question a What are the advantages and disadvantages of using steel structures. Identify plastic hinge distance 'X' is 0.414E from the simple support of a	See: Design of Steel Structural Elements Month / Year Tode: 17CV62 Sem: 5 Marks: 80 Time: Note Answer all FIVE full questions. All questions carry equal marks. - - - Qno. Important Question Marks Marks - a What are the advantages and disadvantages of using steel structures. 06 b Identify plastic hinge distance 'X' is 0.414E from the simple support of a 10	Month / Year May /2 Month / Year May /2 See: Month / Year May /2 Time: 180 mi Note Answer all FIVE full questions. All questions carry equal marks. - Qno. Important Question Marks CO a What are the advantages and disadvantages of using steel structures. 06 CO1 b Identify plastic hinge distance 'X' is 0.414E from the simple support of a 10 CO2

		propped cantilever beam supporting a UDL of w kN/m over the entire span.			
2	а	What are rolled steel sections? Mention any six shapes used as structural elements with sketches.	06	CO1	L3
	b	Calculate Mp for the continuous beam if load factor is3.2.	10	CO2	L4
3	а	Explain the various modes of failure of bolted connections with neat sketch.	06	CO3	L5
	b	Find the maximum force which can be transmitted through the lap joint shown in the Fig 1(b). Find also the efficiency of the joint. Take fu of plate as 410MPa and assume 4.6 grade bolts.	10	CO4	L5
4	а	Explain lap ioint and butt ioint with neat sketch.	06	CO3	L5
	b	Find the maximum load which can be transmitted through the double cover butt joint shown in fig 3(b). Find also the efficiency of the joint. Use 20mm diameter common bolts.	10	CO4	L5
5	а	Define one way slab and Two way slab.	04	CO5	L5
	b	Design a slab over a room of internal dimension 4m×5m supported on 230mm thick brick wall. All the four edges are discontinuous. (All the four corners are prevented from lifting) Use live load 3kn/m ² . Floor finish 1kn/m ² . If concrete is M20 and steel is Fe415. Also sketch the reinforcementdetails.	12	CO6	L5
6	а	Distinguish between one way slab and two way slab with neat sketch.	04	CO5	L5
	b	Design a slab over a room of internal dimension 4.5m×5.5m supported on beams of 230mm width. Two adjacent edges are discontinuous. Use live load on slab 3kn/m ² . Floor finish 1kn/m ² . If concrete is M20 and steel is Fe415. Also sketch the reinforcement details.	12	CO6	L5
7	а	Define Dog-legged staircase and open-well staircase.	04	CO7	L5
	b	Design a dog legged staircase for a public building. Given the following data. Clear dimensions of staircase hall is 3m×5m, Height between the floors= 3.5m, Rise =150mm, Tread =280mm, Width of flight = landing width =1.45m Assume the stairs to be supported on 230mm thick masonry wall at the outer edges of the landings, Parallel to rises. Use M 20 concrete & Fe 415 steel. Sketch the details of reinforcement.	12	CO8	L5
8	a	Distinguish between Dog-legged staircase and open-well staircase with neat sketch.	04	CO7	L5
	b	Design an open well staircase for a public building. The staircase room has clear dimensions of 6000×4500mm. The height between the floors is 4500 mm. The stairs are supported at the outer edges of the landing parallel to the rises. Use M 25 concrete & Fe 500 steel. Sketch the details of reinforcement. wall thickness 230mm	12	CO8	L5
9	а	What are the advantages and disadvantages of using steel structures.	06	CO9	L5
	b	Identify plastic hinge distance 'X' is 0.414E from the simple support of a propped cantilever beam supporting a UDL of w kN/m over the entire span.	10	CO10	L5
10	а	What are rolled steel sections? Mention any six shapes used as structural elements with sketches.	06	CO9	L5
	b	Calculate Mp for the continuous beam if load factor is 3.2.	10	CO10	L5

Course Outcome Computation

Academic Year:																
Odd / Even semester																
INTERNAL TEST				T1					Т	2					Тз	
Course Outcome	CO1		CO2		CO3		CO4		CO5		CO6		C07		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 CC Attainment)															

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 Weight of CO - PO	PO1	D1 PO3		PO3		PO1		PO12		PO12		PO6		PO1	
Course Outcome	CO1	CO2		CO3		CO4		CO5		CO6		CO7		CO8	
Test/Quiz/Lab		T1					Т		2			Т		3	
QUESTION NO	Q1	L Q2 V	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 CO Attainment															