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

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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.

Module	Content	Teaching Hours	Identified Module Concepts	Blooms Learning Levels
1	**Introduction** Advantages and Disadvantages of Steel Structures, Limit state method Limit State of Strength, Structural Stability, Serviceability Limit states, Failure Criteria of steel, Design Consideration, Loading and load combinations, IS code provisions, Specification and Section classification. **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.	10	Limit State Standards Plastic Moment Plastic Hinge	L4 Analysis
2	**Introduction**, Types of Bolts, Behaviour of bolted joints, Design of High Strength friction Grip(HSFG) bolts, Design of Simple bolted Connections (Lap and Butt joints), Moment Resistant Connections. **Introduction**, Types and properties of welds, Effective areas of welds, Weld Defects, Simple welded joints for truss member, Moment resistant Connections. Advantages and Disadvantages of Bolted and Welded Connections.	10	Bolt Valve Strength of Weld Size of Weld	L5 Design
3	**Introduction**, Failure modes, Behaviour of compression members, Sections used for compression members, Effective length of compression members, Design of compression members and built up Compression members, Design of Laced and Battened Systems.	10	Effective Slenderness Ratio Flexural Buckling stress & Strength	L5 Design
4	**Introduction**, Types of Tension members, Slenderness ratio, Modes of Failure, Factors affecting the strength of tension members, Design of Tension members and Lug angles, Splices, Gussets. Design of Simple Slab Base and Gusseted Base.	10	Yield Strength of Plates Rupture of Plates Block Shear	L5 Design
5	**Introduction**, Beam types, Lateral Stability of beams, factors affecting lateral stability, Behaviour of Beams in Bending, Design strength of laterally supported beams in Bending, Design of Laterally unsupported Beams [No Numerical Problems], Shear Strength of Steel Beams. Beam to Beam Connections, Beam to Column Connection and Column Splices	10	Moment Capacity Web Bucking Web Crippling Shear Deflection	L5 Design

	[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.

Module	Details	Chapters	Available
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.
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
3	Knowledge on analyzing Steel structures	Higher Study		Understand 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.

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	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 Assignment	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 Assignment	L4 Analysis
2	17CV62.3	understand the bolted connections on steel structures	5	Bolt Value	Lecture	CIA and Assignment	L5 Design
2	17CV62.4	understand the welded connections on steel structures	5	Strength of Weld Size of Weld	Lecture	CIA and Assignment	L5 Design
3	17CV62.5	Design the compression members as per IS 800-2007	5	Effective Slenderness Ratio	Lecture	CIA and Assignment	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 Assignment	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 Assignment	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 Assignment	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 Assignment	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 .		Shear Deflection		t	
-	-	**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 . . .

Modules	Application Area Compiled from Module Applications.	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	CO1	L3
1	Beams are used in different steel structures like roof truss, gantry girder, plate girder , welded girder and bridges	CO2	L4
2	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
3	Compression members are used in different steel structures like roof truss, gantry girder, plate girder , welded girder and bridges	CO5	L5
3	Compression members are used in different steel structures like roof truss, gantry girder, plate girder , welded girder and bridges	CO6	L5
4	Tension members are used in different steel structures like roof truss, gantry girder, plate girder , welded girder and bridges	CO7	L5
4	Tension members are used in different steel structures like roof truss, gantry girder, plate girder , welded girder and bridges	CO8	L5
5	Beams are used in different steel structures like roof truss, gantry girder, plate girder , welded girder and bridges	CO9	L5
5	Beams are used in different steel structures like roof truss, gantry girder, plate girder , welded girder and bridges	CO10	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.

Modules	Mapping		Mapping Level	Justification for each CO-PO pair	Level
-	**CO**	**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, and environmental consideration	
2	CO3	PO1	1	Applies knowledge of mathematics, science & fundamentals Engineering specialization to the solution of complex engineering problems.	L5
2	CO3	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.	L5
2	CO3	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 and solution of designing of bolted connections.	L5
2	CO4	PO1	1	Applies knowledge of mathematics, science & fundamentals Engineering specialization to the solution of complex engineering problems.	L5
2	CO4	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.	L5
2	CO4	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 and solution of designing of welded connections.	L5
3	CO5	PO1	1	Applies knowledge of mathematics, science & fundamentals Engineering specialization to the solution of complex engineering problems.	L5
3	CO5	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.	L5
3	CO5	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 and solution of designing of compression members	L5
3	CO6	PO1	1	Applies knowledge of mathematics, science & fundamentals Engineering specialization to the solution of complex engineering problems.	L5
3	CO6	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.	L5
3	CO6	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 solution of designing of tension members	L5
4	CO7	PO1	1	Applies knowledge of mathematics, science & fundamentals Engineering specialization to the solution of complex engineering problems.	L5
4	CO7	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.	L5
4	CO7	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 solution of designing of beams	L5
4	CO8	PO1	1	Applies knowledge of mathematics, science & fundamentals Engineering specialization to the solution of complex engineering problems.	L5
4	CO8	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.	L5
4	CO8	PO3	1	Design solutions for complex engineering problems and design system 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	
5	CO9	PO1	1	Applies knowledge of mathematics, science & fundamentals Engineering specialization to the solution of complex engineering problems.	L5
5	CO9	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.	L5
5	CO9	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 solution of designing of beams	L5
5	CO10	PO1	1	Applies knowledge of mathematics, science & fundamentals Engineering specialization to the solution of complex engineering problems.	L5
5	CO10	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.	L5
5	CO10	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 solution of designing of beams	L5

4. Articulation Matrix

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

-	-	Course Outcomes	Program Outcomes														-
Modules	CO.#	**At the end of the course student should be able to . . .**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	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	3	3	3	-	-	-	-	-	-	-	-	-				L3
1	17CV62.2	posses a knowledge of Plastic Behavior on beams by using plastic theory	3	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 column splices, beam to beam , beam to column connections .	3	3	3	-	-	-	-	-	-	-	-	-				L5
-	**17CV62PC**	**Average attainment (1, 2, or 3)**	**3**	**3**	**3**													**-**
-	*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.

Modules	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.

Modules	Gap Topic	Area	Actions Planned	Schedule Planned	Resources Person	PO Mapping
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.

Module #	Title	Teaching Hours	No. of question in Exam						CO	Levels
			CIA-1	CIA-2	CIA-3	Asg	Extra Asg	SEE		
1	Introduction Plastic Behaviour of Structural Steel	10	2	-	-	1	1	2	CO1 CO2	L4
2	Bolted Connections Welded Connections	10	2	-	-	1	1	2	CO3 CO4	L5

3	Design of Compression Members	10	-	2	-	1	1	2	CO5 CO6	L5
4	Design of Tension Members Design of Column Bases	10	-	2	-	1	1	2	CO7 CO8	L5
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.

Modules	Evaluation	Weightage in Marks	CO	Levels
1,2	CIA Exam – 1	15	CO1, CO2, CO3, CO4	L2, L3, L2, L4
3,4	CIA Exam – 2	15	CO5, CO6, CO7, CO8	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 Plastic Behaviour of Structural Steel	Appr Time:	10Hrs
a	***Course Outcomes***	-	**Blooms**
-	The student should be able to:	-	**Level**
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	CO1	L3
2	posses a knowledge of Plastic Behavior on beams by using plastic theory	CO2	L4
b	***Course Schedule***	-	-
Class No	**Module Content Covered**	**CO**	**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
c	**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
e	**Experiences**		
1			
2			
3			

Module – 2

Title:	Bolted Connections Welded Connections	Appr Time:	10 Hrs
a	***Course Outcomes***		**Blooms**
-	The student should be able to:	-	**Level**
1	Students should be able to understand the bolted connections on steel structures	CO3	L5
2	Students should be able to understand the welded connections on steel structures	CO4	L5
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
c	**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
e	**Experiences**	-	-
1			
2			
3			
4			

E1. CIA EXAM – 1

a. Model Question Paper - 1

Crs Code:	17CV62	Sem:6	I	Marks:	30	Time:	75 minutes
Course:	Design Of Steel Structural Elements						

-	-	**Note: Answer any ONE FULL question from each Module**	**Marks**	**CO**	**Level**
		MODULE-1 (15 marks)			
1	a	What are the advantages and disadvantages of using steel structures.	5	CO1	L3
	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	CO2	L4

		OR			
2	a	What are rolled steel sections? Mention any six shapes used as structural elements with sketches.	5	CO1	L3
	b	Calculate Mp for the continuous beam if load factor is3.2.	10	CO2	L4
		MODULE-2 (15 marks)			
3	a	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.

Model Assignment Questions

Crs Code:	17CV62	Sem:	6th	Marks:	10	Time:	90 – 120 minutes
Course:	Design Of Steel Structural Elements						

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

SNo		Assignment Description	Marks	CO	Level
1		Explain working stress method, limit state method of RCC design	5	CO1	L2
2		Distinguish between balanced, under reinforced and over reinforced section of RCC design.	5	CO2	L3
3		Derive the expression for depth of NA y — = 0.42x u , in the case of rectangular RCC beam design.	5	CO2	L3
4		Obtain an expression for limiting percentage of steel for a rectangular RCC section with M20 concrete and Fe500 steel.	5	CO1	L3
5		Enlist the reasons for adopting partial safety factors for loads and material strength.	5	CO1	L2
6		Briefly explain singly and doubly reinforced RCC beam. Enlist the situations where doubly reinforced RCC beam adaptation required.	5	CO2	L3
7		Explain different limit states to be considered in the design of RCC beam and derive the expression for stress block parameter.	5	CO2	L3
8		Explain short term and long term deflections.	5	CO1	L3
9		Dfferentiate between working stress method and limit state method of RCC design.	5	CO1	L2
10		Define: i)Partial safety factor for load and materials. ii)Characteristic load. iii) Characteristic strength.	5	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	5	CO2	L3
12		Explain briefly under reinforced, over reinforced and balanced sections with sketch.	5	CO1	L3
13		Explain briefly under reinforced, over reinforced and balanced sections with sketch.	5	CO1	L2
14		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.	5	CO2	L3
15		Determine the moment of resistance of the T-beam having following	5	CO2	L3

		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.			

D2. TEACHING PLAN - 2

Module – 3

Title:	Design of Compression Members	Appr Time:	10Hrs
a	***Course Outcomes***	-	**Blooms**
-	The student should be able to:	-	**Level**
1	Students should be able to Design the compression members and built up compression members (Laced & Battened Systems) as per IS 800-2007	CO5	L5
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
c	**Application Areas**	**CO**	**Level**
1	Compression members are used in different steel structures like roof truss, gantry girder, plate girder , welded girder and bridges	CO5	L5
d	**Review Questions**	-	-
1	Design a reinforced concrete beam of rectangular section using the following data: Effective span = 5m, width of the beam — 250mm, overall depth = 500mm,	CO3	L5
2	T beam slab floor of an office comprises of a slab 150mm thick resting on beams 3m c/c. The effective span of beam is 8m. Assume live load on the floor as 4kN/m2. Use M20 an dFe415. 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	CO3	L5
5	A Rectangular beam is to be simply supported on supports of 230 mm width. The clear span of the beam is 6m. The beam is to have width of 300 mm. The super imposed load is 12 IcNini. Using M20 concrete and Fe415 steel. Design the beam. Apply check for deflection.	CO3	L5
6	Design a rectangular beam of section 230 mm x 600 mm of effective span 6m. Effective cover of reinforcement should be kept as 50 mm. Imposed load on the beam is 40 kN/m. Use M20 concrete and Fe 415 steel.	CO3	L5
7	simply supported RCC beam of size 300 x 600 mm carries a udl live load of 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 mrn calculate the short term and long	CO3	L5

	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
e	**Experiences**	-	-
1			
2			
3			

Module – 4

Title:	Design of Tension Members Design of Column Bases	Appr Time:	10Hrs
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
c	**Application Areas**	**CO**	**Level**
1	Tension members are used in different steel structures like roof truss, gantry girder, plate girder , welded girder and bridges	CO6	L5
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 sides with ',corners prevented from lifting. Take live load of 4kN/m2. Assume M20 and Fe415.	CO4	L5
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 beams using the following dataNumber of steps in the flight = 10= 300mm Tread = 150mm Rise Width of landing beams= 300mm Assume M20 and Fe415	CO5	L5
6	Design a continuous RC slab for a class room 7m wide and 14 m long. The roof 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	CO4	L5

	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
e	**Experiences**	-	-
1			
2			
3			
4			

E2. CIA EXAM – 2

a. Model Question Paper - 2

Crs Code:	17CV62	Sem:	6	Marks:	30	Time:	75 minutes

Course: Design Of Steel Structural Elements

-	-	**Note: Answer any ONE FULL question from each Module**	**Marks**	**CO**	**Level**
1	a	Define one way slab and Two way slab.	03	CO4	L1
	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/m². Floor finish 1kn/m². If concrete is M20 and steel is Fe415. Also sketch the reinforcementdetails.	12	CO4	L5
2	a	Distinguish between one way slab and two way slab with neat sketch.	03	CO4	L1
	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/m². Floor finish 1kn/m². If concrete is M20 and steel is Fe415. Also sketch the reinforcement details.	12	CO4	L5
3	a	Define Dog-legged staircase and open-well staircase.	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	a	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.

Model Assignment Questions							
Crs Code:	17CV62	Sem:	6th	Marks:	5	Time:	90 – 120 minutes
Course:	Design Of Steel Structural Elements				Module : 3, 4		
Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.							

SNo		Assignment Description	Marks	CO	Level
1		Design a reinforced concrete beam of rectangular section using the following data: Effective span = 5m, width of the beam — 250mm, overall depth = 500mm,	5	CO3	L5
2		T beam slab floor of an office comprises of a slab 150mm thick resting on beams 3m c/c. The effective span of beam is 8m. Assume live load on the floor as 4kN/m2. Use M20 and Fe415. Design one of the intermediate f beams.	5	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	5	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	5	CO3	L5
5		A Rectangular beam is to be simply supported on supports of 230 mm width. The clear span of the beam is 6m. The beam is to have width of 300 mm. The super imposed load is 12 IcNini. Using M20 concrete and Fe415 steel. Design the beam. Apply check for deflection.	5	CO3	L5
6		Design a rectangular beam of section 230 mm x 600 mm of effective span 6m. Effective cover of reinforcement should be kept as 50 mm. Imposed load on the beam is 40 kN/m. Use M20 concrete and Fe 415 steel.	5	CO3	L5
7		simply supported RCC beam of size 300 x 600 mm carries a udl live load of 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 mrn calculate the short term and long term deflection of beam tcs = 0.003 and creep coefficient = 1.6.	5	CO3	L5
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	5	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 Time:	10Hrs
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,	CO7	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 [No Numerical Problems],	CO7	L5
8	Shear Strength of Steel Beams	CO7	L5
9	Beam to Beam Connections	CO7	L5
10	Beam to Column Connection and Column Splices [No Numerical Problems]	CO7	L5

c	**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
e	**Experiences**	-	-
1		CO10	L2
2			
3			
4		CO9	L3
5			

E3. CIA EXAM – 3

a. Model Question Paper - 3

Crs Code:	17CV62	Sem:	5	Marks:	30	Time:	75 minutes
Course:	Design Of Steel Structural Elements						

-	-	**Answer any ONE FULL question from each Module**	**Marks**	**CO**	**Level**
1	a	Determine the reinforcement required for a short column for the following	15	CO6	L5

		data. Column size is 400×600 mm, P_U=2000KN, M_{UX}=160 kn-mt, M_{UY}=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	a	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.

Model Assignment Questions							
Crs Code:	17CV62	Sem:	5	Marks:	5	Time:	90 – 120 minutes
Course:	Design Of Steel Structural Elements						

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

SNo		Assignment Description	Marks	CO	Level
1		What is the role of transverse reinforcement in columns? What are the codal provisions todesign the transverse reinforcement?	5	CO6	L5
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.	5	CO6	L5
3		Explain the different between short columns and long columns. Why is reduction coefficient applied to long column?	5	CO7	L5
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.	5	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.	5	CO6	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.	5	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	5	CO6	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	CO7	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

Course:	Design of Steel Structural Elements					Month / Year	May 2018	
Crs Code:	17CV62	Sem:	6	Marks:	80	Time:	180 minutes	
-	**Note**	Answer all FIVE full questions. All questions carry equal marks.				**Marks**	**CO**	**Level**
1	a	What are the advantages and disadvantages of using steel structures.				06	CO1	L3
	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	CO2	L4
		OR						
2	a	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	a	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
		OR						
4	a	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
5	a	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
		OR			L5
6	a	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	a	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	a	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 is3.2.	10	CO10	L5

2. SEE Important Questions

Course:	Design of Steel Structural Elements					Month / Year	May /2018	
Crs Code:	17CV62	Sem:	5	Marks:	80	Time:	180 minutes	
	Note	Answer all FIVE full questions. All questions carry equal marks.				-	-	
Module	Qno.	Important Question				**Marks**	**CO**	**Year**
1	a	What are the advantages and disadvantages of using steel structures.				06	CO1	L3
	b	Identify plastic hinge distance 'X' is 0.414E from the simple support of a				10	CO2	L4

		propped cantilever beam supporting a UDL of w kN/m over the entire span.			
2	a	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	a	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	a	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
5	a	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	a	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	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
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	a	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	a	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 is3.2.	10	CO10	L5

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 CO 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		PO3		PO3		PO1		PO12		PO12		PO6		PO1	
Course Outcome	CO1		CO2		CO3		CO4		CO5		CO6		CO7		CO8	
Test/Quiz/Lab	T1						T2						T3			
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 CO Attainment																