CE603PC:STRUCTURALENGINEERING–II(STEEL) COURSE PLANNER

I. COURSEOVERVIEW:

This course is recommended for undergraduate students of Civil engineering program who are interestedinlearningthedesignofsteelstructures.Theobjectivesofthisareto learnthebehavior and design of structural steel. The course is structured to introduce inelastic analysis of steel structures,issues of strength and stability and its application to design for case of extremeloading, and related code provisions. The objective of the course is to make the student conversant with the design principles of steel structural elements as per IS Codal provisions

II. PREREQUISITE(S):

Level	Credits	Periods	Prerequisite
UG	4	5	StructuralAnalysisI&II

III. COURSEOUTCOMES:

Attheendofthiscourse,a studentwillbeable to:

COURSE OUTCOMES	Description	Blooms Taxonomy Levels	PROGRAM OUTCOMES &PROGRAM SPECIFIC OUTCOMES
C01	Analyzethetensionmembers, compression members.	Understand	PO1,PO2,PO3, PSO 1
C02	Design the tension members, compressionmembersandcolumn bases and joints and connections	Understand	PO1,PO2,PO3, PO5, PSO 1
C03	AnalyzeandDesignthebeamsincluding built-up sections and beam and connections.	Design	PO1,PO2,PO3, PO5, PSO 2
C04	Identify and Design the various componentsofweldedplategirder including stiffeners	Design	PO1,PO2,PO3, PO5, PSO 1, PSO2

IV. HOW PROGRAMOUTCOMESAREASSESSED:

Programoutcomes		Level	Proficiency assessedby
PO1	**Engineering knowledge**: To Apply the knowledge of mathematics,science,engineeringfundamentals/principals,	0.4	Assignments
	andcivilengineeringtothesolutionofcomplexengineering problems encountered in modern engineering practice.		
PO2	**Problem analysis**: Ability to Identify, formulate, review research literature, and analyze complexengineering problems related to Civil Engineering andreaching substantiatedconclusionsusingfirstprinciplesof mathematics,naturalsciences,andengineeringsciences.	1.2	Exercise, Exams
PO3	**Design/development of solutions**: Design solutions for complexengineeringproblemsrelatedto CivilEngineering anddesign system components or processes that meet the specifiedneedswithappropriateconsiderationforthepublic healthandsafety,andthecultural,societal,and environmental considerations.	0.4	Exercise
PO4	**Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, andsynthesisoftheinformationtoprovidevalid conclusions.	-	Discussion, Seminars
PO5	**Modern tool usage**: Create, select, and apply appropriate techniques,resources,andmodernengineeringandIT tools includingpredictionandmodelingtocomplexengineering activities with an understanding of the limitations.	1.2	Discussion, Seminars
PO6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legaland cultural issuesandtheconsequentresponsibilities relevanttotheCivilEngineeringprofessionalengineering practice.	-	Discussions
PO7	**Environmentandsustainability**:Understandtheimpactofthe CivilEngineeringprofessionalengineeringsolutionsin societalandenvironmentalcontexts,anddemonstratethe knowledgeof, andneedforsustainabledevelopment.	-	------
PO8	**Ethics**:Applyethicalprinciplesand committoprofessional ethicsandresponsibilitiesandnormsoftheengineering practice.	-	------
PO9	**Individualand teamwork**:Functioneffectivelyasan individual,andasamemberorleaderindiverseteams,and in multidisciplinary settings.	-	------

PO10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and withsocietyatlarge,suchas,beingabletocomprehendandwrite effective reports and design documentation,make effective presentations, and give and receive clear instructions.	-	------
PO11	**Project management and finance**: Demonstrate knowledge and understanding oftheengineering and managementprinciplesandapplythesetoone'sownwork,	-	-----
	asamemberandleaderinateam, tomanageprojectsandin multidisciplinaryenvironments.		
PO12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage inindependent and life-longlearninginthebroadestcontextoftechnological change.	-	Prototype, Discussions

V. HOWPROGRAMSPECIFICOUTCOMESAREASSESSED:

Programoutcomes		Level	Proficiency assessedby
PSO1	**ENGINEERINGKNOWLEDGE:**Graduateswillbeabletoapply technicalknowledgeindrawing,analysis,design,laboratory investigationsandconstructionaspectsofcivilengineering infrastructure,alongwithgoodbasicsinmathematics,basic sciences and technical communication.	1.2	Lecturesand Assignments
PSO2	**BROADNESS AND DIVERSITY:**Graduates will be able to summarize and can demonstrate about societal, economical, environmental, healthand safetyfactorsinvolved in infrastructural development,andshallworkwithinmultidisciplinaryteamswith competencein moderntoolusage.	-	Tutorials
PSO3	**SELF-LEARNING AND SERVICE:**Graduates will be able to pursue lifelong learning and professional development to face the challengingandemergingneedsofoursociety,ethicallyand responsibly.	-	Seminarsand Projects

1-None **2-Supportive** **3–HighlyRelated**

VI. SYLLABUS:

UNIT– I:

Materials – Types of structural steel – Mechanical properties of steel – Concepts of plasticity – yield strength - Loads and Stresses – Local buckling behavior of steel. Concepts of limit State DesignDifferent Limit States–Loadcombinationsfordifferent Limit states-DesignStrengths-deflection limits – serviceability – stability check.

DesignofConnections–Different typesofconnections– Bolted connections– Designstrength–

efficiencyof joint– prying action - Welded connections – Types of welded joints – Design requirements-DesignofBeam-columnconnections-Eccentricconnections-TypeIandTypeII connection – Framed connection– stiffened / seated connection.

UNIT– II:

Design of tension Members – Design strength – Design procedure splice – lug angle.Design ofcompressinmembers-Bucklingclass-slendernessratio/strengthdesign-laced-battenedcolumns-splice- column base- slabbase.

UNIT– III:

Plastic Analysis;Plastic moment –Plasticsectionmodulus-Plasticanalysisofcontinuousbeams Design ofFlexuralMembers – Laterallysupported and unsupported Beams – Design of laterally supported beams - Bending and shear strength/buckling – Built-up sections - Beamsplice
Plastic Analysis;Plastic moment –Plasticsectionmodulus-Plasticanalysisofcontinuousbeams Design ofFlexuralMembers – Laterallysupported and unsupported Beams – Design of laterally supported beams - Bending and shear strength/buckling – Built-up sections - Beamsplice

UNIT-IV:

Design of welded plate girders – elements – economical depth – design of main section – connectionsbetweenweband flange –designofstiffeners-bearingstiffener– intermediate stiffeners – Design of web splice and flange splice.

UNIT-V:

DesignofIndustrialStructures;Typesofrooftrusses - loadsontrusses– wind loads- Purlin design – truss design – Design of welded Gantry girder

SUGGESTEDBOOKS:

TEXTBOOKS:

1. SteelStructuresbySubramanyam.N,OxfordHigherEducation,NewDelhi.
2. LimitStateDesignofsteelstructuresbyS.K.Duggal,TataMcGraw-Hill,NewDelhi.

REFERENCEBOOKS:

1. Designofsteelstructuresbyk.s.Sairam,person education
2. DesignofSteelStructuresbyEdwinGaylord,CharlesGaylord,JamesStallmeyer, Tata Mc.Graw-Hill, NewDelhi.
3. Designofsteelstructures vol.1&2-ramChandra,standardpublications
4. Designofsteelstructure,structures,.s.sbhavikatti,ikintpublications house,newdelhi,2010

MOOC'S- SWAYAM/ NPTEL:
https://nptel.ac.in/courses/105106112/https://nptel.ac.in/courses/1051061

12/

GATE SYLLABUS:

Working stress and Limit state design concepts; Design of tension and compression members, beams and beam- columns, column bases; Connections - simple and eccentric, beam-column connections, plate girders and trusses; Plastic analysis of beams and frames.

IESSYLLABUS:

Principles of Working Stress methods, Design of tension and compression members, Design of beams and beam column

connections,built-upsections,Girders,Industrialroofs,PrinciplesofUltimate loaddesign.

VII. COURSEPLAN:

Lecture No.	Unit No.	Topicstobecovered	Linkfor PPT	Linkfor PDF	Courselearning outcomes	Teaching Methodology	Reference
1	1	**UNIT-I**IntroductiontoSteel, Materials - types of structural steel	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1Vpj72MXm0-oUAmo_FXgxYPn38-jbz7Vo	Tounderstand: Introductionto Materials	Digital writing pad,PPT, Chalk and talk	**T1, T2, T3**
2		ConceptofPlasticity,Yield Strength	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1Vpj72MXm0-oUAmo_FXgxYPn38-jbz7Vo	Tolearn: Conceptsof plasticity	Digital writing pad,PPT, Chalk andtalk	
3		Concept ofLimitStateDesign	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1Vpj72MXm0-oUAmo_FXgxYPn38-jbz7Vo	**To understand:** Code forSteel Structures	Digital writing pad,PPT, Chalk and talk	
4		LimitStates–DesignStrengths	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1Vpj72MXm0-oUAmo_FXgxYPn38-jbz7Vo	Tolearn: Concepts oflimit state design	Digital writing pad,PPT, Chalk and talk	
5		DeflectionLimits	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg	https://drive.google.com/drive/folders/1Vpj72MXm0-	DeflectionLimits	Digital writing pad,PPT,	

			5NIPiFshGkVsvb4X	oUAmo_FXgxYPn38-jbz7Vo		Chalk andtalk	
6		Serviceability–serviceability–stability check	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1Vpj72MXm0-oUAmo_FXgxYPn38-jbz7Vo	**To understand:** serviceability	Digital writing pad,PPT, Chalk and talk	
8		Designofconnections,different types of connections	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1Vpj72MXm0-oUAmo_FXgxYPn38-jbz7Vo	**Tounderstand:** Design of Connections	Digital writing pad,PPT, Chalk andtalk	
9		Designofconnections,different types of connections	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1Vpj72MXm0-oUAmo_FXgxYPn38-jbz7Vo	**To understand:** Designof Connections	Digital writing pad,PPT, Chalk and talk	
10		Boltedconnections-Design strength	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1Vpj72MXm0-oUAmo_FXgxYPn38-jbz7Vo	**To understand:** Designstrength	Digital writing pad,PPT, Chalk and talk	
11		Efficiencyofajoint,Prying Action	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1Vpj72MXm0-oUAmo_FXgxYPn38-jbz7Vo	**Tounderstand:** Efficiency of a joint	Digital writing pad	
12		TypesofWeldedconnections	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1Vpj72MXm0-oUAmo_FXgxYPn38-jbz7Vo	**Tolearn:**Welded connections	Digital writing pad	
13		TypesofWeldedjoints-Specifications, Design requirements	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1Vpj72MXm0-oUAmo_FXgxYPn38-jbz7Vo	**Tolearn:**Welded connections	Digital writing pad,PPT, Chalk and talk	
14		Designofbeam-column connections	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1Vpj72MXm0-oUAmo_FXgxYPn38-jbz7Vo	**Tolearn:**Welded connections	Digital writing pad,PPT, Chalk andtalk	
16		Eccentricconnections-TypeI& II connection	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1Vpj72MXm0-oUAmo_FXgxYPn38-jbz7Vo	**To understand:** Designof Welds	Digital writing pad,PPT, Chalk and talk	

17		Framedconnection-Stiffened/ seated connection	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1Vpj72MXm0-oUAmo_FXgxYPn38-jbz7Vo	**Tolearn:**Tension Members	Digital writing pad,PPT, Chalk and talk	
18		Framedconnection-Stiffened/ seated connection	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1Vpj72MXm0-oUAmo_FXgxYPn38-jbz7Vo	**Tolearn:**Tension Members	Digital writing pad,PPT, Chalk andtalk	
19		**UNIT-II**Designoftension Members	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1GBTs2K6D10wLU-DdkE4wr9dRtbzzP35e	**To understand:** Designstrength, Design	Digital writing pad,PPT, Chalk and talk	
20		Simple&builtupmembers- design strength	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1GBTs2K6D10wLU-DdkE4wr9dRtbzzP35e	**To learn:** procedure,splice lug- angle.	Digital writing pad,PPT, Chalk andtalk	
21		Builtupmembers-design	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1GBTs2K6D10wLU-DdkE4wr9dRtbzzP35e	**To learn:** procedure	Digital writing pad,PPT, Chalk and talk	**T1, T2, T3**
22	**2**	Designproceduresplice–lug angle	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1GBTs2K6D10wLU-DdkE4wr9dRtbzzP35e	**Tounderstand:** Problemrelatedto tensionmembers	Digital writing pad,PPT, Chalk and talk	
24		Designofcompressionmembers	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1GBTs2K6D10wLU-DdkE4wr9dRtbzzP35e	**Tounderstand:** Introduction to compression members	Digital writing pad,PPT, Chalk andtalk	
25		Bucklingclass,slendernessratio/ strength design	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1GBTs2K6D10wLU-DdkE4wr9dRtbzzP35e	**To learn:** Bucklingclass	Digital writing pad,PPT, Chalk and talk	**T1, T2, T3**
26		Designofsimplecompression members- procedure	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1GBTs2K6D10wLU-DdkE4wr9dRtbzzP35e	**Tounderstand:** Introduction to compression members	Digital writing pad,PPT, Chalk andtalk	

27		Designofsimplecompression members- procedure	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1GBTs2K6D10wLU-DdkE4wr9dRtbzzP35e	**Tounderstand:** Introduction to compression members	Digital writing pad,PPT, Chalk and talk	
28		Designofsimplecompression members:laced-battened columns	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1GBTs2K6D10wLU-DdkE4wr9dRtbzzP35e	**To understand:** battenedcolumn	Digital writing pad,PPT, Chalk andtalk	
29		Design of simple compression members:splice-columnbase-slabbase.	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1GBTs2K6D10wLU-DdkE4wr9dRtbzzP35e	**To learn:** To knowSplice columnbaseslab base	Digital writing pad,PPT, Chalk and talk	
30		**UNIT-III :** Introduction to plasticanalysis,plasticmoment	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/18jJi84vlsj_wtNgd8BN102Syaf5_xxRK	**To understand:** To know Plastic Theoryandplastic hinge	Digital writing pad,PPT, Chalk andtalk	
31		plasticsectionmodulus,Plastic analysis of continuous beams	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/18jJi84vlsj_wtNgd8BN102Syaf5_xxRK	**To understand:** To know Plastic Theoryandplastic hinge	Digital writing pad,PPT, Chalk and talk	
32		TheoremsofplasticAnalysis	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/18jJi84vlsj_wtNgd8BN102Syaf5_xxRK	**Tolearn:**To know plastic Analysis	Digital writing pad,PPT, Chalk and talk	
33		TheoremsofplasticAnalysis	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/18jJi84vlsj_wtNgd8BN102Syaf5_xxRK	**Tolearn:** To knowplastic Analysis	Digital writing pad,PPT, Chalk andtalk	
34		Plasticanalysisofcontinuous beams	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/18jJi84vlsj_wtNgd8BN102Syaf5_xxRK	**Tolearn:**To know plastic Analysis	Digital writing pad,PPT, Chalk and talk	
36		Laterallysupported/unsupported beams	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/18jJi84vlsj_wtNgd8BN102Syaf5_xxRK	**To understand:** To know Bending andShearStrength /buckling	Digital writing pad,PPT, Chalk andtalk	

37		Laterallysupported/unsupported beams	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/18jJi84vlsj_wtNgd8BN102Syaf5_xxRK	**To understand:** To know Bending andShearStrength /buckling	Digital writing pad,PPT, Chalk and talk	
38		Designoflaterallysupported beams- Problems	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/18jJi84vlsj_wtNgd8BN102Syaf5_xxRK	**To design:** Laterally supportedbeams	Digital writing pad,PPT, Chalk andtalk	
39		Designoflaterallysupported beams- Problems	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/18jJi84vlsj_wtNgd8BN102Syaf5_xxRK	**To design:** Laterally supportedbeams	Digital writing pad,PPT, Chalk and talk	
40		Bendingandshear strength/buckling	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/18jJi84vlsj_wtNgd8BN102Syaf5_xxRK	**To understand:** Bendingandshear strength of beams	Digital writing pad,PPT, Chalk andtalk	
41		Designofbuiltupsections	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/18jJi84vlsj_wtNgd8BN102Syaf5_xxRK	**Todesign:**built-up sections	Digital writing pad,PPT, Chalk and talk	
42		Designofbuiltupsections	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X-	https://drive.google.com/drive/folders/18jJi84vlsj_wtNgd8BN102Syaf5_xxRK	**Todesign:**built-up sections	Digital writing pad	
43		Designofbeamsplice	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X-	https://drive.google.com/drive/folders/18jJi84vlsj_wtNgd8BN102Syaf5_xxRK	**Todesign:**beam splice	Digital writing pad	
45		Designofbeamsplice	- https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X-	https://drive.google.com/drive/folders/18jJi84vlsj_wtNgd8BN102Syaf5_xxRK	**Todesign:**beam splice	Digital writing pad	
46		**UNIT-IV**Designofwelded plate girders	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1NzqmY4Xg27qFNXpw_KAZLDZD4HrI_MeH	**Tounderstand:** Introduction to plate girders,	Digital writing pad,PPT, Chalk andtalk	

47		Designofweldedplategirders	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1NzqmY4Xg27qFNXpw_KAZLDZD4Hrl_MeH	Introductionto plate girders,	Digital writing pad	
48		Elements-economicaldepth	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X-	https://drive.google.com/drive/folders/1NzqmY4Xg27qFNXpw_KAZLDZD4Hrl_MeH	**To understand:** economicaldepth,	Digital writing pad	
49		Designofmainsection	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X-	https://drive.google.com/drive/folders/1NzqmY4Xg27qFNXpw_KAZLDZD4Hrl_MeH	**Tolearn:**design of main section.	Digital writing pad	
50		Connectionsbetweenweband flange	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1NzqmY4Xg27qFNXpw_KAZLDZD4Hrl_MeH	**Tounderstand:** Connections between web flange,	Digital writing pad	**T1, T2, T3**
51		Designofbearingstiffeners	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1NzqmY4Xg27qFNXpw_KAZLDZD4Hrl_MeH	**To design**: stiffnersbearing,	Digital writing pad	
52	**4**	Designofintermediate stiffeners	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1NzqmY4Xg27qFNXpw_KAZLDZD4Hrl_MeH	**To design:** intermediate stiffeners	Digital writing pad	
53		Designofintermediate stiffeners	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1NzqmY4Xg27qFNXpw_KAZLDZD4Hrl_MeH	**To design:** intermediate stiffeners	Digital writing pad	
55		Designofweb splice	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1NzqmY4Xg27qFNXpw_KAZLDZD4Hrl_MeH	**Tounderstand:** Design of Plate girder using IS 800:2007 Problemsrelated.	Digital writing pad	
56		Designofwebspliceproblems	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1NzqmY4Xg27qFNXpw_KAZLDZD4Hrl_MeH	**To learn:** Design of Plate girder usingIS800:2007 Problemsrelated.	Digital writing pad	**T1, T2, T3**
57		DesignofFlange splice	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsv	https://drive.google.com/drive/folders/1NzqmY4Xg27qFNXpw_KAZLDZD4	**Tolearn:**Design of Flange splice	Digital writing pad	

			b4X	Hrl_MeH		
58		DesignofFlange splice	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1NzqmY4Xg27qFNXpw_KAZLDZD4Hrl_MeH	**Tolearn:**Design of Flange splice	Digital writing pad
59		**UNIT-V**DESIGN INDUSTRIALSTRUCTURES, Typesofrooftrusses	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1n4f9E2qsraGG2EGH8dcC77G82OwpgkEs	**Tounderstand**: Roof trusses	Digital writing pad
60		loadsontrusses,windloads	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1n4f9E2qsraGG2EGH8dcC77G82OwpgkEs	**To understand:** Wind loads	Digital writing pad
61		Designofpurlin	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1n4f9E2qsraGG2EGH8dcC77G82OwpgkEs	**Tolearn:**Analysis of trusses, design ofmembers,	Digital writing pad
62		Designofpurlin	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1n4f9E2qsraGG2EGH8dcC77G82OwpgkEs	**Tolearn:**Analysis of trusses, design of members,	Digital writing pad
63	**5**	Designofpurlin	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1n4f9E2qsraGG2EGH8dcC77G82OwpgkEs	**Tolearn:**Analysis of trusses, design of members,	Digital writing pad
63		**PRESENTATIONBYSTUDENTS**				
64		Designofpurlin	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1n4f9E2qsraGG2EGH8dcC77G82OwpgkEs	**Tolearn:**Analysis of trusses, design ofmembers,	Digital writing pad
65		Designofpurlin	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1n4f9E2qsraGG2EGH8dcC77G82OwpgkEs	**Tolearn:**Analysis of trusses, design of members,	Digital writing pad
66		Trussdesign	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsv	https://drive.google.com/drive/folders/1n4f9E2qsraGG2EGH8dcC77G82O	**Todesign**: Truss	Digital writing pad

			b4X	wpgkEs		
67		Trussdesign	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1n4f9E2qsraGG2EGH8dcC77G82OwpgkEs	**Todesign**: Truss	Digital writing pad
68		Trussdesign	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1n4f9E2qsraGG2EGH8dcC77G82OwpgkEs	**Todesign**: Truss	Digital writing pad
69		DesignofweldedGantrygirder	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1n4f9E2qsraGG2EGH8dcC77G82OwpgkEs	**Todesign:**welded gantry girder	Digital writing pad
70		DesignofweldedGantrygirder	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1n4f9E2qsraGG2EGH8dcC77G82OwpgkEs	**Todesign:**welded gantry girder	Digital writing pad
71		DesignofweldedGantrygirder	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1n4f9E2qsraGG2EGH8dcC77G82OwpgkEs	**Todesign:**welded gantry girder	Digital writing pad
72		DesignofweldedGantrygirder	https://drive.google.com/drive/folders/1LftKpdFwm4beJczg5NIPiFshGkVsvb4X	https://drive.google.com/drive/folders/1n4f9E2qsraGG2EGH8dcC77G82OwpgkEs	**Todesign:**welded gantry girder	Digital writing pad

VIII. MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENTOFPROGRAMOUTCOMESANDPROGRAM SPECIFICOUTCOMES:

Course Objectives	ProgramOutcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
I	2	3	-		-	-	-	-	-	-	-	-	3	-	-
II	-	-	-			-		-	-	-	-	-	-	-	-
III	-	3	-	--	3	-	-	-	-	-	-	-	3	-	-
IV	-	-	-			-	-	-	-	-	-	-	-	-	-
V	-	-	2		3	-	-	-	-		-	-	-	-	-
average	0.4	1.2	0.4	-	1.2	-	-	-	-	-	-	-	1.2	-	-

1=None **2=Supportive** **3=Highlyrelated**

IX. QUESTIONBANK:DESCRIPTIVEQUESTIONS:(WITHBLOOMSPHRASES)

UNIT-I

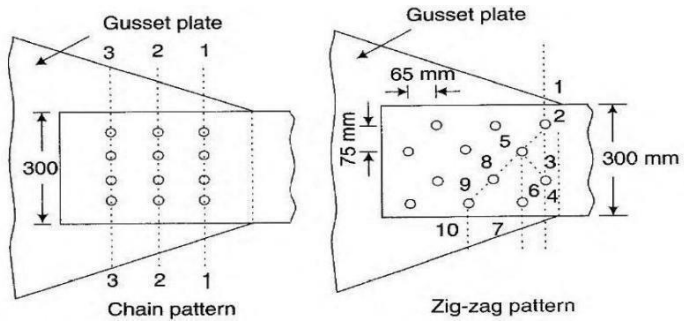
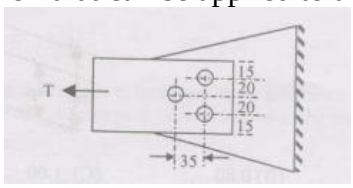
SHORTANSWER QUESTIONS-

S.NO	Question	Blooms Taxonomy Level	Programme Outcome
1.	What aretheadvantagesanddisadvantagesofsteelas a structural material?	Understand	1
2.	Statethephysicaland mechanicalpropertiesof steel as a structural material.	Remember	1
3.	Howthestandardsandspecificationsare different from codes?	Understand	1
4.	Whyisitnecessarytofollowcodesofpractice for designing structures?	Understand	1
5.	Findtheshape factorsforaSquareofside‘a’with its diagonal parallel to the zz- axis.	Understand	1
6.	Sketchthetypicalstress-straincurveofsteel, indicating the important regions.	Remember	2
7.	What ismeantbyductility?Whyandwhereisit important?	Understand	2
8.	Howthetoughnessofsteelismeasured?	Remember	2
9.	Howareresidualstressinducedinsteelsections? Sketchthetypicalresidualstress distributioninarolled I beamand awelded Ibeam.	Understand	2

10.	Howdoresidualstressesaffectdesignof intermediatecolumnsand beams?	Understand	2

LONGANSWERQUESTIONS-

S.No	Question	Blooms Taxonomy Level	Programme Out come
1.	Howthelocalbucklingofsteelstructuralshapesdoes affect the member strength? How is it avoided?	Understand	1
2.	Whatarethedefectsthatmayoriginatewhile rolling steelsection?	Remember	1
3.	Strength and ductility of steel are equally important for steelstructures.How aretheseimproved?Ifthe strengthistobeincreasedwhileretainingthedesired ductility of steel. What is done?	Understand	2
4.	Drawidealisedstress-straincurveformild-steel. Discuss the effect of residual stresses.	Remember	2
5.	A specimen was tested in laboratory and the yield strengthwasfoundtobe250N/mm^2.Takingafactor ofsafetyof2.Findtheworkingstress.	Understand	1
6.	A 100 mm long steel bar and having a square cross sectionof20 mmispulled intensionwitha loadof90 kN. It experiences an elongation of 0.10 mm.Assuringthatthedeformationisentirely elastic,determinethe modulusofelasticityofthe steel.	Understand	1
7.	Hot-rolled steel sections are used to fabricate steel sections.Underno loadConditionwhetherthesection will have stresses? Comment!	Understand	2
8.	An ISA 65 x 65 x 10 carries a tensile load of 200 KN, applied along its centroidalaxis. This angle is tobeweldedtoagussetplate.FindouttheLengths of side fillet welds required at the heel and toe of theangle	Understand	3

9.	A 300 ISF 14 mm of grade Fe410 is used as a tension member in a lattice girder. It is connected to a 18 mm thickgusset plateby18 mmdiameterboltsofgrade 4.6 Calculate the effective net area of the member, if (a) chain boltingisdoneasshowninFigure1. (b) zig-zag bolting isdoneasshowninFigure1.  	Understand	3
10.	A steel flat of rectangular section of size 70 × 6 mm is connectedto agusset plate bythree boltseach having a shear capacity of 15 kN in holes having diameter 11.5 mm.Iftheallowabletensilestressintheflatis150MPa,Find the maximum tension that can be applied to theflatis  	Understand	3

UNIT-2

SHORTANSWER QUESTIONS-

S.N	Question	BloomsTaxonomy Level	Programme Out come
1.	Whatisbuckling?	Remember	4
2.	TwosteelcolumnsP (length$L$ andyieldstrength f_y=250 MP_a) and Q (length 2L and yield strength f_y=500 MP_a) have the same cross-sectionsand end-conditions.Findtheratioofbucklingloadof column P to thatof column Q.	Understand	4
3.	Whatisradiusofgyration?	Remember	4
4.	What isslendernessratio?Statetherelationbetween elastic critical stress and slenderness ratio.	Remember	4

5.	Compressionmembersaremorecriticalthantension members. Comment!	Understand	4
6.	Whyareplasticorcompactsectionspreferredfor compression members?	Understand	4
7.	Whatisthedifference inbehaviouroflongand intermediate columns?	Understand	4
8.	Whichofthetwo,bucklingorstiffnessof compression members is more critical?	Remember	4
9.	Whyare fourdifferentbucklingcurvesprescribed toUnderstandcolumnstrength?	Understand	4
10.	Howdoesstrainhardeningaffectthestrengthofshort columns?	Understand	4

LONGANSWERQUESTIONS-

S.No	Question	Blooms TaxonomyLevel	ProgrammeOutcome
1.	Whyaseparateprovision(formula) forthedesignofa single angle strut has beenproposed byIS: 800 code?	Understand	5
2.	Citetheinstanceswhenacolumnmayberegardedas an axially loaded column?	Remember	4
3.	Whatisthebasicdifferenceinbehaviourbetween tensionandcompressionmembers,whileresisting the loads?	Understand	4
4.	Howdoesthebehaviorofacompression member differ based on its length?	Understand	4
5.	Whyisitbettertochooseplasticorcompactsections for columns?	Understand	2
6.	DerivetheEuler'sformula.	Understand	4
7.	Calculatethedesignstrengthof W14x74withlength of 20 ft. and pinned ends. A36 steel is used.	Understand	4
8.	Astrutof3.4mlengthinatrussisconnectedat eachofitsendswithweldingtothegussetplate. The strut is of a section ISA 100 x 100 x 10 mm.	Understand	4
	Determineitsequivalentslendernessratio.		
9.	Design a column of I-section to support a factored load of 1050 kN. The column has an effective length of 7.0 m with respect to z-axis and 5.0 m with respect to y-axis. Use steel of grade Fe 410.	Understand	4
10.	(a)Designabuilt upcolumncomposedoftwochannel sections placed back to back, carrying anaxial loadof 1500 kN. The effective length of column is 7 m (b) Also design a single lacingsystem.	Understand	4

UNIT-3

SHORTANSWER QUESTIONS-

S.No	Question	Blooms Taxonomy Level	Programme Out come
1.	WhatarerolledI-sectionswidelyusedasbeam members?	Remember	4
2.	Differentiatebetweenthebendingandbucklingofa beam.	Understand	4
3.	Howdoesbucklingofcolumnandbeamdiffer?	Remember	4
4.	Whyshouldplasticorcompactsectionbepreferredfor flexural members in limit state design method?	Understand	4
5.	Whatarecheckstobeperformedforbeammember design?	Understand	4
6.	What isthedifferencebetweenbendingandbuckling of a beam member?	Remember	4
7.	Whatismeantbylateraltorsionalbucklingofbeam member?	Understand	4
8.	Underwhatconditionscanlateralbuckling occur?	Understand	4
9.	Underwhatconditionscanabeammemberbe assumed as laterally restrained?	Remember	4
10.	Whatis localbucklingofabeammember	Remember	4

LONG ANSWERQUESTIONS-

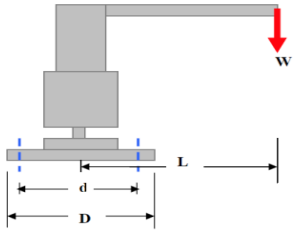
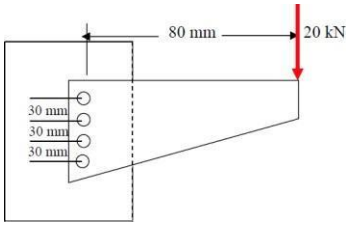
S.No	Question	Blooms TaxonomyLevel	ProgrammeOutcome
1.	Applicationofloadsonabeammaybeat itstop flange or bottom flange or centroid. How doeslevelofapplicationofloadaffectthe beamdesign?	Understand	4
2.	Howarethecolumnbucklingandthelateralbuckling of beam similar?	Understand	4
3.	How will torsion will be there in beams? What isthedifferenceinStVenanttorsion	Understand	4
	andwarpingtorsion?		
4.	Mentioncommonsituationswhereshearmight become critical?	Remember	4
5.	Whatis meantbywebcrippling?	Remember	4

6.	Design by limit state method as per IS: 800 draft code, a hand operated crane, which is provided in a shed, whose details are: Capacityofcrane=50kNLongitudinalspacingof column = 6m Center to center distance of gantry girder=12mWheelspacing=3mEdgedistance= 1mWeightofcranegirder=40kNWeightof trolley car = 10 kN.	Understand	4
7.	Designabeamof5 meffectivespan,carryinga uniform load of 20 kN/m if the compression flangeis laterallysupported(Assumef_y=250N/m^2)	Understand	4
8.	Design a beam of effective span 6.0 m and subjectedto abending momentof105.3x106 Nmm for the following conditions (i) The compression flange is laterally unsupported throughout, (ii)The beam is encased in concrete Checksfordeflectionandshearare notrequired. Assume f_y = 250 MPa.	Understand	4
9.	Designasimplysupportedbeamofeffective span 1.5mcarryinga factoredconcentratedloadof360 kN at mid span.	Understand	4
10.	Design a simply supported beamof 10 meffective spancarryingatotalfactoredloadof60kN/m.The depth of beam should not exceed 500 mm. The compression flange of the beam is laterally supported by floor construction. Assume stiff end bearingis75mm.	Understand	4

UNIT-4

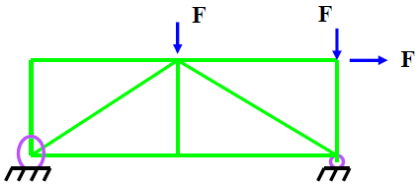
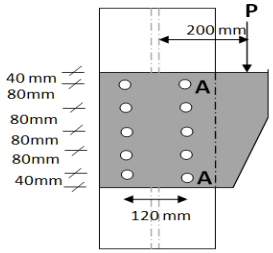
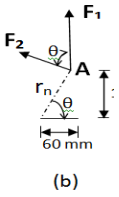
SHORTANSWER QUESTIONS-

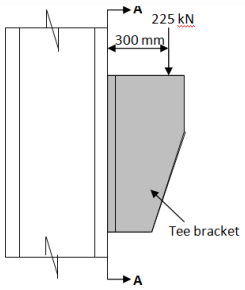
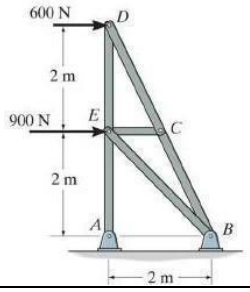
S.No	Question	Blooms Taxonomy Level	Programme Out come
1.	Whatisthemeaningofeccentricityin loading	Remember	5
2.	What isthemeantbyEccentricconnectionin steel structures.	Understand	5
3.	Howarethebuildingconnectionsclassifiedbased on their moment-rotation characteristics?	Remember	5
4.	Whatisstiffenedseatconnection?	Remember	5
5.	Whentheseated beamconnectionsarepreferred	Remember	5
	andnamethetypes?		
6.	Mentionsomeoftherequirementsofgood connections (joints).	Remember	5

7.	Whatarethepossiblewaystoimposeeccentric loading on a welded joint.	Understand	5
8.	The base of a pillar crane is fastened to the foundation by n bolts equally placed on a boltcircle of diameter ***d***. The diameter of the pillar is ***D***. Determine the maximum load carried by any bolt whenthe crane carries a load ***W*** at a distance ***L*** from the center of the base. Observe the figure below to solvetheproblem. 	Understand	5
9.	Abracketissupportedbymeansof4rivetsof samesizeasshowninfigurebelow.Determinethe diameteroftherivetifthemaximumshearstress is140MPa. 	Understand	5
10.	Whataretheassumptionsthatareusedwhen analyzing a simple truss?	Remember	5

LONGANSWERQUESTIONS-

S.No	Question	Blooms Taxonomy Level	Programme Out come
1.	Howarethebuildingconnectionsclassified based on their moment- rotation characteristics?	Understand	5
2.	Describeconnectionofpurlintorafterwithneat sketch.	Understand	5
3.	ExplainAnchoragesoftrusseswithconcrete	Understand	5
	columnneatsketch.		
4.	Given:Loadsasshownonthetruss.Findthe forces in each member of the truss.	Understand	5

5.	Forthistruss,determinethenumberofzero-force members. 	Understand	5
6.	AnISLB300carryingUDLof50kN/mhas effective span of 8 m. This is to be connectedto the webofgirderISMB 450.Designtheframedconnectionusing20 mm black bolts.	Understand	5
7.	AnISMB450 isconnectedtotheflangeofacolumn ISHB 300 @618 N/m. Theendreactiontransmittedthebeamis120kN. Design an unstiffened seated connection. Use M20 black bolts.	Understand	5
8.	Determine the safe load P that can be carried bythe joint shown inFigure below. The boltsused are 20 mm diameter of grade 4.6. The thickness of the Flange of I-section is 9.1 mm and that of bracket plate 10mm.  (a)  (b)	Understand	5
9.	Design a bracket connection to transfer an end reactionof225 kN due to factored loads as in Figure below. The end reaction from the girder acts at an eccentricity of 300 mm from the face of the column flange. Design bolted jointconnecting the Tee-flange with the column flange. Steel is of grade Fe 410 and bolts of grade4.6.	Understand	5

			
10.	Given: Loadsasshownonthetruss. Determine theforceinallthetrussmembers(donotforget to mention whether they are in Tension or Compression). 	Understand	5

UNIT-5

SHORTANSWERQUESTIONS-

S.No	Question	Blooms Taxonomy Level	Programme Outcome
1.	Givetheexpressionfortheoptimumdepthofplate girder.	Remember	5
2.	Differentiatebetweenabeamandaplategirder.	Remember	5
3.	Wherearetheplategirdersused?	Remember	5
4.	Whatarethemaincharacteristicsofaplategirder?	Remember	5
5.	Statesomeadvantagesanddisadvantagesofplate girders over trusses.	Remember	5
6.	Listthedifferentelementsofaweldedplate girder	Understand	5
7.	Whatarethevarioustypesofstiffners?	Remember	5
8.	Statethe minimumwebthicknessprovisionsofaIS 800:2007	Understand	5
9.	What istherangeoftheminimumthicknessof the web that is usually adopted in practice?	Understand	5
10.	Why/wherearebearingstiffeners provided?	Understand	5

LONGANSWERQUESTIONS-

S.No	Question	Blooms Taxonomy Level	Programme Outcome
1.	Inwhat sensethedesignofplategirdersbyelastic method and limit state method is different?	Understand	5
2.	Whatistensionfieldactioninplategirders?	Understand	5
3.	Howdoesaplategirderderivepost-buckling strength?	Understand	5
4.	Brieflyexplainthestepsinvolved inthedesignof plate girders.	Understand	5
5.	Whyhaveboltedandrivetedplategirdersbecome obsolete?	Understand	5
6.	Design a welded plate girder 24 m in span and laterally restrained throughout. It has to support a uniform load of 100 kN/m throughout the span exclusiveofself-weight.Designthegirderwithout intermediate transverse stiffners. The steel for the flangeand webplatesisofgradeFe	Understand	5
7.	410.Yieldstressofsteelmaybeassumedto be250 MPa irrespective of the thickness of plates used. Design the cross section, the end load bearing stiffnerandconnections.	Understand	5
8.	Design a welded plate girder 24 m in effective span and simplysupported at ends. It carries anuniformly distributedloadof100kN/m.drawsectionat support and front elevation of plate girder.	Understand	5
9.	What are stiffeners and why are they used? How manytypesofstiffenersarebeingused inthedesign ofplategirder?Givetheconditions(asperIS800) when stiffeners are required.	Understand	5
10.	Aplategirderissubjectedtoamaximumfactored moment of 4000 kN-m and factored shear force of 600 kN. Design girder without any stiffeners.	Understand	5

X. OBJECTIVEQUESTIONS:

UNIT-I

1. TheIndiancodeswhichdealswiththesteelstructureis
   (a)IS: 800 (b) IS: 875 (c) IS: 475 (d) IS:400
2. Themain advantageofsteelstructuresis
   (a)Itshighstrength (b) itslongservicelife
   (c) itsgas&watertightness (d) Alltheabove
3. Withapercentageincreaseincarboninsteel,itdecreases
   (a)Ductility(b)strength(c)hardness(d)brittleness
4. Poisson'sratio forsteelwithintheelastic limitvariesfrom
   (a)0.15to0.20(b)0.25to0.24(c)0.25to0.33(d)0.33to0.35
5. Thetensilestrengthofmildsteelfor bolts&nutsshould notbelessthan
   (a)32kg/mm^2(b) 36kg/mm^2 (c) 40kg/mm^2(d)44kg/mm^2
6. TheheaviestI-sectionforsamedepthis
   a) ISMBb)ISLBc)ISHBd)ISWB
   b) Bendingcompressiveandtensilestressesrespectivelyarecalculatedbasedonnetareaandgrossarea
   b) grossareaand netarea
   c) netarea inbothcases d)grossareainbothcases
7. Ifthethicknessofthinnest outsideplateis10 mm, thenthe maximumpitchof rivetsin tension will be takenas
   a)120mm b) 160mm c)200mm d)300mm
8. Inagussetedbase,whentheendofthecolumn ismachined forcompletebearingonthebase plate, then the axial load is assumed to be transferred to baseplate
   a) fullybydirectbearing
   b) fullythroughfastenings
   c) 50% bydirectbearingand50%throughfastenings
   d) 75% bydirectbearingand25%throughfastenings
9. Whentheaxisofloadliesintheplaneofrivetgroup,thentherivetsare subjectedto
   a)onlyshearstresses b)onlytensilestresses
   c)both(a)and(b) d) none oftheabove

UNIT-II

1. Theratioofunsupportedlengthtoleastradiusofgyrationisknownas
   (a)Gyrationratio(b)Slendernessratio (c) Bothaand b (d)noneofabove

2. The effective length of a compression member of length *L* held in position and restrained in directionatoneendandeffectivelyrestrained indirectionbut not held inpositionat theother end, is
   (a)L (b)0.67L (c)0.85L (d)2L

3. Astructuralmembersubjectedto compressivestress inadirectionparalleltoits longitudinal axis, is generally known as
   (a)Column(b)stanchion(c)post(d)strut

4. Slendernessratio ofacompression memberis

(a) $\frac{\text{Moments of Interia}}{\text{Radius of gyration}}$ (b) $\frac{\text{Effective length}}{\text{Area of cross-section}}$

(c) $\frac{\text{Radius of gyration}}{\text{Effective length}}$ (d) $\frac{\text{Radius of gyration}}{\text{Area of cross-section}}$

5. The distance betweene.g.ofcompressionande.g.oftensionflangesofaplategirder,is knownas
   a.Overalldepthb.Cleardepth c.Effectivedepth d.Noneofthese
6. Ifthedepthoftwocolumnsectionsareequal,thenthecolumn spliceisprovided
   a.withfillerplatesb.withbearingplatesc.withfiller andhearingplatesd.noneofthese
7. Webcrippling generallyoccursat thepointwhere
   a.bending momentismaximumb.shearing force is minimum
   c.concentratedloadsactd.deflectionismaximum

8. Accordingto ISSpecifications,theeffectivelengthofacolumneffectivelyheldinposition at both ends and restrained in direction at one end is takenas
   a) 0.67Lb)0.8Lc)Ld)1.5L
9. Theeffective lengthofabattenedstruteffectivelyheld inpositionat bothendsbutnot restrained in direction is takenas
   a)1.8Lb)Lc)1.1Ld)1.5L
10. The maximumslendernessratio ofacompressionmembercarryingbothdeadand superimposed loadis
    a)180 b)200 c) 250d)350

UNIT-III

1. Abeamisdefined asastructuralmembersubjectedto
(a) Axialloading(b)Transverseloading
(c)Axialandtransverseloading (d)Noneofthese.

Thearea$A_p$ofcover platesinoneflangeofabuiltupbeam,isgivenby

(a) $A_p = \frac{Z_{reqd} + Z_{beam}}{h}$ (b) $A_p = \frac{Z_{reqd} + Z_{beam}}{A}$

(c) $A_p = \frac{Z_{reqd} \times Z_{beam}}{h}$ (d) $A_p = \frac{Z_{reqd} - Z_{beam}}{h}$

2. Theaverageshearstressforrolledsteelbeamsection,is
(a)845kg/cm^2 (b)945kg/cm^2 (c)1025kg/cm^2 (d)1500 kg/cm^2

3. TherolledsteelI-sectionsaremostlyusedasbeamsbecause theseprovide
   (a) Largemomentofinertiawithlesscross-sectionalarea
   (b) Largemomentofresistanceascomparedtoothersection
   (c) Greaterlateralstability (d) Alltheabove
5. The permissible stress in bending for rolled steel I-beams and channels,is
   (a)1500kg/cm^2 (b)1575kg/cm^2 (c)945kg/cm^2 (d)1650kg/cm^2

6. Rolledsteelbeamsaredesignated byIndianStandard series andits
   (a) Weightper metreand depthofitssection(b) Depthofsectionandweightpermetre
   (c)Widthofflangeandweightpermetre (d)Weightpermetreand flangewidth.
7. Amajorbeaminabuildingstructure, isknownas
   (a)agirder (b)afloorbeam (c)amain beam (d)alltheabove
8. Lacingbars inasteelcolumnshouldbedesignedtoresist
   a) bendingmomentdueto 2.5%ofthecolumnload
   b) shearforce dueto2.5%ofthe columnload
   c) 2.5%ofthecolumnload d)both(a)and(b)
9. Angle ofinclinationofthe lacingbarwiththe longitudinalaxisofthecolumnshould preferably bebetween
   a) 10°to30° b) 30°to40°c)40°to70°d)90°
10. Batteningispreferablewhenthe
    i) columncarriesaxial loadonly
    ii) space betweenthetwomaincomponents isnotverylarge
    iii) columniseccentricallyloadedThecorrectanswer is
    a)only(i) b)only(iii)c)(i)and(ii)d)(ii)and(iii)

UNIT-IV

1. Lugangleis
   a) usedwithsingleanglemember b)notusedwithdoubleanglemember
   c)usedwithchannel member d)usedwithchannelmember
2. Bulbanglesareusedin
   a) columnbuilding b)bridgebuildingc)shipbuildingd)watertankbuilding
3. Rolledsteelanglesectionsareclassifiedas
   a) equalanglesb)unequalanglesc)bulbangled)alltheabove
4. Thestiffportionofabearingstiffenersistakenequalto
   a)Depthofthebeamb)3/4thdepthofthebeamc)depthofthebeamd)2/3depthofbeam
5. AccordingtoIS:800lacingbarsresisttransverseshear equalto
   a)1.0%oftheaxialload b)2.0%oftheaxialload
   c)2.5%oftheaxialload d)3.0%oftheaxialload
6. Theoverlapofbattenplateswiththe mainmembersinweldedconnectionsshouldbemore than
   a)3t b) 4t c) 6t d) 8t where t = thickness of the battenplate
7. Theslendernessratiooflacingbarsshouldnotexceed
   a) 100 b)120c)145 d)180
8. Minimumpitchprovidedinrivetedsteeltanksis
   a)1.5d b) 2.0d c) 2.5d d)3.0d
   where d is diameter ofrivets
9. Shear bucklingofwebinaplategirderisprevented byusing
   a) verticalintermediatestiffener b)horizontalstiffeneratneutralaxis
   c)bearingstiffener d) none of theabove
10. Horizontalstiffenerinaplategirderisprovidedtosafeguardagainst
    a) shearbucklingofwebplate b)compressionbucklingofwebplate
    c)yielding d) alloftheabove

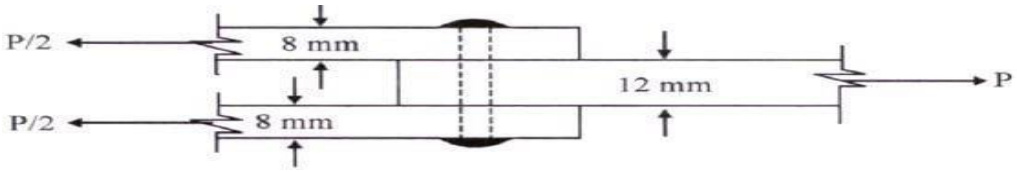
UNITV

1. Inasteelplategirder, thewebplate isconnectedtothe flangeplatesbyfillet welding.The size of fillet welds is designed to safelyresist.
   (a) thebendingstressesinthe flan (b)theverticalshearforceatthesection
   (c) thehorizontalshear forcesbetweentheflangesandthewebplate
   (d) theforcescausingbucklingintheweb
2. Gantrygirdersaredesignedtoresist:
   1)Lateralloads2)Longitudinalload 3)Verticalloads
   (a)1 and 2 only(b)1 and 3only(c)2 and3 only(d)1,2and3
3. The distance between the outer faces of flanges of a plate girder, is known as
   (a)overalldepth(b)cleardepth(c)effectivedepth(d)Noneofthese
4. Bearingstiffenerinaplategirderisusedto
   a) transfer theload fromthetopflangetothebottomone
   b) preventbucklingofweb
   c) decreasetheeffectivedepthofweb d)preventexcessivedeflection
5. The forces acting on the web splice of a plate girderare
   a)axialforces b)shearandaxialforces
   c)shear andbendingforces d)axialandbendingforces
6. Bearingstiffenersareprovidedat
   i) thesupportsii) themidspan
   iii)thepointofapplicationofconcentratedloadsThecorrect answeris
   a)only(i) b)both(i)and(ii) c)both(i)and(iii) d)(i),(ii)and(iii)
7. Rivetsconnectingflangeanglestocoverplates inaplategirderare subjectedto
   a) horizontalshearonlyb)verticalloadonly c) both(a)and(b) d) none oftheabove
8. Bearingstiffenerinaplategirderisusedto
   a)transfertheloadfromthe topflangetothebottomone b)preventbucklingofweb
   c)decreasetheeffectivedepthofweb d)preventexcessivedeflection
9. Economical depth of a plate girder correspondsto
   a)minimumweight b) minimum depth
   c)maximumweight d)minimumthicknessofweb
10. Shear bucklingofwebinaplategirderisprevented byusing
    a)verticalintermediatestiffenerb)horizontalstiffeneratneutralaxis
    c)bearingstiffener d) none of theabove

GATE

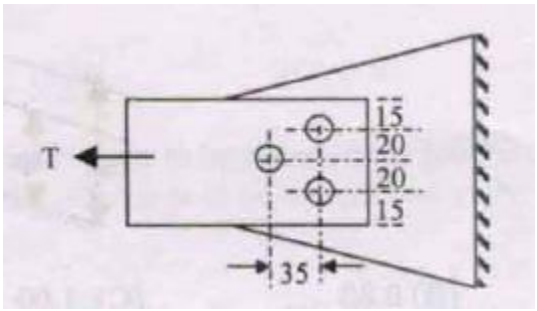
1. Two steel columns P (length L and yield strength fy = 250MPa) and Q (length 2L and yield Strengthfy=500MPa)havethesame cross-sectionsandend-conditions. Theratio ofbuckling load of column P to that of column Qis:
   a)0.5 9b)1.0c)2.0 d)4.0
2. AsymmetricI-section(withwidthofeachflange=50mm,thicknessofeachflange=10mm, depth of web = 100 mm, and thickness of web =10mm) of steelsubjectedtoa shear force of100 mm. Find the magnitude ofthe shear in N/mm2) in the web at its junction with the topflange. _____
3. In a steel plate with bolted connections, the rupture of the net section is a mode of failure under
   (A)Tension(B)compression(C)flexure(D)shear

4. Theratioofthetheoreticalcriticalbucklingloadforacolumnwithfixedendstothatofanother column with the same dimensions and material, but with pinned ends, is equalto
   (A)0.5(B)1.0(C)2.0(D)4.0
5. A 12 mm thick plate is connected to two 8 rnm thick plates, on either side through a 16 rnm diameter power driven field rivet as shown in the figure below. Assuming permissible shear stressas90MPaand permissible bearing stressas270 MPa inthe rivet,the rivet value ofthe joint is



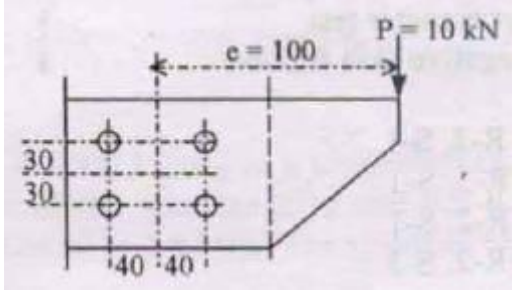
A)56.70kN(B)43.29kN(C) 36.19 kN(D)21.65Kn

6. Batteningispreferablewhenthe
   i) columncarriesaxial loadonly
   ii) spacebetweenthetwomaincomponentsisnotverylarge
   iii) columniseccentricallyloadedThecorrectansweris
   a)only(i)b)only(iii)c) (i)and(ii) d)(ii)and(iii)
7. A steel flat of rectangular section of size 70 x 6 mm is connected to a gusset plate by three boltseachhavingashearcapacityof15kNinholeshavingdiameter11.5mm.Iftheallowable tensile stress in the flat is 150 MPa, the maximumtension that can be applied to the flatis



(A)42.3kN(B)52.65kN(C)59.5kN (D)63.0kN

8. Abracketconnectionismadewithfourboltsof10mmdiameterandsupportsaloadof10kN at an eccentricity of 100 mm. The maximum force to be resisted byany bolt willbe



A)5 kN (8)6.5kN(C)6.8 kN(D)7.16kN

9. Bearingstiffeners inplategirdersare providedto
(a) decreasetheeffectivedepthofweb
(b) transfertheload fromthetop flangeto the bottomflange
(c) preventbucklingofweb
(d) increase the bearingcapacityoftheflange
10. Strengthandserviceabilityofastructurecannotbe predictedonaccountofseveral unforeseenfactors.
(a)1,2and3(b)3only(c)2only(d)1only

IES:

1. TwoanglesofISA100x100x6have beenusedasatie member. Theanglesareweldedon either sideofagusset andtagweldedover its length. The maximumlengthofthemember is: (For ISA 100x100x6, Area = 2334 mm^2 and YXX = 30mm)
(a)5.4m(b)6.0m(c)12.0m(d)24.0m
2. Gantrygirdersaredesignedtoresist:
1)Lateralloads2)Longitudinalload3)Verticalloads
(a)1and2only(b)1 and3 only(c)2 and3 only(d)1,2and3
3. Theeffectivewidthofoutstandincompoundsteelcolumnsfordesignpurposesisequalto
(a) halftheflangewidth(b) distanceofthefreeedgefromtherivetline
(c) distanceofthefreeedgefromthestiffeners
(d) distanceofthefreeedgetothenearestrowofrivets
4. For asteelbuilt upcolumnsubjectedto anaxialforceof1200kN,the lacingsystemistobe designed for resisting transverse shearof
(a)15kN (b)20kN (c)25kN (d)30Kn
5. At certainlocationofaplategirderofwebsize1000x10, apairofbearingstiffeners100 mmx 5 mm is welded. The effective area of bearing stiffenersis
(a)1000mm^2 (b)2000mm^2 (c)3000mm^2 (d)5000mm^2
6. ISMB 250 (Ze = 410x10^3) mm^3 has been chosen as a beam cross-section to resist a bending moment.Two plates100mmx10 mmareweldedto eachflangeto enhancethe moment capacity. The enhanced moment capacityis
(a)71.5kNm (b)79.5kNm (c)99.0kNm (d)148.0kNm
7. Bearingstiffeners inplategirdersare providedto
(a) decreasetheeffectivedepthofweb
(b) transfer theload fromthetopflangetothebottomflange
(c) preventbucklingofweb(d)increasethe bearing capacityoftheflange

8. Whichofthefollowing statements is/arecorrect?

1) Asteelstructuredesignercanguaranteethesafetyofthestructure.

2) Workingstressmethodofdesignofsteelstructuresoffersasaferandeconomicalstructure.

3) Strengthand serviceabilityofa structurecannotbe predictedonaccount of severalunforeseen factors.

(a)1,2and 3 (b)3only (c)2only (d)1only

9. Whentheeffectofwindorearthquake loadistakeninto account inthedesignofariveted connection, the permissible stresses in rivets may be exceeded by

(a)16.66% (b)33.33% (c)25% (d)50%

10. Amildsteelflat subjectedtoatensile forceof840kNisconnectedtoagusset plateusing rivets. Ifthepermissible forcesrequired per pitch length(i) to shear asinglerivert,(ii) to crush the rivet and (iii) totearthe plate are 50 kN, 80kN and 60 kN respectively, thenthe number of rivets requiredis

(a)12 (b)14 (c)16 (d)17

11. Theeffectivethroatthicknessofafilletweld dependsupon

(a) anglebetweenfusionfaces (b) lengthofweld

(c) permissibleshearstress (d)typeofweld

12. Whenthe load linecoincideswiththecentroidoftherivet group,therivetsaresubjectedto

(a)shearonly (b)tension only (c) bendingonly (d) shear as well astension

13. AnISMB500 isusedasa beamina multistoryconstruction. Fromtheviewpoint ofstructural design, it can be considered to be 'laterally restrained'when

(a) thetensionflangeis laterallyrestrained

(b) thecompressionflangeislaterallyrestrained

(c) theweb is adequatelystiffened

(d) theconditionsin both(a)and (c)aremet.

14. Asteelcolumnpinnedat bothendshasabuckling loadof200kN,Ifthecolumnis restrained against lateral movement at its mid-height, its buckling load will be

(a)200kN (b)283kN (c) 400kN (d) 800 kN

15. Consider the following provisions to possiblyimprovethe shear capacityofa steel girder: 1.Horizontal stiffeners 2.Verticalstiffeners 3.Columnsplice 4.Bearingstiffeners Which of these arecorrect?

(a)1,2,3and4(b)3and4only (c)1and 2 only(d)2 and3only

16. Inasteelplategirder, thewebplate isconnectedtothe flangeplatesbyfillet welding.The size of fillet welds is designed to safelyresist.

(a) thebendingstressesintheflanges(b)theverticalshear forceatthesection

(c)thehorizontalshearforcesbetweentheflangesandthewebplate

(d) theforcescausingbucklingintheweb

17. Inlacedcolumns,endtie-platesare providedto

(a) check thebucklingofcolumn

(b) keepthecolumncomponentsinposition

(c) checkthedistortionofcolumnsectionsatendsbecauseof unbalanced

18. Whichofthefollowingelementsofa pitchedroofindustrialsteelbuildingprimarilyresistslateral load parallel to the ridge?

(a)Bracing (b)Purlin (c)Truss (d)Column

XIII. WEBSITES:

1. http://www.asce.org
2. http://www.icivilengineer.com
3. http://www.construction-guide.in
4. http://nptel.ac.in/courses/112105171/1

XIV. EXPERTDETAILS:

1. VinayakEswaran,Professor &HeadoftheDepartment,IITHyderabad
2. Dr.RajaBanerjee,AssociateProfessor,IITHyderabad
3. Dr.YVDRao.FacultyIncharge,EngineeringServicesDivision,BITSPilani,Hyderabad Campus
4. Dr. JeevanJaidi, AssociateProfessor,Dept.ofMechanicalEngineering,BITS-Pilani, HyderabadCampus
5. Dr P.Laxminarayana,Head,Dept.ofMechanicalEngineering,OsmaniaUniversityCollege of Engineering,Hyderabad
6. Dr.T.I.Eldho.DepartmentofCivilEngineering, IITBombay

XV. JOURNALS:

1 ThesisDigest oncivilEngineering
2 InternationalEngineeringandTechnologyJournalofCivilandStructure
3 Internationaljournalofcivilengineering
4 Journalofinformationknowledgeandresearchin civilengineering
5 Internationaljournalofcivilengineeringandtechnology
6 InternationalJournalofCivilEngineeringandApplications
7 RecentTrendsinCivilEngineering andTechnology
8 World ResearchJournalofCivilEngineering

XVI. LISTOFTOPICSFOR STUDENTSEMINARS:

1. MechanicalPropertiesofSteel
2. Riveted,Welded,andBoltedConnections
3. DesignofTensionMembers
4. DesignofCompressionMembers
5. DesignofSteelBeams
6. DesignofPlateGirders
7. DesignofRoofTruss

XVII. CASESTUDIES/SMALLPROJECTS:

1. Studyofvarioustypesofconnections
2. StudyofPlatedGirders
3. StudyofColumnsandColumnBase
4. StudyofRoofTruss