

INSTITUTE OF AERONAUTICAL ENGINEERING

Dundigal, Hyderabad -500 043

CIVIL ENGINEERING TUTORIAL QUESTION BANK

2018 - 2019

Course Name	:	ADVANCED STEEL DESIGN
Course Code	:	ACE004
Class	:	M. Tech II Semester
Branch	:	STRUCTURAL ENGINEERING
Year	:	2018 - 2019
Course Faculty	:	Dr. J S R Prasad, Professor

OBJECTIVES

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated and taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education. The major emphasis of accreditation process is to measure the outcomes of the program that is being accredited.

In line with this, Faculty of Institute of Aeronautical Engineering, Hyderabad has taken a lead in incorporating philosophy of outcome based education in the process of problem solving and career development. So, all students of the institute should understand the depth and approach of course to be taught through this question bank, which will enhance learner's learning process.

PART – A (SHORT ANSWER QUESTIONS)

UNIT-IPROPERTIES OF STEEL

Mechanical Properties, Hysteresis, Ductility, Hot Rolled Sections: compactness and non-compactness, slenderness, residual stresses

S No	Short Answer Questions	Blooms	Program
5. NU		Taxonomy Level	Outcome
1	What are the factors that will govern the structural design?	Understand	PO1
2	Which type of steel is most commonly used in general construction? Why?	Application	PO9
3	State the physical and mechanical properties of steel as a structural material.	Remember	PO1
4	What are the structural elements of a building?	Knowledge	PO1
5	What are the various types of structural steel sections?	Remember	PO2
	(Or) How would you classify the various types of structural steel sections?		
6	Define the term slenderness ratio	Remember	PO1
7	Define the term Built up section	Remember	PO1
7	Mention the advantages and disadvantages of steel structures.	Understand	PO3
8	What are the load combinations for the design purposes?	Application	PO3
9	How the rolled steel beams are classified?	Understand	PO3
10	Draw the stress strain curve for mild steel	Evaluation	PO3
11	What are the steps involved in structural design	Remember	PO1
12	Define Permissible stresses and Working stresses	Knowledge	PO2
13	What are residual stresses?	Understand	PO3
14	Classify the columns according to the slenderness ratios.	Understand	PO2

UNIT-I PART – B (LONG ANSWER QUESTIONS)

1	Explain about the loads to be considered in the Limit State design of steel.	Understand	PO3
2	Briefly explain the possible limit states that are considered in the limit state design method for design of steel structures.	Understand	PO2
3	Write short notes on general stability, stability against overturning and sway	Apply	PO3
4	What are the various steps involved in the construction of steel structures?	Understand	PO1
5	Briefly explain the various stability checks considered by the IS code.	Apply	PO2
6	Classify the steel structural members based on the load transfer.	Understand	PO1
7	Explain the concepts of "plasticity" and "yield strength"	Understand	PO2
8	Explain the concept of limit state design and limit states.	Apply	PO1
9	Explain the concept of design strength and deflection limits	Apply	PO2
10	Write a short note on serviceability and stability check.	Apply	PO3

UNIT-II

PART – A (SHORT ANSWER QUESTIONS)

UNIT – II

Inelastic Bending Curvature, Plastic Moments, Design Criteria Stability, Strength, Drift. Stability of Beams: Local Buckling of Compression Flange & Web, Lateral Torsional Buckling

1.	What are the two important assumptions made to achieve ideal beam behavior?	Remember	PO1
2.	What are laterally restrained beams?	Understand	PO1
3.	What is elastic critical moment?	Remember	PO3
4.	What is lateral torsional buckling?	Understand	PO3
5.	What is plastic moment of resistance?	Understand	PO2
6.	What is the relation for plastic section modulus, Z_p ?	Remember	PO3
7.	What is the relation for shape factor, v?	Understand	PO3
8.	What is plastic hinge?	Apply	PO2
9.	Mention on what parameters plastic hinged length depends.	Understand	PO3
10.	Explain the behavior of plastic hinge.	Understand	PO3
11	What should be the cross-section of the beam to ensure that compression flange	Understand	PO2
	of beam is restrained from moving laterally?		
12	When does the beam buckle in terms of moments?	Remember	PO1

UNIT-IIPART – B (LONG ANSWER QUESTIONS)

1.	A rectangular section has 200 mm x 400 mm cross-section. Determine plastic section modulus and load factor	Analyze	PO2		
2.	For the section shown, find the shape factor. Take $f_y = 250$ MPa and FOS = 1.62 $N \qquad A \qquad 2h$ $b \qquad b$	Analyze	PO2		
3.	Evaluate the value of shape factor for a circular section.	Analyze	PO2		

4.	Evaluate the value of shape factor for a trapezoidal section.	Analyze	PO2
5	Evaluate the value of shape factor for a diamond section.	Analyze	PO2
6	Explain the Design Process of Structural Steel?	Apply	PO3
7	Find the value of M_p for the portal frame loaded upto collapse as shown in below	Knowledge	PO1
	figure. All the members have the same plastic moment of resistance M_p .		
	30 kN		
8	Determine the value of 'W' at collapse for the portal frame shown below.	Understand	PO1
	w в <u>с</u>		
	2mp		
	2 m 2 m		
	mp dm		
	A mp		
9.	Find outthe value of shape factor of 'T'- section.	Analyze	PO2
10.	Write short notes on	Understand	PO1
	a) types of mechanism		
	b) Theorems of plastic analysis		
1.1	c) Methods of plastic analysis	TT 1 . 1	DO1
11.	Explain the following:	Understand	POI
	a) Plasuc bending of beams b) L and Factor		
12	0) Lodu Factor	Domombor	PO1
12.	Philosophy	Kemember	rUI
UNIT-111			

UNIT-III

Slenderness Ratio, Local Buckling of Flanges and Web, Bracing of Column about Weak Axis Allowable Stress Design, Plastic Design, Load and Resistance Factor Design

PART – A (SHORT ANSWER QUESTIONS)			
1	Write short notes on design procedure for bracings	Understand	PO1
2	Write short notes on different types of mechanisms	Understand	PO1
3	Write notes on Redistribution of moment, plastic hinge and rotation capacity	Apply	PO2
4	Write notes on Advantages and disadvantages of space frames.	Apply	PO2
5	A member transmits a moment of 600 kNm and an axial force of 1200 kN. Design the section by plastic method. Assume necessaryrequired data.	Apply	PO3

6.	Find the central deflection of the beam shown in Figure using plastic Analysis.	Apply	PO3
	W (Total load)		
	monorman		
7.	What is the Euler critical load for column with both the ends hinged?	Understand	PO1
8.	What is the Euler critical load for column with both the ends fixed?	Understand	PO1
9.	What is the relation between critical stress and slenderness ratio?	Understand	PO1
10.	Why is built up section used?	Apply	PO2
	UNIT-IIIPART – B (LONG ANSWER O	UESTIONS	
Slend	derness Ratio Local Buckling of Flanges and Web Bracing of Column about Wea	k Axis Allowable Stres	s Design
Sien	Plastic Design. Load and Resistance Factor Design	K 1 IAIS 1 HIOWADIC DUC	
1.	Write notes on built up section. Under what circumstances you would go for	Apply	PO2
	Built-up members?		
2.	Differentiate web buckling from web crippling.	Apply	PO2
3.	State four standard conditions of support conditions of compression members	Understand	PO1
	and state corresponding expressions for effective length		
4.	(a) State the assumptions that made in Euler's theory	Understand	PO1
	(b) Name the modes of failure in a column.		
5.	a) Name the lateral systems that are used in compound columns and which is	Understand	PO1
	the mostly used one?		
	b) Why the lateral systems are provided in compound columns?		
6.	Write short notes on lacing and battening for built up compression member	Apply	PO2
7.	Design a column to carry an axial load of 410 kN. The column is 4.2 m long	Analyze	PO3
	and is effectively held in position at both ends but restrained against rotation at		
	end only. Yield stress of steel = 250 MPa.		
8.	Design a built-up column to carry an axial load of 3000 kN. The column is 4 m	Analyze	PO3
	long and adequately restrained in position but not in direction at both ends.		
9.	Find a suitable design for a built-up column consisting of two channels	Analyze	PO3
	connected by batten to carry an axial load of 800 kN; the effective length of	5	
	column is 6 m.		
10.	What is the main difference between elastic design and plastic design? What	Apply	PO3
	does shape factor = (z_p/z_e) physically signify?		