MUTHAYAMMAL ENGINEERING COLLEGE

(An Autonomous Institution)

(Approved by AICTE, New Delhi, Accredited by NAAC & Affiliated to Anna University)
Rasipuram - 637 408, Namakkal Dist., Tamil Nadu

Estd. 2000

MUST KNOW CONCEPTS

MKC

CIVIL

2021-2022

Course Code & Curse Name : 19CEC04/Design of Steel Structures
Year/Sem/Sec : III/VI

Subject		16CED05 / Design of Steel structures		
S. No	**Term**	**Notation (Symbol)**	**Concept/Definition/Meaning/ /Equation/ Expression**	**Units**
			UNIT:I-INTRODUCTION	
1.	Staggered pitch	p_s	Distance between two consecutive rivets in a zigzag riveting	m
2.	Gauge distance	g	Distance between two consecutive bolts of adjacent serves	m
3.	Pitch of the bolt	p	Center spacing of bolts in a row	m
4.	Structures based on shape and geometry		Rolled steel beam ,channel ,angle section,I- section	
5.	Efficiency of bolted joints		Strength of the bolt joint/ Strength of the solid plates	%
6.	Types of bolts		Unfinished (or) black bolts, turned bolts, high strength bolts	
7.	Types of weld		Butt weld, Fillet weld, Slot weld, Plug weld, Spot weld, Pipe weld, Seam weld	
8.	Types of Limit states		Limit state of collapse &Serviceability	
9.	Efficiency of Riveted joint		Strength of riveted joint/ Strength of unriveted joint	
10.	Rivet line		Imaginary line passing through the rivets	
11.	Slip factor		Ratio of the load per effective interface	
12.	Throat thickness		Throat thickness = 0.7 X Size of the weld	
13.	Different forms of structural steel section		Beams, Channels, Angles, Flats	
14.	High tension bolts		A bolt made from high strength	
15.	Use of high tension bolts		High tensile bolt have replaced the use of steel rivet in steel frame construction	
16.	Modes of failure of Riveted Joint		Shear failure of Rivets,Plates,Tearing Bearing failure	

17.	Advantages of welded connection		Economy, Rigidity, aesthetic effect,versatility	
18.	Disadvantage of welded connection		Requires skilled labour , joints are over rigid, difficult to inspect	
19.	Uses of bolt connections		Bolts can be used in both bearing and slip critical connections	
20.	Disadvantage of bolted connection		Rigidity of joints is reduced due to loose fit, resulting into excessive deflection.	
21.	Bolted joint		Less rigidity, easy to remove , skilled labours not required ,appearance is not good.	
22.	Welded joint		Improve the rigidity ,difficult to remove ,skilled labours required, good appearance.	
23.	Nominal diameter of the rivet	d	The diameter of the shank before driving.	m
24.	Gross diameter of rivet	D	Gross diameter = nominal diameter +clearance	m
25.	Effective length of the butt weld	L	Length for which the specified size of the weld exists.	m
UNIT:II-TENSION MEMBERS				
26.	Tension member splice		The available length is less than the required length of the tension member	
27.	Types of tension members		Wires and cables , rods and bars, built up members	
28.	Tension member		Structural member subjected to tensile force	
29.	Net sectional area		Gross sectional area of the member	
30.	Types of steel structure		Single angle, double angle placed back to back, tee section	
31.	Factors influencing the strength of tension member		Tensile stress, type of the section, cross sectional area pitch ,gauge and edge distance.	
32.	Built up member		Two or more than two members	
33.	Uses of lug angles		Size of gusset plate can be decreased	
34.	Net effective area		The reduced net sectional area of such a section	
35.	Gross area		Area of cross section without reducing rivet hole	
36.	Lug angle		It is an short length of an angle section	
37.	Types of tension member		Square and circular rods,Built up steel sections	
38.	Tension splice		Tension splices are provided to join two length of the member	
39.	Shear lag		Shear deformation effect.	
40.	Shear force		The in plane force at any transverse cross section	
41.	Shear stress		Stress component acting parallel to face plane	
42.	Examples of tension members		Single angle, double angle placed back to back, tee section	
43.	Net area		Net area is equal to the gross area	
44.	Single angle section connected by one leg angle		$A_{net} = A_1+A_2k, k = \frac{3A_1}{3A_1+A_2}$	
45.	Pair of angles back to back (or single		$A_{net} = A_1+A_2k, k = \frac{5A_1}{5A_1+A_2}$	

	Tee) connected by one leg angle to the same side of a gusset.			
46.	Design strength of tension member		Due to yielding of cross section	
47.	T_{nf}		Nominal tensile strength of friction type bolt.	
48.	T_{nb}		Nominal strength of bolt under axial tension	
49.	T_{nd}		Design tension capacity	
50.	T_{ndf}		Design tension capacity of friction type bolt.	
UNIT:III-COMPRESSION MEMBERS				
51.	slenderness ratio		Ratio of effective length to corresponding radius of gyration	
52.	Effective length of column		Distance between successive inflection point	
53.	Types of column base		Slab base Gusseted base	
54.	Minimum number of batten plates required for a column		Not less than 3 bays	
55.	lacing		minimum radius of gyration without increasing the area	
56.	Batten plates		connecting rolled steel section on either side	
57.	Basics in design of compression members		Assume a suitable trial section,effective length slenderness ratio	
58.	Requirements of lacing system		Uniform Bars inclined at 40º to 70^0	
59.	Latticed column		Connect the element sections so as they act as a composite section	
60.	Gusseted base		It consist of base plate connected to the column through the gusset plate	
61.	Eulers formula		$P= \pi^2EI/l_e^2$	
62.	Purpose of lacing and battens		Act together as a single unit	
63.	End post		End compression members are called end post	
64.	End post used in		Column Bridge members	
65.	Bearing strength of concrete		$0.45f_{ck}$	
66.	Area of base plate		$P_u/0.45\ f_{ck}$	
67.	Eccentrically loaded column		Distance from assumed point of application	
68.	Short struct		the applied forces will cause a compressive strain	
69.	Both ends pin ended		1.0L	
70.	Both ends pin ended		0.5L	
71.	One end fixed and the other end		0.707L	

	pinned			
72.	One end fixed, and the other free to sway		1.2L	
73.	One end fixed and the other end free		2.0L	
74.	f_{cd}		Design compressive stress	
75.	f_{cc}		Euler buckling stress	
UNIT:IV-BEAMS				
76.	Lateral torsional building		Twisting of beams near support	
77.	Castellated beam		Rolled beam with increased depth	
78.	Web crippling		Introduction of an excessive load over a small length of a beam	
79.	Plastic moment		$M_P = F_y * Z_P$	KN.m
80.	Shape factor		$K=Z_P/Z_e$	
81.	Beam column		axial compression and bending moment	
82.	Beams		Used for shorter spans consist of rolled section.	
83.	Built up beams		Ready made available beams sections are not sufficient	
84.	Plate girder		Used to carry extensively large load	
85.	Stiffeners		An element used to retain out of plane deformation of plates	
86.	Web splice		Required length of web plate is more than available length	
87.	Simple bending equation		M/I=f/y=E/R	
88.	Section modulus		Z=I/Y	
89.	Classifications in Stiffeners		Intermediate ,Load carrying stiffeners,Bearing stiffeners	
90.	purlin		Provide full torsional resistant	
91.	Laterally restrained beam		Compression flange is restrained laterally	
92.	Compact section		Section which develops full plastic moment	
93.	Laterally unrestrained beams		Compression flange is not restrained against lateral bending	
94.	Z		Section modulus	mm^3
95.	Z_P		Plastic section modulus	mm^3
96.	Z_e		Elastic section modulus	mm^3
97.	M_P		Plastic moment capacity of the section	KN.m
98.	M_q		Applied moment on the stiffener	KN.m
99.	M_S		Moment at service laod	KN.m
100.	M_Y		Factored applied moment	KN.m
UNIT:V-ROOF TRUSS AND INDUSTRIAL STRUCTURES				
101.	Component of roof truss		Top chord,Main tie,Panel points	
102.	Gantry girder		Concrete or steel member of short cantilever span	
103.	importance of steel decking		Reduces the volume of concrete in tension zone It distributes shrinkage strains	

104.	Purlin spacing for G.I sheets		1.5 to 1.7 m	
105.	Purlin spacing for A.C sheets		Limited to 1.4 m	
106.	Loads to be considered for gantry girder		Vertical load,Impact loads,Horizontal force	
107.	Loads to be considered in roof truss		Dead load,Live load,Snow load ,wind load	
108.	Pitch of a roof		Ratio found by dividing the rise by the span	
109.	Roof coverings		Slates ,Tiles ,Load sheets	
110.	Use of Sag rod		To provide lateral support for the purlins	
111.	Serviceability criteria for gantry girder		Deflection limit,Vibration limit,Fire resistance	
112.	Load combinations for purlin		Dead load+live load,Dead load+wind load,Dead load+snow load	
113.	Simple span for Elastic cladding		Span/240	
114.	Simple span for brittle cladding		Span/300	
115.	Cantilever span for Elastic cladding		Span/120	
116.	Cantilever span for brittle cladding		Span/150	
117.	Clear span		Horizontal distance between inside faces or supports	
118.	girder		Main truss supporting secondary truss	
119.	structs		Member do not belong to top and bottom chord	
120.	Spacing of truss		Distance between two consecutive stress	
121.	Sway		Lateral deflection of a frame	
122.	Sway member		Tranverse displacement of one end	
123.	Snow load		Load on a structure due to accumulation of snow and ice	
124.	Gravity load		Load arising due to gravitational effects	
125.	Wind load		Load due to wind pressure	

Placement Questions				
126.	The brick laid with its length parallel to the face of a wall		Stretcher	
127.	In verandah (corridor) floors outward slope is		1 in 60	
128.	The local swelling of a finished plaster		Blistering	
129.	The portion of a brick cut across the width		Bat	
130.	According to ICAO, all markings on the runways are		White	

131.	Free body diagram is an		Isolated joint with all the forces	
132.	Bulking of sand is maximum if moisture content is about		4	%
133.	For masonry work with solid bricks, consistency of mortar should be		9 to 13	cm
134.	The forces acting on the web splice of a plate girder are		Shear and bending forces	
135.	Settling velocity increases with		Depth of tank	
136.	The plinth area of a building not includes		Area of cantilevered porch	
137.	Los Angeles testing machine is used to conduct		Abrasion test	
138.	The meander pattern of a river is developed by		Dominant discharge	
139.	Canals taken off from ice-fed perennial rivers, are known		Perennial canals	
140.	Different grades are joined together by		Vertical curve	
141.	What is the average of first five multiples of 12?		36	
142.	What is the HCF of 1095 and 1168?		73	
143.	What is the area of triangle with base 5m and height 10m		25	m^2
144.	A: B: C is in the ratio of 3:2:5. How much money will C get out of Rs1260?		630	
145.	What is the probability of getting an even number when a dice is rolled?		1/2	
146.	What is the market price of a 9% share when a person gets 180 by investing Rs4000?		Rs.200	
147.	If 30% of a certain number is 12.6, what is the number?		42	
148.	Complete the series 2, 5, 9, 19, 37……..		75	
149.	Find the average of first 4 consecutive even numbers		5	
150.	Find the average of first 9 consecutive odd numbers		9	

Faculty Team Prepared Signature

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