6013 (2)

N19-00122

TED (15) – 6013

(REVISION — 2015)

Reg. No. ....

Signature ....

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2019

STRUCTURAL DESIGN - II

[*Time* : 3 hours

(Maximum marks : 100)

[*Note* :— Use of IS codes 800-2007, 875, 1905 and Steel table are permittted.]

PART — A

(Maximum marks : 10)

Marks

I Answer *all* questions in one or two sentences. Each question carries 2 marks.

1. List any two methods of connection of steel members.
2. Define the term 'tension member'
3. Define 'slenderness ratio' of compression members.
4. Define 'Laterally supported Beam'.
5. Define 'effective height of masonry wall'. (5×2 = 10)

PART — B

(Maximum marks : 30)

II Answer any *five* of the following questions. Each question carries 6 marks.

1. Classify the properties of Structural steel.
2. Calculate the 'design shear strength' of a 16 mm diameter bolt of grade 4.6 used for a Lap joint for 12 mm thick steel plates of Fe 410 grade.
3. Define the following terms : (a) Gross area (b) Net area (c) Net effective area.
4. Write the usual steps in the design of compression members.
5. Explain the classification of Cross sections as per IS 800-2007, based on plastic analysis.
6. List the loads acting on a roof truss.
7. Write short notes on the following :

   (a) Stress reduction factor (b) Area reduction factor (5×6 = 30)

Marks

PART — C

(Maximum marks : 60)

(Answer *one* full question from each unit. Each full question carries 15 marks.)

UNIT — I

III (a) List any six advantages of steel structures. 6

(b) Design a suitable longitudinal fillet weld to connect Fe 410 grade plates of size 120 × 8mm to 150 × 10mm to transmit a pull equal to full strength of small plate. Assume welding is to be done in work shop. 9

OR

IV (a) Explain the design philosophy of steel structures. 6

(b) Two steel plates (Fe410) of size 180 × 20 mm are lap jointed by use of 6 numbers of 20 mm diameter bolt of 4.6 grade. Determine the strength of joint if the pitch of the bolt is 60mm and edge distance is 30 mm. 9

UNIT — II

V (a) With neat figure, explain the use of Lug angles. 6

(b) Determine the design axial load capacity of the column ISHB 300 @ 577 N/m, if the length of column is 3 m and its both ends pinned. 9

OR

VI (a) With neat figure write short notes on Lacing and Battens. 6

(b) A single unequal angle ISA 90 × 60 × 6 mm is connected to a gusset plate of 10mm thick with 5 numbers of bolts of 16mm diameter, determine the design strength.
Take e = 30mm, p = 50mm, g = 50mm and fy = 250Mpa. 9

UNIT — III

VII (a) An ISWB 350 @ 569N/m carries maximum shear force 100 KN, check the safety of the beam in shear. Take fy = 250 Mpa. 6

(b) With a neat figure explain the different parts of a plate girder. 9

OR

VIII (a) Write short notes on steel beam and its design procedure. 6

(b) Determine the design bending strength of a laterally restrained beam. ISMB 300 @ 442N/m, if the yield stress of steel is 250 Mpa. 9

UNIT — IV

IX (a) List the types of roof trusses. 6

(b) A masonry wall of 29 cm effective thickness is subjected to an eccentric load of 100KN at an eccentricity of 30 mm. The length of wall is 2.50 m and the mortar is of grade M1 (cement mortar 1:5) while the bricks used are of compressive strength 5.0N/mm^2. Check the design of the wall. Assume slenderness ratio of wall as 12. 9

OR

X (a) Explain the "Design considerations of a masonry wall". 6

(b) A roof truss shed is to be built in Lucknow for an industry. The size of shed is 24 × 40m. The height of building is 12m at the eves. Determine the basic wind pressure. 9

(13)

1

SCORING INDICATOR

Scoring indicator

REVISION : 2015 **COURSE CODE :6013**

COURSE TITLE : **STRUCTURAL DESIGN -11**

QN NO			SPLIT SCORE	SUB TOTAL	TOTAL
		PART-A			
1	1	Bolted , Rivetted ,Welded (Any two)	2	2	
	2	A tension member also called tie member is one which, is intended to resist axial tension.	2	2	
	3	Slenderness ratio : Ratio of Effective length to least radius of gyration λ = kl/r min.	1+1	2	
	4	Laterally supported beam: A beam in which the compression flange is laterally supported by flooring.It is mainly subjected to bending and shear	2	2	
	5	Effective height of masonry wall : The effective height (h) to be used for calculating the slenderness ratio, is the function of the actual height (H) of the wall and the condition of lateral support (varies from 0.75H to 1.50H)	2	2	10
		PART-B			
11	1	Properties of Structural steel: a) Physical properties : i).Unit mass of steel ρ =7850kg/m^3 ii) modulas of elasticity E= 2x10^5 N/mm^2 iii) poisson's ratio μ =0.30 iv)Modulas of rigidity G=0.769x10^{5}N/mm^2 v)Co-efficient of thermal expansion α =12x10^{-6}/^{o}C	3x1		
		b) mechanical properties: i) Yield stress fy ii)Tensile or ultimate stress fu iii)maximum percentage of elongation on guage length iv) Notch toughness	3x1	6	
	2	Design shear strength of bolt for lap joint Fe 410 steel , fu= 410 Mpa 4.6 grade bolt, fub = 400 Mpa Diameter of bolt = 16mm Anb = 0.78x π 16^2/4 = 156.83 mm^2	1		
		For lap joint , bolt is in single shear, ns =0, nn =1 Vdsb = Vnsb/rmb Vnsb =(fu/√3)x (nn Anb+ ns Asb) = 37.12KN	4		
		Vdsb = (37.12/1.25) = 29.70KN	1	6	

3	i) Gross area: The total area of cross section of the member without deducting the area of holes in it is called gross area .	2		
	ii) Net area :The area of cross section of the member after deducting the area of holes is called net area	2		
	iii) Net effective area : The equivalent area of an imaginary axially loaded member of equal load carrying capacity is called net effective area	2	6	
4	Steps involved in the design of copression members : 1.Design stress in compression is to be assumed (fcd) 2. Determine effective sectional area A=Pd/fcd 3.Select a section to give effective area required and calculate rmin 4.Knowing the end conditions and deciding the type of connection determine effective length 5.Find slenderness ratio and hence design stress **fcd** and load carrying capacity **Pd** 6.Revised the section if calculated **Pd** deffers considerably from the design load	6x1	6	
5	Classification of cross section 1) Class- 1 (Plastic) cross section: These section can develop plastic hinges and have the rotation capacity required for failure of the structure by formation of plastic mechanism.	1½		
	2) Class-2 (compact) Cross sections : Such section can develop plastic moment of resistence ,but have inadequate plasic hinge rotation capacity for formation of plasic mechanism, due to local buckling.	1½		
	3) Class -3(Semi compact) Cross sections : These are the sections in which the extreme fibre in compression can reach yield stress , but cannot develop the plasic moment of resistence , due to local buckling.	1½		
	4) Class-4 (slender) cross sections : The cross sections the element of which buckle locally even before reaching yield stress belong to this category. They having width to thickness ratio more than specified for class 3	1½	6	
6	Loads acting on roof truss 1.Dead load 2.Live load 3.Wind load 4.Earth quake load 5.Erection load 6.Snow load	6x1	6	

8|13.

	7	Short notes on: a) Stress reduction factor : It depends on the slenderness ratio and eccentricity of loading divided by the thickness of the member. The value of stress reduction factor for slenderness ratio varying from 6 to 27 and eccentricity of loading diveded by the thickness of the member variying from 0 to 1/3 are given in table 9 of IS 1905-1987	3		
		b) Area reduction factor : This factor taken in to considerations smallness of the sectional area of the elements and is applicable when c/s area of the elements is less than $0.20m^2$. As per IS 1905-1987 the area reduction factor is given by $k_a = 0.7+1.5A$, where A = area of section in m^2.	3	6	
		(Any 5 x 6)			30
		PART-C			
111	1	Advantages of steel structures 1. It has high strength per unit mass 2.Assured quality and high durability 3.Speed of construction 4.It can be strengthened at any later time 5.It can be easily dismantled and transported to other sites quickly 6.If joints are taken care , it is the best waterand gas resistant 7.material is (any 6)	6x1	6	
	2	Given ; Size of plates : 120x8mm, 150x10 mm minimum size of weld = 8-1.50=6.50 use s = 6 mm fillet weld fu= 410 N/mm2, γ_{mw}=1.25, thick.of small plate =8mm, width of	2		
		full design strength of smaller plate = Ag.fy/γ_{mo}			

(contd ... page 4/12)

Full design strength of smaller plate =(8x120x250)/1.10 =218.18 KN 2

Let eff .length of weld be Lw, throat thickness t=0.70x6 =4.20 mm 1

Design strength of weld=(Lw.t.fu)/(√3x1.25)

218.18×10^3= Lwx 4.20x410/ (2.165) 3

Lw=274.31mm, hence provide effective length of 140 mm on each side. 1 9 15

OR

IV 1 Design philosophy

The aim of of design is to decide shape,size and connection details of the members so that the structure being designed will perform satisfactorily during its intended life. With an approprite degree of safety the structure should

a) Sustain all loads expected on it

b)sustain deformations during and after construction

c)Should have adequate durability

d) Should have adequate resistence to misuse and fire

e) Structure should be stable and have alternate load paths to pre 4

The design philosophies used are

i) Working stress method

ii) Ultimate load design 2 6

iii) Limit state design

2 Solution :

For M20 bolts of grade 4.6

diameter of bolt, d = 20mm

diameter of bolt hole, d_o = 22 mm

Ultimate strength f_{ub}= 400 Mpa

Partial safety factor , γ_{mb} =1.25

For Fe 410 plates, f_u = 410 Mpa

Partial safety factor , γ_{ml} =1.25

Strength of plate in joint

thickness of thinner plate, t =20mm

Width of plate b= 180 mm

no stagggering p_{si} =0

Number of bolt holes in the weakest section =3

A_n = [b-ndo +0] t

An =[180-3x22]x20 = 2280 mm^2

Design strength of plate in joint ,T_{dn} =0.90fu An/γ_{ml}

T_{dn} = (0.90x 410x2280/1.25) = 673.056 KN 2

Strength of bolt

strength in shear ; n_n = 1per bolt, n_s = 0

Anb =(0.78xπX20^2)/4 =245 mm^2

no reduction factor β_{ij} =β_{lg} =β_{pk} = 1 nominal shear strength Vnsb =(fub/√3)x (nn Anb+ns Asb)

((400/√3)x(6x245+0))= 339.482KN

Design strength = (Vnsb/γmb) =(339.482/1.25)=**271.59 KN** 3

D.Strength in bearing

Kb least of following

i) e/3 do= 0.4545 ii)(p/3do)-0.25 = 0.6591

iii) fub/fu =0.975 iv)1.0

Vnpb =2.5kb.d.t.fu =2.5x.4545x20x20x410= **186.35 KN**

D.Strength in bearing =Vnpb/γmb =**149.07 KN/bolt**

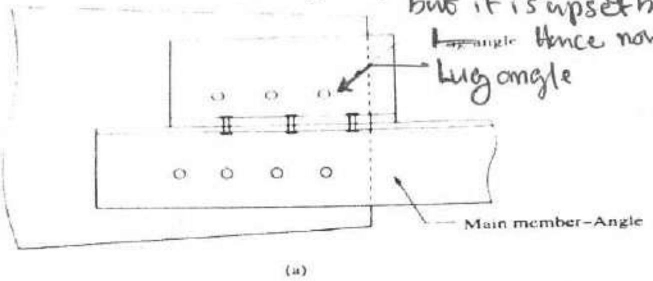
Design str.of joint = 6x 149.07 =**894.42 KN** 3

Design str. of joint = **271.59 KN** (least value) 1 9 15

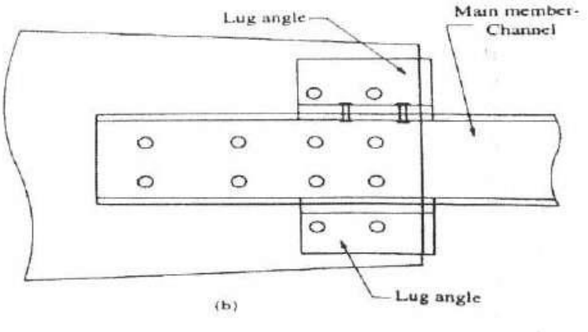
UNIT-11

V 1) Lug angle

Length of the end connection of a heavily loaded tension may be reduced by using lug angles. By using lug angles there will be saving in gusset plate but it is upset by aditional fasteners and angles required. Hence now adays, it is not preffered. 2



(a)



(b)

4 6

2

For rolled steel sections,

$f_y = 250\ N/mm^2$, $f_u = 410\ N/mm^2$ and $E = 2 \times 10^5\ N/mm^2$.

For both end pinned columns,

$KL = L = 3m$.

For ISHB 300 @ 577 N/m.

$h = 300$ mm, $b_f = 250$ mm, $t_f = 10.6$ mm, $A_e = A = 7484\ mm^2$

$\therefore \frac{h}{b_f} = 1.2$ and $t_f < 40$ mm.

Hence according to Table 10 in IS-800.

Hence according to ~~Table 6.1~~ (Refer Table 10 in IS 800) 3

it falls under buckling class 'b' for buckling about z-z axis and under class 'c' for buckling about y-y axis.

From steel table $r_{min} = r_{yy} = 54.1$ mm.

$$f_{cc} = \frac{\pi^2 E}{\left(\frac{KL}{r}\right)^2} = \frac{\pi^2 \times 2\times10^5}{\left(\frac{3000}{54.10}\right)^2} = 641.92 \text{ N/mm}^2 \quad 641.92 \text{ N/mm}^2$$

Non-dimensionalised effective slenderness ratio

$$\lambda = \sqrt{\frac{f_y}{f_{cc}}} = \sqrt{\frac{250}{641.92}} = 0.624$$

For buckling class b,

$\alpha = 0.34$.

$$\therefore \quad \phi = 0.5\,[1 + \alpha(\lambda - 0.2) + \lambda^2]$$
$$= 0.5\,[1 + 0.34\,(0.624 - 0.2) + 0.624^2]$$
$$= 0.767$$

$$\therefore \quad f_{cd} = \frac{f_y / \gamma_{mo}}{\phi + \left(\phi^2 - \lambda^2\right)^{0.5}}$$
$$= \frac{250/1.1}{0.767 + \left(0.767^2 - 0624^2\right)^{0.5}}$$
$$= 187.36 \text{ N/mm}^2$$

$\therefore$ Strength of column

$$P_d = A_c f_{cd} = 7484 \times 187.36$$
$$= 1402237 \text{ N}$$
$$= 1402.237 \text{ kN}$$ 5

$$\therefore \text{Working load} = \frac{1402.237}{1.5} = 934.823 \text{ kN}$$ **Answer** 1 9 15

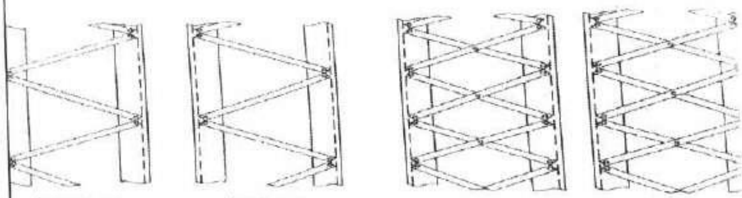
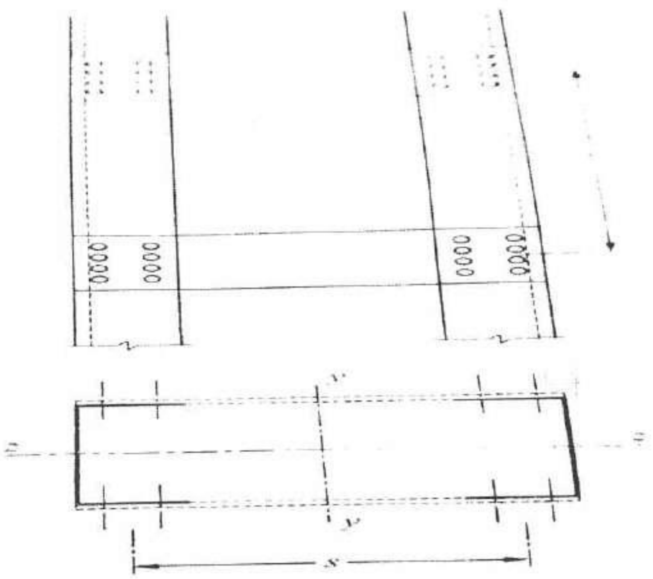
OR

VI. 1) <u>Lacing and Battens</u>

To achieve maximum value for miimum radius of gyration, without incresing the area of the section , a number of elements are placed away from the principal axis using suitable lateral system. The commonly used lateral systems are (a) lacing (b) battening. Perforated cover plates are also used for this purpose.

The object of providing lateral system is to keep the main members of the column away from principal ones. The lacing are subjected to shear force due to horizontal forces on column. Instead of lacing one can use battens to keep members of columns at required distances 2

Contd.. p6/12.

	  	2	
	 Battened column.	2	6
2	**Given :** ISA 90x60x6 mm, d= 16mm, d0=18mm Ag=865mm², L=90mm, b=60mm Desgn. Str. Due to yield of C/S, Tdg=Ag. Fy/rmo **Tdg= (865x250)/1.10 = 196.59 KN**	1	
	Design strength due to rupture: $T_{dn} = \frac{0.9 A_{nc} f_u}{\gamma_{m1}} + \frac{\beta A_{go} f_y}{\gamma_{m0}}$ where $\beta = 1.4 - 0.076 \left(\frac{W}{t}\right)\left(\frac{f_y}{f_u}\right)\left(\frac{b_s}{L_c}\right)$ where W = width of unconnected (or) out standing $= 60$ mm $t = 6$ mm b_s = shear lag width $= (W + W_1 - t)$ $W = (L-g) = 90 - 50 = 40$ mm		

L_c = length of end connection (distance between outer most bolts)

$L_c = 4 \times \text{pitch}$

$= 4 \times 250$

$= 200 \text{ mm}$

$b_s = W + W_1 - t$

$= 60 + 40 - 6$

$b_s = 94 \text{ mm}$

A_{nc} = net area of connected leg (deduct bolt hole)

$A_{nc} = \left[L - \frac{t}{2} - d_o\right] t$

$A_{nc} = \left[90 - \frac{6}{2} - 18\right] 6$

$A_{nc} = 414 \text{ mm}^2$ 2

A_{go} = gross area of out standing leg

$= \left|b - \frac{t}{2}\right| t$

$= \left|60 - \frac{6}{2}\right| 6$

$A_{go} = 342 \text{ mm}^2$

$\beta = 1.4 - 0.076 \left(\frac{60}{6}\right)\left(\frac{250}{410}\right)\left(\frac{94}{200}\right)$

$\beta = 1.182$

$\therefore T_{dn} = \frac{0.9 A_{nc} f_u}{r_{m1}} + \frac{\beta A_{go} f_y}{r_{mo}}$

$T_{dn} = \frac{(0.9)(414)(410)}{1.25} + \frac{(1.182)(342)(250}{1.1}$

$= 122.21 + 91.87$

$\therefore T_{dn} = 214.08 \text{ kN}$ 2

Design strength due to block shear:

$$T_{db1} = \left[\frac{A_{vg} f_y}{\sqrt{3}\, r_{mo}} + \frac{0.9 A_{tn} f_u}{r_{m1}}\right]$$

$$T_{db2} = \left[\frac{0.9 A_{vn} f_u}{\sqrt{3}\, r_{m1}} + \frac{A_{tg} f_y}{r_{mo}}\right]$$

A_{vg} = gross area in shear

$= [e + (n-1)p]\, t$

$= [30 + 4p]\, t$

$= [30 + (4 \times 50)]\, 6$

$= 1380 \text{ mm}^2$ 1

A_{vn} = net area In shear (deduct bolt holes, upto centre of last bolt

$A_{vn} = [e + (n-1)p - (n - 0.5d_0)]t$ ... last bolt

$= [30 + 4 \times 50 - (5 - 0.5 \times 18)]6$

$= [230 - (4.5 \times 18)]6$

$A_{vn} = 894 \text{ mm}^2$

$A_{tg} = 50 \times 6 = 300 \text{ mm}^2$

A_{tn} = net area in tension
(deduct bolt hole upto centre of bolt)

$A_{tn} = [g - 0.5\, d_0]\, t$

$= [50 - 0.5 \times 18]\, 6$

$= 246 \text{ mm}^2$

$$T_{db1} = \left[\frac{A_{vg} f_y}{\sqrt{3}\, r_{mo}} + \frac{0.9 A_{tn} f_u}{r_{m1}}\right]$$

$$= \left[\frac{1380 \times 250}{\sqrt{3} \times 1.1} + \frac{(0.9)(246)(410)}{1.25}\right]$$

$$= [181.07 + 72.61]$$

$T_{db1} = 253.68$ kN

$$T_{db2} = \left[\frac{0.9 \times A_{vn} \times f_u}{\sqrt{3}\, r_{m1}} + \frac{A_{tg} f_y}{r_{m0}}\right]$$

$$= \left[\frac{0.9 \times 894 \times 410}{\sqrt{3} \times 1.25} + \frac{300 \times 250}{1.1}\right]$$

$$= [152.36 + 68.18]$$

$T_{db2} = 220.54$ kN 2

Design Strength of the member = ***196.59KN*** (least value) 1 9 15

UNIT-111

VII 1) Given : V= 100 KN, ISWB 350, fy= 250N/mm2, h=350mm,tw=8mm

Factored SF Vu = 1.5x 100 =**150KN**

Condition : (0.60 Vd>Vu) 2

Design shear Vd= (Av.fy)/(√3 ɼmo), where Av = (hx tw)

Vd=(350x8x250)/(√3 x1.1) =**367.40KN** 2

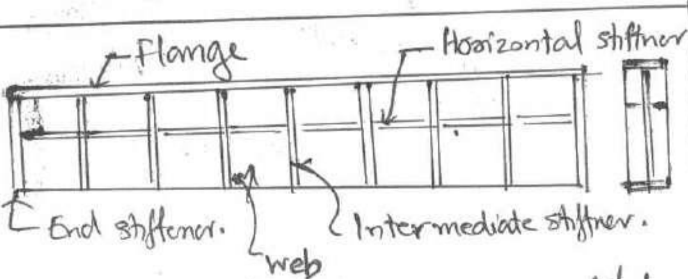
0.60 Vd= 0.60x 367.40 =**220.44 KN** 2 6

0.60Vd> Vu, hence beam is safe against shear

2) **10.2 ELEMENTS OF PLATE GIRDERS**

The following are the elements of a typical plate girder [Ref. Fig. 10.2].

1. Web
2. Flanges
3. Stiffeners



	4	

webs of required thickness are provided to
(a) keep flange plates at required distances.
(b) Resist the shear in the beam.

Flanges of required width and thickness to resist bending moment and acting on the beam is developing comp. forces in one flange tensile forces in another flange.

stiffneness are provided to safeguard the web against local buckling failure. The stiffners provided are classified into
(a) Transverse (vertical) stiffner and
(b) Longitudinal (horizontal) stiffner.

Transverse stiffner are of two types:
(i) bearing stiffener (ii) Intermediate stiffner — 5. — 9.

OR

VIII 1) Steel beam is a structural member with length considerably larger than c/sectional dimensions, subject to lateral loads which give rise to BM and SF in the member. Angles, channels, T or I sections are commonly used as beams. For heavier sections, builtup sections like plate girders are used. Based on lateral supports to comp. flanges they are classified as (i) laterally supported ii) Laterally un supported beams. For laterally supported, the beams are mainly subjected to bending and shear, where as for laterally unsupported it is subjected to lateral buckling of comp. flange, resulting reduction in the load carrying capacity. — 3.

Design procedure:

1. Trial section is selected assuming it is going to plastic section.
2. section checked for the class it belongs.
3. check for bending strength.
4. check for shear strength.
5. check for deflection.

If any check fails the section is revised. 3 6.

2. Given: ISMB 300 @ 442 N/m, $f_y = 250$ Mpa

properties: $h = 300$ mm, $b_f = 140$ mm, $t_f = 12.40$ mm

$t_w = 7.50$ mm $Z_{xx} = 573.6 \times 10^3$ mm^3

$d = h - 2t_f = 300 - (2 \times 12.40) = 275.20$ mm. 2

$M_d = (\beta_b \cdot Z_p \cdot f_y)/\gamma_{mo}$, referring table-2 of 1

IS 800, $b/t_f = \left[\frac{b_f}{2}/t_f\right] = 5.64 < 9.40\varepsilon$

(where $\varepsilon = 1$) and $(d/t_w) = 36.69 < 84\varepsilon$, the

given section is plastic and $\beta_b = 1$ 2.

for symmetrical I section $(Z_p/Z_{xx}) = 1.14$

$Z_p = 1.14 \times 573.6 \times 10^3 = 653.90 \times 10^3$ mm^3 2

∴ Design bending strength

$M_d = (\beta_b \times Z_p \times f_y)/\gamma_{mo}$

$= (1 \times 653.90 \times 10^3 \times 250)/1.10$

$= 148.61$ kNm. 2 9 15.

		UNIT-IV			
IX 1)		**Types of Roof truss** 1.King post truss 2.Queen post truss 3.Howe-triangle truss 4.Fink or French truss 5.Compound French truss 6.North light truss 7.Pratt truss (Any six)	6	6	
	2)	**Solution** : Given P= 10KN, e =30mm, t=290mm sl.ratio = 12, L= 2.50m eccentricity ratio = (e/t)= (30/290)= 0.103 As the eccentricity ratio lies between(1/24)= 0.04 and (1/6)= Area of wall =2.5x0.29 = 0.725 m^2>0.20 m^2	2		
		Hence area reduction factor K_a =1.0 From table (9) Of IS: 1905-1987 for Sl.ratio =12 (e/t)=(1/12), Ks =0.81 (e/t)=(1/6), Ks =0.78 Hence for (e/t)= 0.103, Ks= 0.803	2		
		1.0 and crushing strength of brick as 5N/mm^2 from table (10) of IS de mortar with crushing strength from table (8) of IS 1905-1987 is (permissible comp. stress $f_c = 1.25 \times k_a \times k_s \times k_p \times f_b$	2		
		f_c =(1.25x1.0x 0.803 x 1.20 x0.50) = 0.602 N/mm^2 The actual stress $f = (P/1000 \times t) \pm (6Pe/1000 \times t^2)$ **Max stress = 0.559 n/mm^2 (C)** **Min. stress = 0.134 N/mm^2 (C)** Since the max. comp stress is less than the permissible stress the	3	9	15
X	1).	**Design considerations** Masonry structures gain stability from the support offered by cross walls,floors, roofs and other elements such as piers and buttresses. Load bearing walls are structurally more efficient when the load is uniformly distributed and the structure is planned such that the eccentricity of the loading the member is small as possible. Eccentric loading is to be avoided by providing adequate bearing of floor or roof slab on the wall. Adequate stiffness in slab is to be provided and fixity at supports is to be avoided.	2		

Contd... 13.

SCORING INDICATOR

The strength of wall is measured in terms of its resistence to the combination of self weight, super imposed load and lateral pressure.The stability of wall is indicated by its resistence to over turning by lateral forces and buckling caused by excessive slenderness ratio. The strength of a masonry wall depends upon the strength of masonry unit and strength of mortar. The quality of workmanship and the method of bonding also have a bearing on the strength of masonry wall. 2

The mix proportions and strength of commonly used mortars for masonry may be obtained from IS 1905-1987.e thickness of load bearing wall should be such that it is sufficient at all points to ensure the resulting stresses due to the loading for which the wall is designed ae within the prescibed limits for that type of wall. 2 6

2) **Solution** : From wind zone map (IS875-Part3) , the basic wind speed in luknow is V_b =47m/s

Risk co efficient K1 , from table 12.1 for gen. building with

Terrain height and structure size factor K2 2

dimension being 40 m, It belong to class B structure. K2= 0.88 for h= 10m,K2= 0.94 if h= 15 m

there for h= 12 m , K2 = 0.904 2

Topography factor K3, the ground near shed may be assumed plain K3= 1+ Cs

Cs= Z/L = 0, there for K3 =1.0 1

Design wind speed V2 = K1. K2. K3. Vb

= 1.0x 0.904x1.0x 47 = 42.488 m/s 2

Basic wind pressure Pz= 0.60 Vz^2=0.60 x 42.488^2= 1083N/m^2 2 9 15