L-3/T-2/ARCH **Date : 16/07/2017**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-3/T-2 B. Arch Examinations 2015-2016

Sub : **ARCH 353** (Urban Design I)

Full Marks: 140 Time : 3 Hours

USE SEPARATE SCRIPTS FOR EACH SECTION

The figures in the margin indicate full marks.

SECTION – A

There are **FIVE** questions in this section. Answer **Q. No. 5** and any **THREE** from the rest.

1. Define the terms 'Urban', 'Urbanism' and 'Urban Design'. Discuss the three orientations in 'Urban Design' with suitable examples. **(6+10=16)**

2. Discuss the context of 'Urban Design and Development' in the 19th and 20th century and how this was manifested spatially. **(8+8=16)**

3. Discuss the logic of 'Herdsman and Hunters' settlement pattern. Does it have any relevance to early Greek and Roman settlement? Elaborate. **(8+8=16)**

4. 'Land use' and 'Traffic and Transportation' shape a city pattern- Discuss with suitable examples. **(16)**

5. Write short notes on any **two** of the following: **(11×2=22)**
   (a) Open space and Urban space.
   (b) Quality of Environment as the domain of Urban Design.
   (c) Sustainable Urban Design.

SECTION-B

There are **FIVE** questions in this section. Answer **Q. No. 6** and any **THREE** from the rest.

6. Write notes on any **two** of the following: **(11×2=22)**
   (a) Garden City.
   (b) Spatial organization of urban space.
   (c) Non-measurable urban design attributes.

7. Discuss the general characteristics of Urban Design interventions at various levels. **(16)**

8. Define 'Scale' in Urban Design and discuss its relationship with 'Urban Mass', 'Urban Enclosure' and 'Urban Space'. **(16)**

9. Discuss the measurable Urban Design criteria, using examples with sketches. **(16)**

10. (a) Elaborate the domains of Urban Design with which a professional Urban designer deals with. **(10)**
    (b) Name five attributes of Kevin Lynch to enable reading a city. Use examples with short descriptions. **(6)**

L-3/T-2/ARCH **Date : 09/08/2017**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-3/T-2 B. Sc. Engineering Examinations 2015-2016

Sub : **CE 367** (Structure IV: Steel and Timber Structures)

Full Marks: 140 Time : 3 Hours

USE SEPARATE SCRIPTS FOR EACH SECTION

The figures in the margin indicate full marks.

SECTION – A

There are **FOUR** questions in this section. Answer any **THREE**.

1. (a) Write short notes on: **(8⅓)**

(i) Effective length in column section

(ii) Classification of sawn lumber

(iii) Different types of roof truss.

(b) Select the lightest W 12 section of A572 Grade 50 steel for a column subjected to an axial compression of 300 kips. Assume the member is hinged at the top and bottom for bending about either principle axis and length of column is 10 feet. Use AISC/ASD specification. Table for design properties is given in Annexure-A. **(15)**

2. (a) Prove that for a rectangular beam section, maximum shear stress is $\frac{3V}{2A}$. **(8⅓)**

(b) Select the lightest A36 steel W12 section for a simply supported beam of 15′ span supporting a dead load of 0.15 kip/ft and live load of 0.85 kip/ft. Assume beam is fully supported against lateral torsional bucking. **(15)**

Table for design properties is given in Annexure-A.

3. (a) (i) Draw and label a cross section of log showing the cellular makeup of wood. **(8⅓)**

(ii) Draw a bar chart showing different moisture condition in lumber.

(b) Two 2″ x 10″ x 10′ Spruce Pine Fir is to be used together as a single beam. The beam is used in dry conditions and normal temperature to support a snow load, and is simply supported at each end and is laterally supported along its length. Total load on the beam is 500 lb/ft. **(3+7+5)**

(i) Locate the section where maximum bending stress develops and determine the magnitude of maximum bending stress on the section.

(ii) Determine the allowable bending stress, F_b' for the beam.

(iii) Based on the answer from i) and ii), determine if the beam is adequate for supporting the load. If not, determine the number of additional 2″ x 10″ lumbers that are needed to reduce the bending stress below the allowable limit.

Use Annexure B and C.

Contd P/2

CE 367/ARCH

4. (a) Distinguish between compact section, non-compact section and slender section in steel column. **(8 ⅓)**

(b) (i) Define slenderness ratio in timber beams. For the timber beam (two2″ x 10″ x 12′) mentioned in Question 2(b), **(5+8+2)**

(ii) Locate the section where the maximum value for shear force is observed. Compute the maximum shear stress and check whether it is within the allowable limit.

(iii) Calculate the maximum deflection due to the load.

Use Annexure B and C.

SECTION-B

There are **FOUR** questions in this section. Answer any **THREE** questions.

Assume reasonable values for any missing data, if any.

5. (a) What are the assumptions made in truss analysis? **(5 ⅓)**

(b) Design the following members of a pratt truss (shown in Fig. 1) from the load table given below: **(18)**

Member	Member Force (kip)		
	Dead load (kip)	Wind (left-to-right) (kip)	Wind (right-to-left) (kip)
$U_2 U_3$	-11.2	16.8	12.7
$U_2 L_3$	-6.8	-5.2	23.72
$U_1 L_1$	0.94	0	0

Assume, K = 0.6 F_y = 36 ksi, E = 29000 ksi (Annexure 1 is attached for section properties)

6. Calculate the joint loads for dead and wind load (show the loading diagram with loads at the joint) for the interior truss of an industrial building (Fig. 1). Spacing between two adjacent trusses (bay) is 20 ft. Show the loads with neat sketches. **(23 ⅓)**

Given:

Loads:

(a) CGI Sheet Roofing = 2.2 psf

(b) Purlins = 1.35 psf

(c) Sagrod, Bracings = 1.5 psf

(d) Self-weight of truss = 60 lb/ft of horizontal span

Design wind speed = 220 km/h

Wall Height = 18 ft

$C_c = 47.2 \times 10^{-6}$

$q_z = C_c C_I C_z V_b^2$

$p_z = C_G C_{pe} q_z$

Other charts are enclosed with the question (Annexure 2, 4, 5)

Contd P/3

CE 367/ARCH

7. Following data are given for the question below:

CGI Roofing = 2.0 psf

Self-weight of purlins = 1.5 psf

Spacing between adjacent trusses = 24 ft

Design wind pressure:

Windward Side = 8.75 psf

Leeward side = -22.33 psf

Trial Section for Purlin (A36 steel): **(23 ⅓)**

(1) C 10 x 30 (S_{xx} = 20.7 in^3, S_{yy} = 1.65 in^3)

(2) C 12 x 30 (S_{xx} = 27.0 in^3, S_{yy} = 2.06 in^3)

(3) C 15 x 33.9 (S_{xx} = 42.0 in^3, S_{yy} = 3.11 in^3)

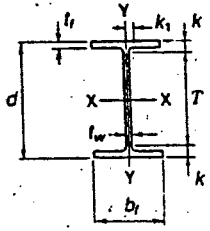
Sagrod is provided at half the distance in between trusses.

Consider X-axis in the plane of roofing and Y-axis in the perpendicular direction of the plane of roofing. Equation for moment about X-axis is $wL^2/8$ and moment about Y-axis is $wL^2/32$.

Check for adequacy of the trial purlin sections considering both dead load and wind load for the truss shown in fig. 1. Comment on whether the section (1), (2), (3) are adequate or not.

8. (a) Draw a simple pratt truss and label the different components in it. **(3 ⅓)**

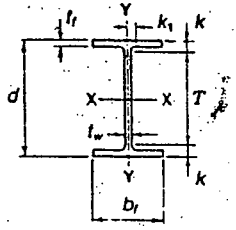
(b) Suppose, the members U_2 U_3 and U_2 L_3 mentioned in Question 5 (refer to Fig. 1) are designed to be L 4 x 4 x $\frac{3}{4}$ and L 4 x 4 x $\frac{5}{8}$ respectively. At node U_2 both of them are connected to a gusset plate of thickness $\frac{5}{16}$ ". Design fillet welds for this connection. Given, F_y = 36 ksi. Use Annexure 1,3. **(20)**



W SHAPES
Dimensions

Design-nation	Area A	Depth d	Web Thickness t_w	Web $\frac{t_w}{2}$	Flange Width b_f	Flange Thickness t_f	Distance T	Distance k	Distance k_1
	In.²	In.	In.	In.	In.	In.	In.	In.	In.
W 12×336*	98.8	16.82	16¼	1.775	1¾	¾	13.385	13⅜	2.955	2¹⁵⁄₁₆	9⅛	3¹⁵⁄₁₆	1¼
×305*	89.6	16.32	16¼	1.625	1⅝	¾	13.235	13¼	2.705	2¾	9⅛	3⅞	1¹⁄₁₆
×279*	81.9	15.85	15⅞	1.530	1½	¾	13.140	13⅛	2.470	2½	9⅛	3¹⁵⁄₁₆	1⅛
×252*	74.1	15.41	15⅜	1.395	1⅜	¾	13.005	13	2.250	2¼	9⅛	3¹⁵⁄₁₆	1⅛
×230*	67.7	15.05	15	1.285	1¼	¾	12.895	12⅞	2.070	2⅛	9⅛	3¹⁵⁄₁₆	1¹⁄₁₆
×210*	61.8	14.71	14¾	1.190	1⅛	¾	12.790	12¾	1.900	1⅞	9⅛	3¹⁵⁄₁₆	1
×190	55.8	14.38	14⅜	1.060	1¹⁄₁₆	⅝	12.670	12⅝	1.735	1¾	9½	2¹⁵⁄₁₆	1¹⁄₁₆
×170	50.0	14.03	14	0.960	¹⁵⁄₁₆	½	12.570	12⅝	1.560	1⅝	9½	2¼	1⅛
×152	44.7	13.71	13¾	0.870	⅞	⁷⁄₁₆	12.480	12½	1.400	1⅜	9½	2⅛	1¹⁄₁₆
×136	39.9	13.41	13⅜	0.790	¹³⁄₁₆	⅜	12.400	12⅜	1.250	1¼	9½	1¹⁵⁄₁₆	1
×120	35.3	13.12	13⅛	0.710	¹¹⁄₁₆	⅜	12.320	12⅜	1.105	1⅛	9½	1¹³⁄₁₆	1
×106	31.2	12.89	12⅞	0.610	⅝	⁵⁄₁₆	12.220	12¼	0.990	1	9½	1¹¹⁄₁₆	¹⁵⁄₁₆
× 96	28.2	12.71	12¾	0.550	⁹⁄₁₆	⁵⁄₁₆	12.160	12⅛	0.900	⅞	9½	1⅝	⅞
× 87	25.6	12.53	12½	0.515	½	¼	12.125	12⅛	0.810	¹³⁄₁₆	9½	1½	⅞
× 79	23.2	12.38	12⅜	0.470	½	¼	12.080	12⅛	0.735	¾	9½	1⁷⁄₁₆	⅞
× 72	21.1	12.25	12¼	0.430	⁷⁄₁₆	¼	12.040	12	0.670	¹¹⁄₁₆	9½	1⅜	⅞
× 65	19.1	12.12	12⅛	0.390	⅜	³⁄₁₆	12.000	12	0.605	⅝	9½	1⁵⁄₁₆	¹³⁄₁₆
W 12× 58	17.0	12.19	12¼	0.360	⅜	³⁄₁₆	10.010	10	0.640	⅝	9½	1⅜	¹³⁄₁₆
× 53	15.6	12.06	12	0.345	⅜	³⁄₁₆	9.995	10	0.575	⁹⁄₁₆	9½	1¼	¹³⁄₁₆
W 12× 50	14.7	12.19	12¼	0.370	⅜	³⁄₁₆	8.080	8⅛	0.640	⅝	9½	1⅜	¹³⁄₁₆
× 45	13.2	12.06	12	0.335	⅜	³⁄₁₆	8.045	8	0.575	⁹⁄₁₆	9½	1¼	¹³⁄₁₆
× 40	11.8	11.94	12	0.295	⁵⁄₁₆	³⁄₁₆	8.005	8	0.515	½	9½	1¼	¾
W 12× 35	10.3	12.50	12½	0.300	⁵⁄₁₆	³⁄₁₆	6.560	6½	0.520	½	10½	1	⁹⁄₁₆
× 30	8.79	12.34	12⅜	0.260	¼	⅛	6.520	6½	0.440	⁷⁄₁₆	10½	¹⁵⁄₁₆	½
× 26	7.65	12.22	12¼	0.230	¼	⅛	6.490	6½	0.380	⅜	10½	⅞	½
W 12× 22	6.48	12.31	12¼	0.260	¼	⅛	4.030	4	0.425	⁷⁄₁₆	10½	⅞	½
× 19	5.57	12.16	12⅛	0.235	¼	⅛	4.005	4	0.350	⅜	10½	¹³⁄₁₆	½
× 16	4.71	11.99	12	0.220	¼	⅛	3.990	4	0.265	¼	10½	¾	½
× 14	4.16	11.91	11⅞	0.200	³⁄₁₆	⅛	3.970	4	0.225	¼	10½	¹¹⁄₁₆	½

*For application refer to Notes in Table 2.
Shapes in shaded rows are not available from domestic producers.



W SHAPES
Properties

Nominal Wt. per Ft.	Compact Section Criteria $\frac{b_f}{2t_f}$	Compact Section Criteria F_y'	Compact Section Criteria $\frac{d}{t_w}$	Compact Section Criteria F_y''	r_T	$\frac{d}{A_f}$	Elastic Properties Axis X-X I	Axis X-X S	Axis X-X r	Axis Y-Y I	Axis Y-Y S	Axis Y-Y r	Plastic Modulus Z_x	Plastic Modulus Z_y
Lb.		Ksi		Ksi	In.		In.⁴	In.³	In.	In.⁴	In.³	In.	In.³	In.³
336	2.3	—	9.5	—	3.71	0.43	4060	483	6.41	1190	177	3.47	603	274
305	2.4	—	10.0	—	3.67	0.46	3550	435	6.29	1050	159	3.42	537	244
279	2.7	—	10.3	—	3.64	0.49	3110	393	6.16	937	143	3.38	481	220
252	2.9	—	11.0	—	3.59	0.53	2720	353	6.06	828	127	3.34	428	196
230	3.1	—	11.7	—	3.56	0.56	2420	321	5.97	742	115	3.31	386	177
210	3.3	—	12.5	—	3.53	0.61	2140	292	5.89	664	104	3.28	348	159
190	3.7	—	13.6	—	3.50	0.65	1890	263	5.82	589	93.0	3.25	311	143
170	4.0	—	14.6	—	3.47	0.72	1650	235	5.74	517	82.3	3.22	275	126
152	4.5	—	15.8	—	3.44	0.79	1430	209	5.66	454	72.8	3.19	243	111
136	5.0	—	17.0	—	3.41	0.87	1240	186	5.58	398	64.2	3.16	214	98.0
120	5.6	—	18.5	—	3.38	0.96	1070	163	5.51	345	56.0	3.13	186	85.4
106	6.2	—	21.1	—	3.36	1.07	933	145	5.47	301	49.3	3.11	164	75.1
96	6.8	—	23.1	—	3.34	1.16	833	131	5.44	270	44.4	3.09	147	67.5
87	7.5	—	24.3	—	3.32	1.28	740	118	5.38	241	39.7	3.07	132	60.4
79	8.2	62.6	26.3	—	3.31	1.39	662	107	5.34	216	35.8	3.05	119	54.3
72	9.0	52.3	28.5	—	3.29	1.52	597	97.4	5.31	195	32.4	3.04	108	49.2
65	9.9	43.0	31.1	—	3.28	1.67	533	87.9	5.28	174	29.1	3.02	96.8	44.1
58	7.8	—	33.9	57.6	2.72	1.90	475	78.0	5.28	107	21.4	2.51	86.4	32.5
53	8.7	55.9	35.0	54.1	2.71	2.10	425	70.6	5.23	95.8	19.2	2.48	77.9	29.1
50	6.3	—	32.9	60.9	2.17	2.36	394	64.7	5.18	56.3	13.9	1.96	72.4	21.4
45	7.0	—	36.0	51.0	2.15	2.61	350	58.1	5.15	50.0	12.4	1.94	64.7	19.0
40	7.8	—	40.5	40.3	2.14	2.90	310	51.9	5.13	44.1	11.0	1.93	57.5	16.8
35	6.3	—	41.7	38.0	1.74	3.66	285	45.6	5.25	24.5	7.47	1.54	51.2	11.5
30	7.4	—	47.5	29.3	1.73	4.30	238	38.6	5.21	20.3	6.24	1.52	43.1	9.56
26	8.5	57.9	53.1	23.4	1.72	4.95	204	33.4	5.17	17.3	5.34	1.51	37.2	8.17
22	4.7	—	47.3	29.5	1.02	7.19	156	25.4	4.91	4.66	2.31	0.847	29.3	3.66
19	5.7	—	51.7	24.7	1.00	8.67	130	21.3	4.82	3.76	1.88	0.822	24.7	2.98
16	7.5	—	54.5	22.2	0.96	11.8	103	17.1	4.67	2.82	1.41	0.773	20.1	2.26
14	8.8	54.3	59.6	18.6	0.95	13.3	88.6	14.9	4.62	2.36	1.19	0.753	17.4	1.90

ANNEXURE A

Moisture Content Factors C_M [a,b,e]								
Strength Property	Fb	Ft	Fc	Fc⊥	Fv	E	Frt	Fg
Sawn Lumber, Visual or Machine Graded Wet conditions of use MC > 19% Dimension lumber (including Southern Pine)	0.85[a]	1.00	0.80[b]	0.67	0.97	0.90	--	--d
5 in. X 5 in. and larger	1.00	1.00	0.91	0.67	1.00	1.00	--	--d
Decking Wet conditions if use all Species except Southern Pine[c]	0.85	--	--	0.67	--	0.90	--	--

Notes:
a) When $(F_b)(C_F)$ for dimension lumber of all species ≤ 1150 psi, C_M = 1.0.
b) When $(F_c)(C_F)$ for dimension lumber of all species except Southern Pine ≤ 750 psi, C_M = 1.0; when F_c for visually graded Southern Pine ≤ 750 psi, C_M = 1.0.
c) For Southern Pine, use Reference design values for wet service conditions

SIZE FACTORS, C_F- for Sawn Lumber not including Southern Pine					
		F_b		F_t	F_c
Grades	Width/Depth	Thickness			
		2" & 3"	4"		
Select Structural, No.1 & Btr. No. 1, No. 2, No. 3	2",3"&4"	1.5	1.5	1.5	1.15
	5"	1.4	1.4	1.4	1.1
	6"	1.3	1.3	1.3	1.1
	8"	1.2	1.3	1.2	1.05
	10"	1.1	1.2	1.1	1.0
	12"	1.0	1.1	1.0	1.0
	14" & Wider	0.9	1.0	0.9	0.9
Stud	2", 3" & 4"	1.1	1.1	1.1	1.05
	5" & 6"	1.0	1.0	1.0	1.0
Construction & Standard	2", 3, & 4"	1.0	1.0	1.0	1.0
Utility	4"	1.0	1.0	1.0	1.0
	2" & 3"	0.4	--	0.4	0.6

Frequently Used Load Durations Factors C_D[1]		
Load Duration	C_D	Typical Design Loads
Permanent (>10 yrs)	0.9	Dead Load
Ten Years (Normal)	1.0	Occupancy Live Load
Two Months	1.15	Snow Load
Seven Days	1.25	Construction Load (Roof Included)
Ten Minutes	1.6	Wind/Earthquake Load
Impact[2]	2.0	Impact Load

=5=

Annexure B

Moisture Content Factors C_M [a,b,e]								
Strength Property	Fb	Ft	Fc	Fc⊥	Fv	E	Frt	Fg
Sawn Lumber, Visual or Machine Graded Wet conditions of use MC > 19% Dimension lumber (including Southern Pine)	0.85[a]	1.00	0.80[b]	0.67	0.97	0.90	--	--d
5 in. X 5 in. and larger	1.00	1.00	0.91	0.67	1.00	1.00	--	--d
Decking Wet conditions if use all Species except Southern Pine[c]	0.85	--	--	0.67	--	0.90	--	--

Notes:
a) When $(F_b)(C_F)$ for dimension lumber of all species ≤ 1150 psi, C_M = 1.0.
b) When $(F_c)(C_F)$ for dimension lumber of all species except Southern Pine ≤ 750 psi, C_M = 1.0; when F_c for visually graded Southern Pine ≤ 750 psi, C_M = 1.0.
c) For Southern Pine, use Reference design values for wet service conditions

SIZE FACTORS, C_F- for Sawn Lumber not including Southern Pine					
		F_b		F_t	F_c
Grades	Width/Depth	Thickness			
		2" & 3"	4"		
Select Structural, No.1 & Btr. No. 1, No. 2, No. 3	2",3"&4"	1.5	1.5	1.5	1.15
	5"	1.4	1.4	1.4	1.1
	6"	1.3	1.3	1.3	1.1
	8"	1.2	1.3	1.2	1.05
	10"	1.1	1.2	1.1	1.0
	12"	1.0	1.1	1.0	1.0
	14" & Wider	0.9	1.0	0.9	0.9
Stud	2", 3" & 4"	1.1	1.1	1.1	1.05
	5" & 6"	1.0	1.0	1.0	1.0
Construction & Standard	2", 3, & 4"	1.0	1.0	1.0	1.0
Utility	4"	1.0	1.0	1.0	1.0
	2" & 3"	0.4	--	0.4	0.6

Frequently Used Load Durations Factors C_D[1]		
Load Duration	C_D	Typical Design Loads
Permanent (>10 yrs)	0.9	Dead Load
Ten Years (Normal)	1.0	Occupancy Live Load
Two Months	1.15	Snow Load
Seven Days	1.25	Construction Load (Roof Included)
Ten Minutes	1.6	Wind/Earthquake Load
Impact[2]	2.0	Impact Load

Annexure C

TEMPERATURE FACTORS, C_t				
Design Values	In Service Moisture Conditions	C_t T≤100°F	C_t 100°F<T≤125°F	C_t 125°F<T≤150°F
F_t, E	Wet or Dry	1.0	0.9	0.9
F_b, F_v, F_c and $F_{c\perp}$	Dry	1.0	0.8	0.7
F_b, F_v, F_c and $F_{c\perp}$	Wet	1.0	0.7	0.5

Design Values for Visually Graded Dimension Lumber (2"-4" thick) Except Southern Pine* **

Species and commercial grade	Size classification	Bending Fb	Tension parallel to grain Ft	Shear parallel to grain Fv	Compression perpendicular to grain Fc1	Compression parallel to grain Fc	Modulus of Elasticity E	Minimum Modulus of Elasticity Emin
Redwood								
Clear Structural	2" & wider	1750	1000	160	650	1850	1400000	510000
Select Structural		1350	800	160	650	1500	1400000	510000
Select Structural, open grain		1100	625	160	425	1100	1100000	400000
No. 1		975	575	160	650	1200	1300000	470000
No.1, open grain		775	450	160	425	900	1100000	400000
No. 2		925	525	160	650	950	1200000	440000
No.2, open grain		725	425	160	425	700	1000000	370000
No. 3		525	300	160	650	550	1100000	400000
No.3, open grain		425	250	160	425	400	900000	330000
Stud		575	325	160	425	450	900000	330000
Construction	2" & wider	825	475	160	425	925	900000	330000
Standard		450	275	160	425	725	900000	330000
Utility	2"- 4" wide	225	125	160	425	475	800000	290000
Spruce-Pine-Fir								
Select Structural	2" & wider	1250	700	135	425	1400	1500000	550000
No. 1/No. 2		875	450	135	425	1150	1400000	510000
No. 3		500	250	135	425	650	1200000	440000
Stud	2" & wider	675	350	135	425	725	1200000	440000
Construction		1000	500	135	425	1400	1300000	470000
Standard	2"- 4" wide	550	275	135	425	1150	1200000	440000
Utility		275	125	135	425	750	1100000	400000

Recommended Deflection Limitations

Use classification	Applied load only	Applied load + dead load
Roof beams		
Industrial	$l/180$	$l/120$
Commercial and institutional		
Without plaster ceiling	$l/240$	$l/180$
With plaster ceiling	$l/360$	$l/240$
Floor beams		
Ordinary usage*	$l/360$	$l/240$
Highway bridge stringers	$l/200$ to $l/300$	
Railway bridge stringers	$l/300$ to $l/400$	

* The ordinary usage classification is for floors intended for construction in which walking comfort and minimized plaster cracking are the main considerations. These recommended deflection limits may not eliminate all objections to vibrations such as in long spans approaching the maximum limits or for some office and institutional applications where increased floor stiffness is desired. For these usages the deflection limitations in the following table have been found to provide additional stiffness.

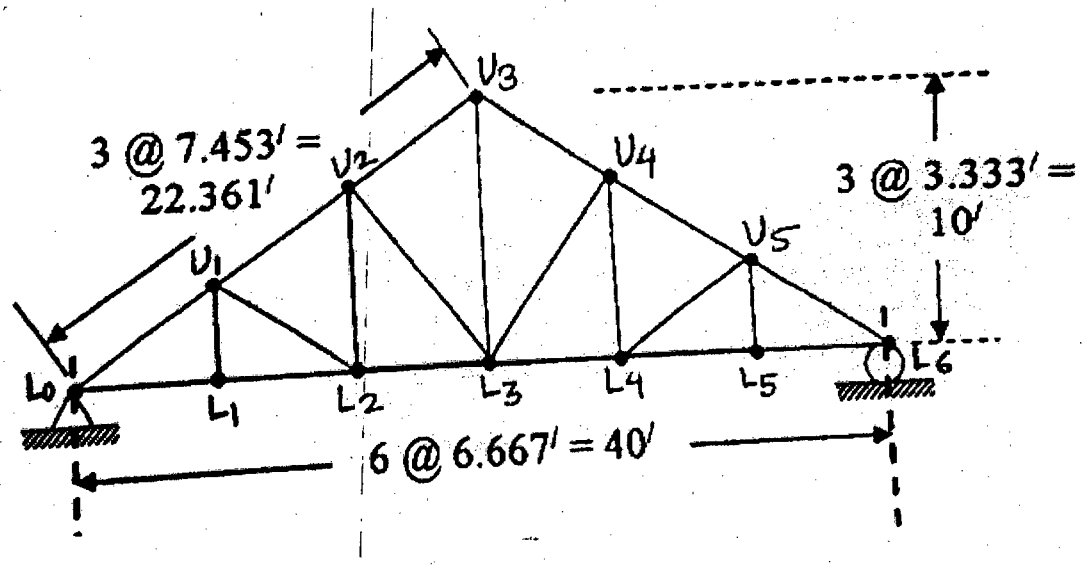
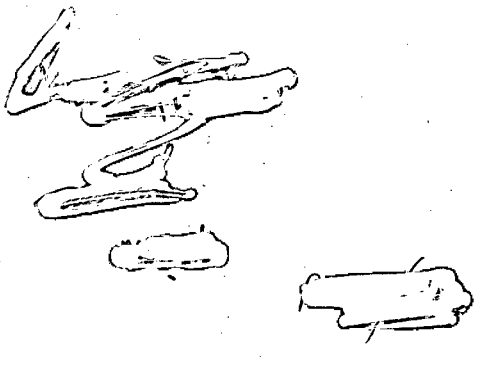


Figure 1



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Annexure- 1

Section	Area (in^2)	Ix (in^4)	Sx (in^3)	rx (in)	Iy (in^4)	Sy (in^3)	ry (in)	Iz (in^4)	rz (in)
L4X4X3/8	2.86	4.52	1.6	1.23	4.32	1.6	1.23	1.73	0.779
L4X4X7/16	3.3	5.23	1.73	1.22	4.991	1.73	1.22	1.99	0.777
L4X4X1/2	3.75	5.82	1.96	1.21	5.62	1.96	1.21	2.26	0.776
L4X4X3/4	5.44	7.62	2.79	1.18	7.62	2.79	1.18	3.29	0.774
L4X4X5/6	4.81	6.62	2.38	1.2	6.62	2.38	1.2	2.76	0.774
L4X3-1/2X3/8	2.68	4.16	1.48	1.25	2.96	1.16	1.05	1.39	0.719
L4X3-1/2X1/2	3.6	5.3	1.92	1.23	3.76	1.5	1.04	1.79	0.716
L3-1/2X3-1/2X1/4	1.7	2	0.787	1.09	2	0.787	1.09	0.802	0.688
L3-1/2X3-1/2X5/16	2.1	2.44	0.969	1.08	2.44	0.969	1.08	0.984	0.685
L3-1/2X3-1/2X3/8	2.5	2.86	1.15	1.07	2.86	1.15	1.07	1.17	0.683
L3-1/2X3X1/4	1.68	1.92	0.773	1.1	1.3	0.665	0.908	0.622	0.628
L3-1/2X3X5/16	1.95	2.33	0.951	1.09	1.58	0.718	0.9	0.758	0.624
L3-1/2X3X3/8	2.32	2.73	1.12	1.09	1.84	0.847	0.892	0.894	0.622
L3-1/2X3X7/16	2.67	3.1	1.29	1.08	2.09	0.971	0.885	1.02	0.62
L3X3X1/4	1.44	1.23	0.569	0.926	1.23	0.569	0.926	0.49	0.586
L3X3X5/16	1.78	1.5	0.699	0.918	1.5	0.699	0.918	0.606	0.583
L3X3X3/8	2.11	1.75	0.825	0.91	1.75	0.825	0.91	0.716	0.581
L3X3X7/16	2.43	1.96	0.948	0.903	1.96	0.948	0.903	0.817	0.58
L3-1/2X2-1/2X1/4	1.46	1.81	0.769	1.12	0.776	0.41	0.731	0.426	0.541
L3-1/2X2-1/2X5/16	1.79	2.2	0.925	1.11	0.937	0.501	0.723	0.518	0.538
L3-1/2X2-1/2X3/8	2.12	2.56	1.09	1.1	1.09	0.589	0.716	0.609	0.535
L3X2-1/2X5/16	1.63	1.41	0.681	0.932	0.888	0.487	0.739	0.436	0.518
L3X2-1/2X3/8	1.93	1.65	0.803	0.924	1.03	0.573	0.731	0.514	0.517
L3X2-1/2X1/2	2.5	2.07	1.03	0.91	1.29	0.736	0.718	0.665	0.516
L3X2-1/2X7/16	2.22	1.87	0.921	0.917	1.17	0.656	0.724	0.594	0.516
L2-1/2X2-1/2X1/4	1.19	0.692	0.387	0.764	0.692	0.387	0.764	0.276	0.482
L2-1/2X2-1/2X3/16	0.901	0.535	0.295	0.771	0.535	0.295	0.771	0.209	0.482
L2-1/2X2X3/16	0.816	0.511	0.293	0.79	0.292	0.195	0.597	0.148	0.426
L2-1/2X2X1/4	1.07	0.656	0.361	0.782	0.372	0.263	0.589	0.192	0.423
L2-1/2X2X5/16	1.32	0.79	0.465	0.774	0.446	0.309	0.581	0.233	0.42
L2X2X1/8	0.491	0.188	0.129	0.62	0.189	0.129	0.62	0.0756	0.391
L2X2X3/16	0.722	0.271	0.188	0.612	0.271	0.188	0.612	0.109	0.389
L2X2X1/4	0.944	0.348	0.244	0.605	0.348	0.244	0.605	0.142	0.387
L2X2X3/8	1.37	0.478	0.348	0.591	0.478	0.348	0.591	0.203	0.386
L2X2X5/16	1.16	0.414	0.296	0.598	0.414	0.296	0.598	0.172	0.386
L2-1/2X1-1/2X3/16	0.724	0.464	0.28	0.801	0.126	0.11	0.418	0.0754	0.324
L2-1/2X1-1/2X1/4	0.947	0.594	0.364	0.792	0.16	0.142	0.411	0.0977	0.321

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Annexure 2

Combined Height and Exposure Coefficient, C_z

Height above ground level, z (metres)	Coefficient, C_z (1)		
	Exposure A	Exposure B	Exposure C
0-4.5	0.368	0.801	1.196
6.0	0.415	0.866	1.263
9.0	0.497	0.972	1.370
12.0	0.565	1.055	1.451
15.0	0.624	1.125	1.517
18.0	0.677	1.185	1.573
21.0	0.725	1.238	1.623
24.0	0.769	1.286	1.667
27.0	0.810	1.330	1.706
30.0	0.849	1.371	1.743
35.0	0.909	1.433	1.797
40.0	0.965	1.488	1.846
45.0	1.017	1.539	1.890
50.0	1.065	1.586	1.930
60.0	1.155	1.671	2.002
70.0	1.237	1.746	2.065
80.0	1.313	1.814	2.120
90.0	1.383	1.876	2.171
100.0	1.450	1.934	2.217
110.0	1.513	1.987	2.260
120.0	1.572	2.037	2.299
130.0	1.629	2.084	2.337
140.0	1.684	2.129	2.371
150.0	1.736	2.171	2.404
160.0	1.787	2.212	2.436
170.0	1.835	2.250	2.465
180.0	1.883	2.287	2.494
190.0	1.928	2.323	2.521
200.0	1.973	2.357	2.547
220.0	2.058	2.422	2.596
240.0	2.139	2.483	2.641
260.0	2.217	2.541	2.684
280.0	2.910	2.595	2.724
300.0	2.362	2.647	2.762

Note : (1) Linear interpolation is acceptable for intermediate values of z.

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Annexure 3 Minimum size of fillet weld

Minimum Fillet Weld Size (inch)	Maximum thickness of part (inch)
1/8	To ¼ inclusive
3/16	Over ¼ to ½
¼	Over 1/2 to 3/4
5/16	Over 3/4 to 1 ½
3/8	Over 1 ½ to 2 ¼
1/2	Over 2 ¼ to 6
5/8	Over 6

Annexure 3 Maximum size of fillet weld

Maximum fillet weld size (inch	Minimum thickness of part (inch)
Thickness of material	Less than ¼ inch
Thickness of material – 1/16 inch	¼ inch & over ¼ inch

Annexure 4

External Pressure Coefficients, C_{pe} for Roof †

Wind Direction	l_h/L	Windward Side θ (degrees) 0	10-15	20	30	40	50	> 60	Leeward Side
Normal to ridge	≤ 0.3	- 0.7	0.2*	0.2	0.3	0.4	0.5	0.01 θ	- 0.7 for all values of l_h/L and θ
			- 0.9*						
	0.5	- 0.7	- 0.9	- 0.75	- 0.2	0.3	0.5	0.01 θ	
	1.0	- 0.7	- 0.9	- 0.75	- 0.2	0.3	0.5	0.01 θ	
	≥ 1.5	- 0.7	- 0.9	- 0.9	- 0.9	- 0.35	0.2	0.01 θ	
Parallel to ridge	l_h/B or l_h/L ≤ 2.5				- 0.7				- 0.7
	l_h/B or l_h/L > 2.5				- 0.8				- 0.8

† Coefficients are to be used with $p_h = C_G C_{pe} q_h$, see Sec 2.4.6.6(a)

* Both values of C_{pe} shall be used for load calculations.

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Annexure 5

Gust Response Factors, G_h and G_z (1)

Height above ground level (metres)	G_h (2) and G_z		
	Exposure A	Exposure B	Exposure C
0-4.5	1.654	1.321	1.154
6.0	1.592	1.294	1.140
9.0	1.511	1.258	1.121
12.0	1.457	1.233	1.107
15.0	1.418	1.215	1.097
18.0	1.388	1.201	1.089
21.0	1.363	1.189	1.082
24.0	1.342	1.178	1.077
27.0	1.324	1.170	1.072
30.0	1.309	1.162	1.067
35.0	1.287	1.151	1.061
40.0	1.268	1.141	1.055
45.0	1.252	1.133	1.051
50.0	1.238	1.126	1.046
60.0	1.215	1.114	1.039
70.0	1.196	1.103	1.033
80.0	1.180	1.095	1.028
90.0	1.166	1.087	1.024
100.0	1.154	1.081	1.020
110.0	1.114	1.075	1.016
120.0	1.134	1.070	1.013
130.0	1.126	1.065	1.010
140.0	1.118	1.061	1.008
150.0	1.111	1.057	1.005
160.0	1.104	1.053	1.003
170.0	1.098	1.049	1.001
180.0	1.092	1.046	1.000
190.0	1.087	1.043	1.000
200.0	1.082	1.040	1.000
220.0	1.073	1.035	1.000
240.0	1.065	1.030	1.000
260.0	1.058	1.026	1.000
280.0	1.051	1.022	1.000
300.0	1.045	1.018	1.000

Note: (1) For main wind-force resisting systems, use building or structure height h for z.

(2) Linear interpolation is acceptable for intermediate values of z.

L-3/T-2/ARCH **Date : 05/08/2017**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-3/T-2 B. Arch. Examinations 2015-2016

Sub : **ARCH 397** (Interior Design)

Full Marks: 140 Time : 3 Hours

USE SEPARATE SCRIPTS FOR EACH SECTION

The figures in the margin indicate full marks.

SECTION – A

There are **FOUR** questions in this section. Answer **Q. No. 1** and any **Two** from the rest.

1. Short notes: (any two) **(15×2)**
   (a) Spatial Form
   (b) Curvilinear spaces
   (c) The vertical dimension of space

2. (a) Mention the design principles that can maintain a sense of visual order in an interior space. Explain 'Balance and 'Emphasis' with necessary drawings. **(15)**
   (b) Explain how Architect Marina Tabassum has maintained a sense of visual order among the design elements of interior space of the project 'Bait Ur Rouf Mosque'. **(5)**

3. Discuss three different types of structural systems; Linear structural system, Planar structural system and volumetric structural system. **(20)**

4. (a) Explain the concept of space. What are the geometric elements that articulate and define space? **(12)**
   (b) Will rapid technological advancement influence future Interior Design? If so, explain why and how? **(08)**

SECTION-B

There are **FOUR** questions in this section. Answer **Q. No. 5** and any **TWO** from the rest.

5. (a) How variation and height of opening gives different senses of spaces in indoor? **(15×2=30)**
   (b) Draw and explain different types of walls and partitions used to create/ separate spaces within a building.

6. Name different types of finish flooring applied on top of hard flooring. Explain in details with necessary drawings. **(20)**

7. Name and draw different types of doors and windows according to their operation and construction. **(20)**

8. (a) "The form of distribution of light depends on the design of the fixtures as well as its placement and orientation in a space"– Elaborate with drawings. **(10)**
   (b) Name different types of light fixtures and its placement in ceiling and wall. **(10)**
