4-1

University of Asia Pacific
Department of Civil Engineering
Mid Term Examination Fall 2018
Program: B. Sc. in Civil Engineering

Course Title: Project Planning & Management — Course Code: CE 401
Time: 1 Hour — Full Marks: 60

[Assume Reasonable Values for Any Missing Data]

SECTION – A

1. (a) What challenges are being faced by the construction industry nowadays? (6)

   (b) In the project life cycle show (i) level of activity (ii) level of effort required and (iii) change in crew size graphically. (6)

   (c) Show the effect of (i) cost increases (ii) delay and (iii) performance on the investment in the project life cycle graphically. (6)

   (d) List the 'think twice' contract clauses. (6)

   (e) What are the elements of a legal contract? (6)

SECTION – B

(Question 4 is mandatory. Answer any one from Question 2 & 3.)

2. A project consists of 14 activities having their relationship as follows: (20)

   i. A and B can be done concurrently
   ii. C and E are the successor activities of A, and D and G are same to B
   iii. F follows both activity C and D
   iv. H, I and L follows F
   v. J is the successor activity to E and H; and M is the successor to I and G
   vi. J is the predecessor to K, and M is predecessor to N
   vii. K, L and N are the last activities and mark the end of the project.

   Draw the network and number the events. The three time estimates of the activities are as follows. Compute: **(i)** Expected time of completion of each activity, **(ii)** earliest expected time for each event, **(iii)** latest allowable occurrence time for each event. Comment on your answers.

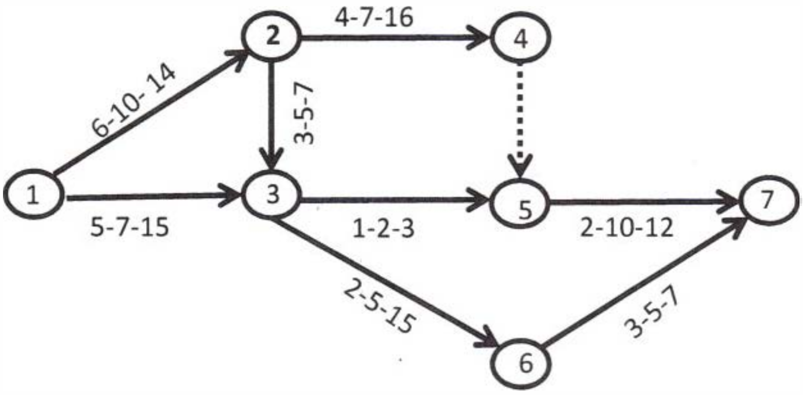
A (6-9-18)	H (2-3-5)
B (5-8-17)	I (2-4-6)
C (4-7-22)	J ((3-5-13)
D (4-7-16)	K (5-8-17)
E (4-7-10)	L (6-11-20)
F (4-10-22)	M (4-9-20)
G (2-5-8)	N (4-7-16)

OR

3. The following figure shows the network for a construction project, with the three time (20)

estimates of each activity marked. Determine:

- **i.** Critical path and its standard deviation
- **ii.** Probability of completion of project in 30 days
- **iii.** Time duration that will provide 95% and 98% probability of its completion in time.
- **iv.** Comment on what you would do as a PM, if you want 95% or 98% probability of completion of the project.



4. (a) Describe the limitations of Gantt Chart. How would you overcome those limitations? **(3+1)**

(b) Write short notes on any two: **(2*2)**

- i. Least Square Regression Line
- ii. Dummy activity
- iii. WBS

(c) What do you understand by super critical activity? As a PM, what would be your decision regarding allocation of resources if $T_S < T_L$ **(1+1)**

Standard Normal Probabilities

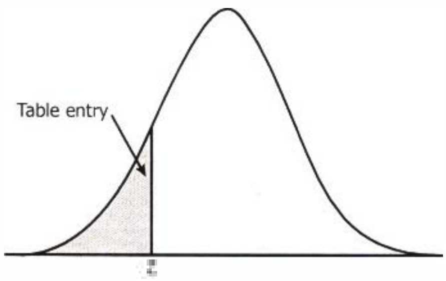


Table entry for z is the area under the standard normal curve to the left of z.

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
−3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
−3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
−3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.0005
−3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.0007
−3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
−2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
−2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
−2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
−2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
−2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	.0049	.0048
−2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	.0066	.0064
−2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.0084
−2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
−2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
−2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
−1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
−1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
−1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
−1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
−1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
−1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
−1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
−1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
−1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
−1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
−0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
−0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
−0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
−0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
−0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
−0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
−0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
−0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
−0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
−0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641

Standard Normal Probabilities

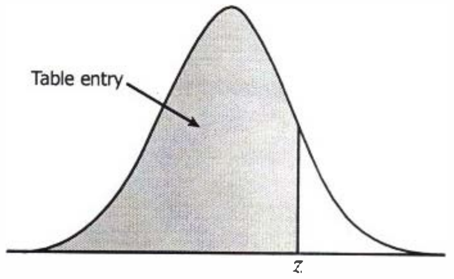


Table entry for z is the area under the standard normal curve to the left of z.

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998

University of Asia Pacific
Department of Civil Engineering
Midterm Examination Fall 2018
Program: B.Sc. Engineering (Civil)

Course Title: Structural Engineering III | Course Code: CE 411
Time: 1 hour | Credit Hour : 3.0 | Full Marks: 4 x 10

ANSWER ALL QUESTIONS. Any missing data can be assumed reasonably.

1. Ignore zero-force members of the space truss ***abcdefgh*** as shown in ***Fig.1*** and apply boundary conditions to formulate stiffness matrix and load vector [Given: S_x = 1200 k/ft. Nodal Coordinates (ft) are *a*(0,0,0), *b*(0,0,-10), *c*(0,20,-10), *d*(0,20,0), *e*(15,0,0), *f*(15,0,-10), *g*(15,20,-10), *h*(15,20,0)].

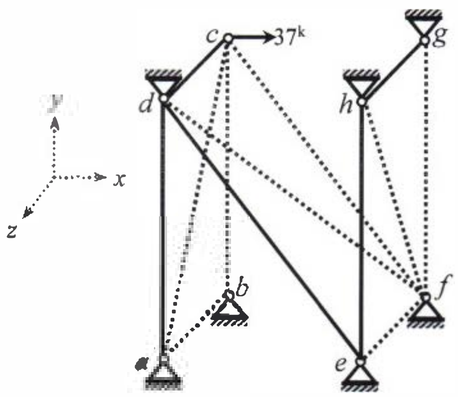


Fig.1

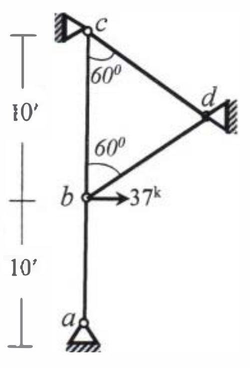


Fig.2

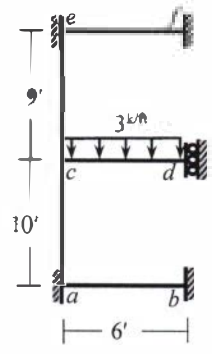


Fig.3

2. Identify zero-force members of the truss ***abcd*** loaded as shown in ***Fig.2***. Determine the displacements of joint ***b***. Also calculate member forces [Given: EA/L =1000 k/ft].

3. Use stiffness method (neglect axial deformations) to calculate rotation of joint ***c*** and displacement of joint ***d*** of the frame ***abcdef*** loaded as shown in ***Fig.3*** [Given: EI = 40×10^3 k-ft^2].

4. Use stiffness method to calculate deflection of joint ***f*** and rotations of joint ***d*** of the grid system ***abcdefghijk*** loaded as shown in ***Fig.4*** [Given: EI = 20×10^3 k-ft^2 and GJ = 5×10^3 k-ft^2].

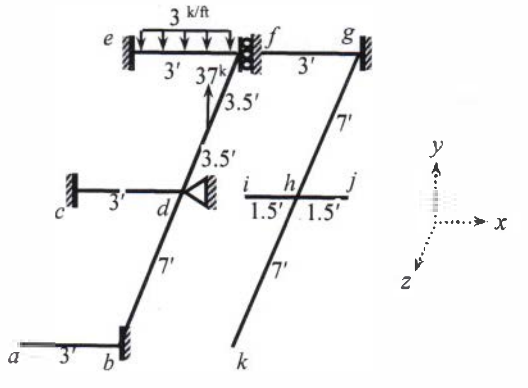


Fig.4

List of Useful Formulae for CE 411

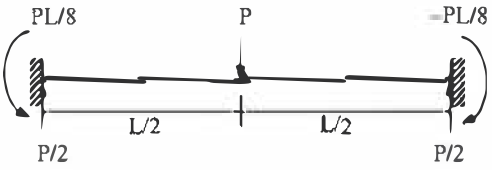
* The stiffness matrix $\mathbf{K_m^G}$ of a 2D truss member in the global axis system is given by

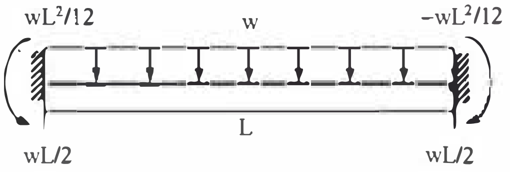
$$\mathbf{K_m^G} = S_x \begin{pmatrix} C^2 & CS & -C^2 & -CS \\ CS & S^2 & -CS & -S^2 \\ -C^2 & -CS & C^2 & CS \\ -CS & -S^2 & CS & S^2 \end{pmatrix}$$

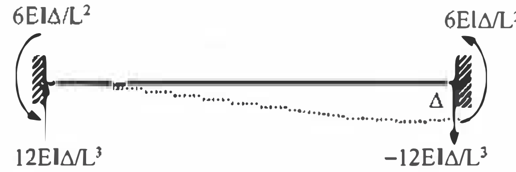
and Truss member force, $P_{AB} = S_x\,[(u_B-u_A)\,C + (v_B-v_A)\,S]$

[where $C = \cos\theta$, $S = \sin\theta$]

Fixed End Reactions for One-dimensional Prismatic Members under Typical Loadings







* The stiffness matrix of a 3D truss member in the global axes system [using $C_x = \cos\alpha$, $C_y = \cos\beta$, $C_z = \cos\gamma$] is

$$\mathbf{K_m^G} = S_x \begin{pmatrix} C_x^2 & C_xC_y & C_xC_z & -C_x^2 & -C_xC_y & -C_xC_z \\ C_yC_x & C_y^2 & C_yC_z & -C_yC_x & -C_y^2 & -C_yC_z \\ C_zC_x & C_zC_y & C_z^2 & -C_zC_x & -C_zC_y & -C_z^2 \\ -C_x^2 & -C_xC_y & -C_xC_z & C_x^2 & C_xC_y & C_xC_z \\ -C_yC_x & -C_y^2 & -C_yC_z & C_yC_x & C_y^2 & C_yC_z \\ -C_zC_x & -C_zC_y & -C_z^2 & C_zC_x & C_zC_y & C_z^2 \end{pmatrix}$$

$C_x = L_x/L$, $C_y = L_y/L$, $C_z = L_z/L$
where $L = \sqrt{[L_x^2 + L_y^2 + L_z^2]}$

* Member force $P_{AB} = S_x\,[(u_B - u_A)\,C_x + (v_B - v_A)\,C_y + (w_B - w_A)\,C_z]$

* Ignoring axial deformations, the matrices $\mathbf{K_m^L}$ and $\mathbf{G_m^L}$ of a frame member in the local axis system are

$$\mathbf{K_m^L} = \begin{pmatrix} S_1 & S_2 & -S_1 & S_2 \\ S_2 & S_3 & -S_2 & S_4 \\ -S_1 & -S_2 & S_1 & -S_2 \\ S_2 & S_4 & -S_2 & S_3 \end{pmatrix} \qquad \mathbf{G_m^L} = (P/30L) \begin{pmatrix} 36 & 3L & -36 & 3L \\ 3L & 4L^2 & -3L & -L^2 \\ -36 & -3L & 36 & -3L \\ 3L & -L^2 & -3L & 4L^2 \end{pmatrix}$$

where $S_1 = 12EI/L^3$, $S_2 = 6EI/L^2$, $S_3 = 4EI/L$, $S_4 = 2EI/L$

*The general form of the stiffness matrix for any member of a 2-dimensional frame is

$$\mathbf{K_m^G} = \begin{pmatrix} S_xC^2+S_1S^2 & (S_x-S_1)CS & -S_2S & -(S_xC^2+S_1S^2) & -(S_x-S_1)CS & -S_2S \\ (S_x-S_1)CS & S_xS^2+S_1C^2 & S_2C & -(S_x-S_1)CS & -(S_xS^2+S_1C^2) & S_2C \\ S_2S & S_2C & S_3 & S_2S & -S_2C & S_4 \\ -(S_xC^2+S_1S^2) & -(S_x-S_1)CS & S_2S & S_xC^2+S_1S^2 & (S_x-S_1)CS & S_2S \\ -(S_x-S_1)CS & -(S_xS^2+S_1C^2) & -S_2C & (S_x-S_1)CS & (S_xS^2+S_1C^2) & -S_2C \\ -S_2S & S_2C & S_4 & S_2S & -S_2C & S_3 \end{pmatrix}$$

University of Asia Pacific
Department of Civil Engineering
Mid Term Examination Fall 2018
Program: B.Sc. Engineering (Civil)

Course Title: Geotechnical Engineering II — Course Code: CE 441
Time: 1 hour — Full Marks: 20

Answer all the questions. **(5*4 = 20)**

1. During standard penetration tests (Figure 1), N_{60} was obtained 15 at both the depths of 5 m and 18 m. 4
   (i) Calculate $(N_1)_{60}$ at both the depths. 1
   (ii) Calculate the effective angle of internal friction at the depth of 5 m.

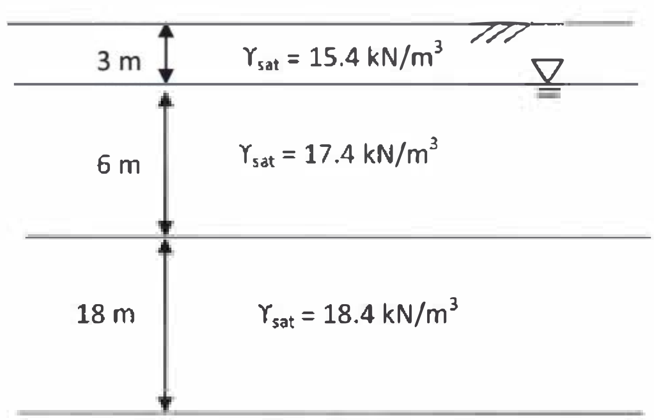


Figure 1

2. For the individual shallow footing (Figure 2), calculate the net ultimate bearing capacity, if eccentricity along footing width is 0.38 m. The load is vertical. 5

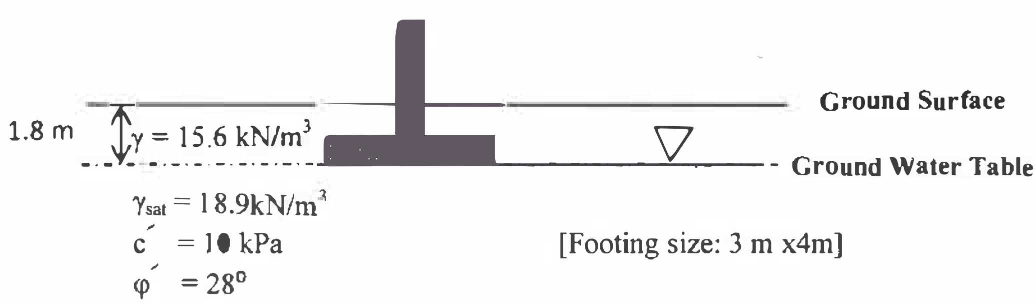


Figure 2

3. Calculate the ultimate (gross) bearing capacity of a 2 m wide strip footing in the soil profile given in Figure 3. 5

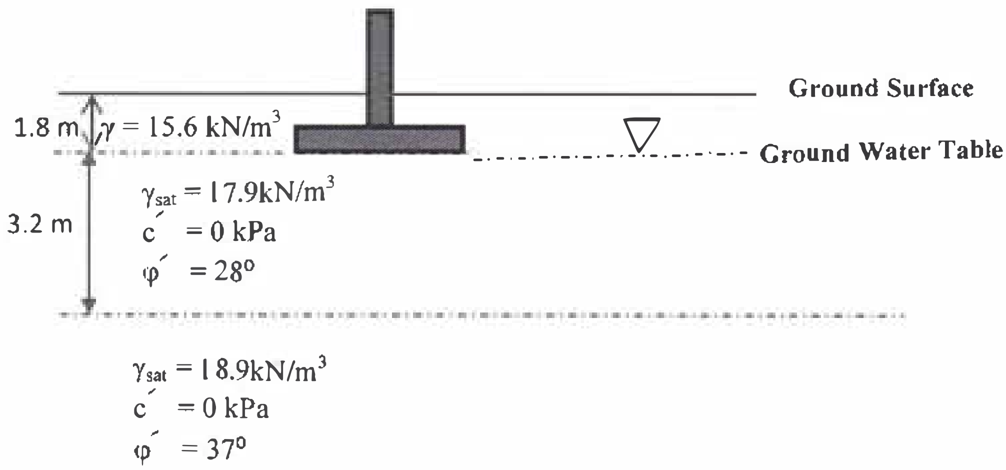


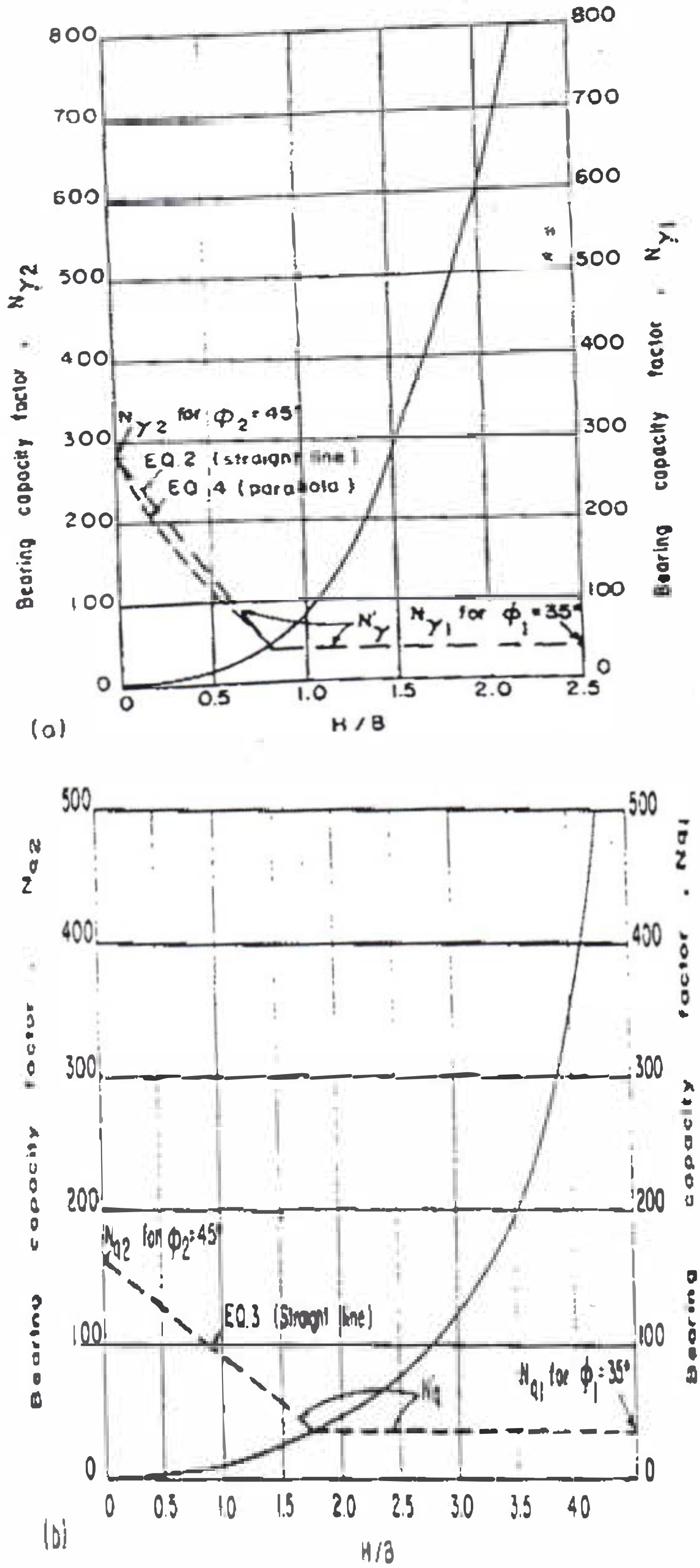
Figure 3

4. A 6 m thick clay layer is located at a depth of 3 m. The water table is located at a depth of 3 m. Assume the moist unit weight of the soil near the ground is 15.4 kN/m^3 and the saturated unit weight of clay soil is 17.2 kN/m^3. 5
Total column load = 40000 kN
Dimensions of Mat foundation: 15 m x 18 m
Calculate the depth of partially compensated mat foundation. Provide FS (factor of safety) of 3.

Important Correlations

$$\varphi' = \tan^{-1}\left[\frac{N_{60}}{12.2 + 20.3\left(\frac{\sigma'_o}{P_a}\right)}\right]^{0.34}$$

$$\varphi' = \sqrt{20(N_1)_{60} + 20}$$



Design Charts: Weak sand overlying strong sand

Table 1: Bearing Capacity Factors for General Bearing Capacity Equation

ϕ	N_c	N_q	N_γ (Meyerhof)	ϕ	N_c	N_q	N_γ (Meyerhof)	ϕ	N_c	N_q	N_γ (Meyerhof)
0°	5.10	1.00	0.00	17°	12.34	4.77	1.66	34°	42.16	29.44	31.15
1°	5.38	1.09	0.00	18°	13.10	5.26	2.00	35°	46.12	33.30	37.15
2°	5.63	1.20	0.01	19°	13.93	5.80	2.40	36°	50.59	37.75	44.43
3°	5.90	1.31	0.02	20°	14.83	6.40	2.87	37°	55.63	42.92	53.27
4°	6.19	1.43	0.04	21°	15.81	7.07	3.42	38°	61.35	48.93	64.07
5°	6.49	1.57	0.07	22°	16.88	7.82	4.07	39°	67.87	55.96	77.33
6°	6.81	1.72	0.11	23°	18.05	8.66	4.82	40°	75.31	64.20	93.69
7°	7.16	1.88	0.15	24°	19.32	9.60	5.72	41°	83.86	73.90	113.99
8°	7.53	2.06	0.21	25°	20.72	10.66	6.77	42°	93.71	85.37	139.32
9°	7.92	2.25	0.28	26°	22.25	11.85	8.00	43°	105.11	99.01	171.14
10°	8.34	2.47	0.37	27°	23.94	13.20	9.46	44°	118.37	115.31	211.41
11°	8.80	2.71	0.47	28°	25.80	14.72	11.19	45°	133.87	134.87	262.74
12°	9.28	2.97	0.60	29°	27.86	16.44	13.24	46°	152.10	158.50	328.73
13°	9.81	3.26	0.74	30°	30.14	18.40	15.67	47°	173.64	187.21	414.33
14°	10.37	3.59	0.92	31°	32.67	20.63	18.56	48°	199.26	222.30	526.46
15°	10.98	3.94	1.13	32°	35.49	23.18	22.02	49°	229.93	265.50	674.92
16°	11.63	4.34	1.37	33°	38.64	26.09	26.17				

Table 2: Shape, Depth & Load Inclination Factors for General Bearing Capacity Equation

Author	Factor	Condition	Equation
Meyerhof	Shape	$\phi = 0°$	$F_{cs} = 1 + 0.2\left(\frac{B}{L}\right)$ $F_{qs} = F_{\gamma s} = 1$
		$\phi \geq 10°$	$F_{cs} = 1 + 0.2\left(\frac{B}{L}\right)\tan^2\left(45 + \frac{\phi}{2}\right)$ $F_{qs} = F_{\gamma s} = 1 + 0.1\left(\frac{B}{L}\right)\tan^2\left(45 + \frac{\phi}{2}\right)$
	Depth	$\phi = 0°$	$F_{cd} = 1 + 0.2\left(\frac{D_f}{B}\right)$ $F_{qd} = F_{\gamma d} = 1$
		$\phi \geq 10°$	$F_{cd} = 1 + 0.2\left(\frac{D_f}{B}\right)\tan\left(45 + \frac{\phi}{2}\right)$ $F_{qd} = F_{\gamma d} = 1 + 0.1\left(\frac{D_f}{B}\right)\tan\left(45 + \frac{\phi}{2}\right)$

University of Asia Pacific
Department of Civil Engineering
Mid Term Examination Spring 2018
Program: B. Sc. Engineering (Civil)

Course Title: Transportation Engineering II — Course Code: CE 451
Time: 1 hour — Full Marks: 30

[Assume Reasonable Values for Any Missing Data]

Answer **Question 1 or Question 2.**

1. a. Compare the use of cutback bitumen and bitumen emulsion from environmental point of view. 4

b. Summarize the significance of Penetration test and Flash and Fire test of bitumen? 6

c. Analyze the use of VG-10, VG-20, VG-30 and VG-40 Bitumen. 8

d. Explain the Marshal Stability and Flow Test. 12

2. a. The gradation required for a typical mix is given in Table 1 in column 1 and 2. The gradation of available for three types of aggregate A, B, and C are given in column 3, 4, and 5. **Determine the proportions of A, B and C if mixed will get the required gradation in column 2.** 10

Table 1

Sieve Size (mm) (1)	Required Gradation Range (2)	Filler (A) (3)	Fine Aggregate (B) (4)	Coarse Aggregate (C) (5)
25.4	100.0	100.0	100.0	100.0
12.7	90.0-100.0	100.0	100.0	94.0
4.76	60.0-75.0	100.0	100.0	54.0
1.18	40.0-55.0	100.0	66.4	31.3
0.3	20.0-35.0	100.0	26.0	22.8
0.15	12.0-22.0	73.6	17.6	9.0
0.075	5.0-10.0	40.1	5.0	3.1

b. In designing an asphalt concrete mixture for a highway pavement to support medium traffic, data in Table 2 showing the aggregate characteristics and Table 3 showing data obtained using the Marshall method were used. **Determine the optimum asphalt content for this mix** for the specified limits given in Table 4. (The nominal maximum particle size in the aggregate mixture is 1 in.) 20

Table 2 Aggregate Characteristics

Aggregate Type	Percent by Weight of Total Paving Mixture	Bulk Specific Gravity
Coarse	52.3	2.65
Fine	39.6	2.75
Filler	8.1	2.70

Table 3 Marshall Test Result

Asphalt % by Weight of Total Mix	Weight of Specimen (g) in air	Weight of Specimen (g) in water	Stability (lb)	Flow (0.01 in)	Maximum Specific Gravity of Paving Mixture
5.0	1325.6	780.1	1460	7	2.54
5.5	1331.3	789.6	1600	10	2.56
6.0	1338.2	798.6	1560	11	2.58
6.5	1343.8	799.8	1400	13	2.56
7.0	1349.0	798.4	1200	16	2.54

Table 4 Suggested Test Limit

Marshall Method Mix Criteria	Light Traffic	Medium Traffic	Heavy Traffic
Compaction (No. of blows each end of Specimen)	35	50	75
Stability N (lb)	3336(750)	5338(1200)	8006(1800)
Flow0.25 mm (0.01 in)	8 to 18	8 to 16	8 to 14
Air Voids (%)	3 to 5	3 to 5	3 to 5

Mineral Percentage of Voids in Mineral Aggregates	
Standard Sieve Designation	%
No. 16	23.5
No. 4	21
No. 8	18
3/8 in.	16
½ in.	15
¾ in.	14
1 in.	13
1 ½ in.	12
2 in.	11.5
2 ½ in.	11

Required Formula:

$$G_{mb} = \frac{W_a}{W_a - W_w} \qquad P_a = 100\frac{G_{mm} - G_{mb}}{G_{mm}} \qquad G_{sb} = \frac{P_{ca} + P_{fa} + P_{mf}}{\frac{P_{ca}}{G_{bca}} + \frac{P_{fa}}{G_{bfa}} + \frac{P_{mf}}{G_{bmf}}} \qquad G_{se} = \frac{100 - P_b}{(100/G_{mm}) - (P_b/G_b)}$$

University of Asia Pacific
Department of Civil Engineering
Midterm Examination Fall 2018
Program: B.Sc. Engineering (Civil)

Course code: CE 461
Course title: Irrigation and Flood Control

Time: 60 Minutes Total marks: 20

Answer all questions

1. Explain why irrigation is important for Bangladesh. **(2)**
2. Do you think that **conjunctive** use of water (using water from more than one source) for irrigation could reduce water shortage in Bangladesh during non-monsoon period? Justify your answer. **(0.5 + 2.5)**
3. Urbanization rate in Dhaka city is increasing at an alarming rate in recent decades. In Dhaka, open spaces, permeable layers and wetland are reducing rapidly due to unsustainable and/or illegal constructions of impervious permanent structures including roads, residential, industrial buildings etc.

   As a result, many areas in Dhaka go under water when there is high precipitation only for few hours. Do you consider this situation in Dhaka as "Flood"? Justify your answer. **(1+3)**
4. Explain the relationship between *soil moisture tension* and *soil moisture stress*. **(2)**
5. Calculate the irrigation requirement of a wheat crop when the leaching requirement of a wheat soil is 17% and the soil water has been depleted 70%. The available water holding capacity of the root zone is 16 cm. **(3)**
6. A European steel company is planning to open a new steel production unit in Bangladesh. Exports Promotion Bureau of Bangladesh offered them two lands, one in ***Mymensingh*** and one is ***Sylhet***, from which the company management has to choose one location for their steel production unit.

   Based on your knowledge about geological condition and flood hazards risk, which district (Mymensingh or Sylhet) the company should select for its new plant? Justify your answer. **(3)**
7. Explain the following: i) Flood, ii) Aquifer **(1.5 +1.5)**