

University of Asia Pacific
Department of Civil Engineering
Mid-Term Examination, Fall - 2017
Program: Bachelor of Science in Civil Engineering

Course Title: Principles of Management
Time: 1 hour

Course Code: IMG 301

Credit: 2
Full Marks: 20

Answer any 4 from the following questions; each question is of equal value.

1. Contrast efficiency and effectiveness. Give an example of a time; When an organization was
 - a) Effective but not efficient
 - b) Efficient but not effective
 - c) Both efficient and effective
 - d) Neither efficient nor effective

2. Is Dhaka North City Corporation an organization? Classify different resources (Human, Financial, Physical, and Informational) of Dhaka North City Corporation.

3. For the following statements identify the nature of managerial roles played for each action:
When a manager:
 - a. Resolves any conflict arisen between two employees.
 - b. Monitors their competitors' policies and techniques on a regular basis.
 - c. Shares information with the employees.
 - d. Develops new ideas for innovation.
 - e. Attends at a ribbon-cutting ceremony.

4. Briefly outline the principles of Behavioral Management approach.

[Please turn over]

5. Suppose you are the resource manager of TOMA Construction Ltd. Recently, TOMA Construction Ltd. received some offer from different Institutions to construct apartments. The benefits and problems of each project are given below:

Projects	Benefits/ Drawbacks
A	Resources availability-Excellent
	Stack resources-Poor
	Training for the employees-Satisfactory
	Work environment-Good
B	Resources availability-Average
	Stack resources-Good
	Training for the employees-Excellent
	Work environment-Poor
C	Resources availability-Excellent
	Stack resources-Satisfactory
	Training for the employees-Poor
	Work environment-Satisfactory

TOMA Construction Ltd. basically considers the following areas as criteria in order to evaluate a project: Resource availability (35%), Training for the employees (5%), Stack. Resources (10%), Work environment (50%).

Scoring:

Excellent-80

Satisfactory-75

Good-60

Average-50

Poor-40

As a resource manager you are to determine which project to choose by TOMA construction Ltd. and will be beneficial for this.

University of Asia Pacific
Department of Civil Engineering
Midterm Examination Fall 2017
Program: B.Sc. Engineering (Civil)

Course Code: CE 313

Course Title: Structural Engineering II

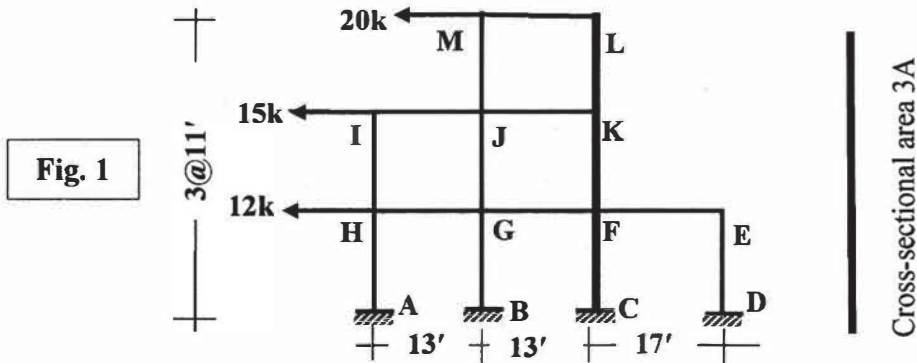
Credit Hour: 3.0

Time: 60 Minutes

Full Marks: 3 x 20

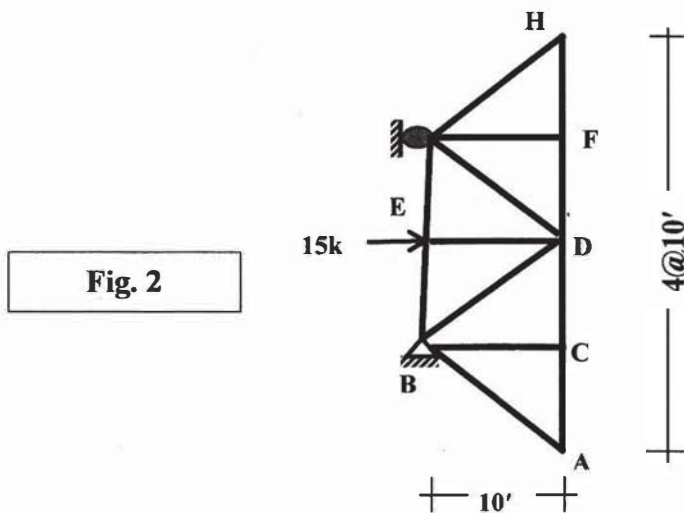
Answer all questions. *The figures are not drawn to scale. Any missing data can be assumed reasonably.*

[1] Use Portal Method to draw BMD of all beams of the frame shown in Fig. 1?



[2] Use Cantilever Method to determine axial forces of columns HI, GJ, MJ, FK and LK of the frame shown in Fig. 1? Assume all the columns are having same cross-sectional area A except columns CFKL.

[3] Use Virtual Work Method to determine the vertical deflection at joint A of the truss shown in Fig. 2. Given, $E = 29000$ ksi, truss members have the same cross-sectional area of 5 in^2 .



University of Asia Pacific
Department of Civil Engineering
Mid-Term Examination Fall 2017

Course Code: CE 317 (A)
Course Title: Design of Reinforced Concrete II

Time: 1 (one) Hour
Full Marks: (3x20) = 60

Answer any 2 (Two) questions.
Each question carries equal marks

1. Use USD to design Panel D in the two-way slab shown in Fig.1. Floor Finish = 30 psf, Partition wall = 50 psf, Live load = 60 psf. [Given, $f_c' = 3$ ksi and $f_y = 50$ ksi]

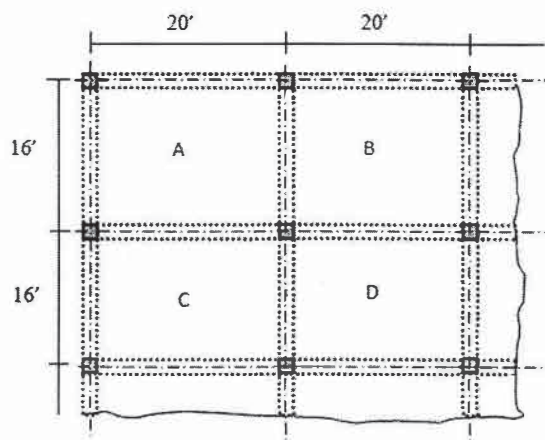


Fig.1

2. Find the design moments of an interior panel of a flat slab (Fig.2) of size 20'x14' c/c (supported on 12'x12' edge beams), if it carries FF = 30 psf, RW = 50 psf, LL = 60 psf [Given: $f_c' = 4$ ksi, $f_y = 60$ ksi].

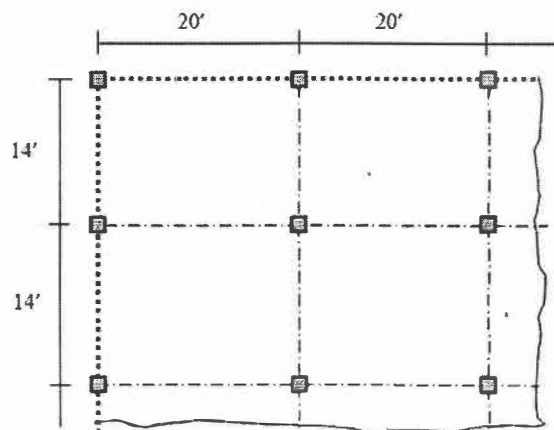


Fig.2

3. Design the main reinforcement and ties for an interior column in Fig.2. Architectural considerations require that a rectangular column of dimensions to be 15" x 25". Consider design dead load of 200 kips, live load of 300 kips, dead load moment of 160 kip-ft. and live load moment of 230 kip-ft. [Given: $f_c' = 4$ ksi, $f_y = 60$ ksi].

Formulas

Minimum Thickness of Flat Plates [$f_y = 40$ ksi]

Exterior Panels without Edge Beams	Exterior Panels with Edge Beams	Interior Panels
$L_n/33$	$L_n/36$	$L_n/36$

L_n is the clear span in long direction

Total Static Moment, $M_0 = w_n L_2 L_n^2 / 8$

$A_s = (f_c / f_y) [1 - \sqrt{\{1 - 2M_u / (\phi f_c b d^2)\}}] b d$

Distribution Factors applied to Static Moment M_0 for Positive and Negative Moments

Position of Moment	Ext Edge unrestrained (a)	Slab with beams between all supports (b)	No beam between interior supports		Exterior Edge fully restrained (e)
			Without edge beam (c)	With edge beam (d)	
Exterior M^{+}	0.00	0.16	0.26	0.30	0.65
Interior M^{-}	0.75	0.70	0.70	0.70	0.65
M^{+}	0.63	0.57	0.52	0.50	0.35

$$\alpha = E_{cb} I_b / E_{cs} I_s$$

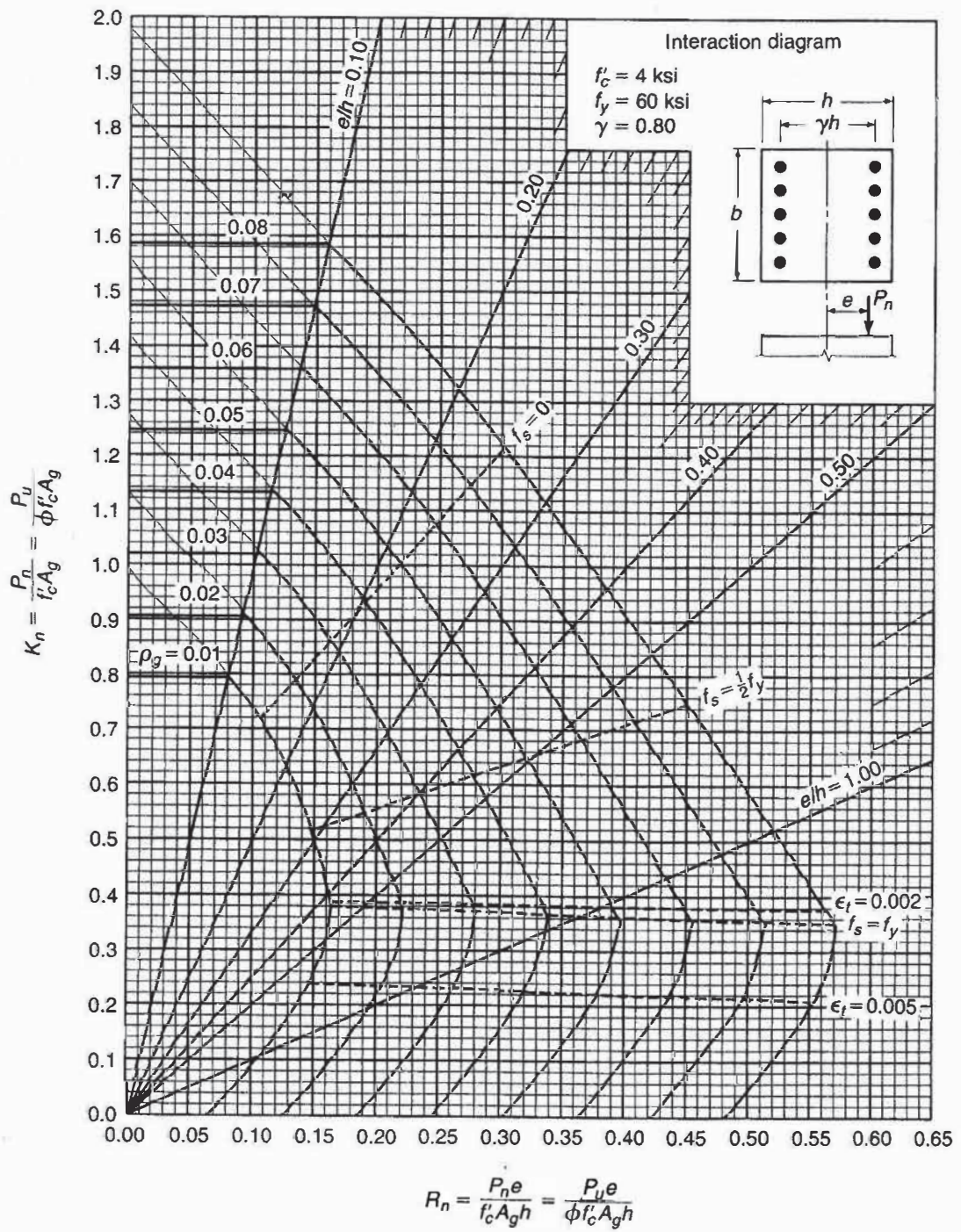
$$\beta_t = E_{cb} C / 2 E_{cs} I_s$$

$$C = \sum (1 - 0.63 x/y) x^3 y / 3$$

$$\% \text{ of Exterior } M^{+} \text{ supported by Column Strip} = 100 - 10\beta_t + 12\beta_t (\alpha_1 L_2 / L_1) (1 - L_2 / L_1)$$

$$\% \text{ of } M^{+} \text{ supported by Column Strip} = 60 + 30 (\alpha_1 L_2 / L_1) (1.5 - L_2 / L_1)$$

$$\% \text{ of Interior } M^{-} \text{ supported by Column Strip} = 75 + 30 (\alpha_1 L_2 / L_1) (1 - L_2 / L_1)$$



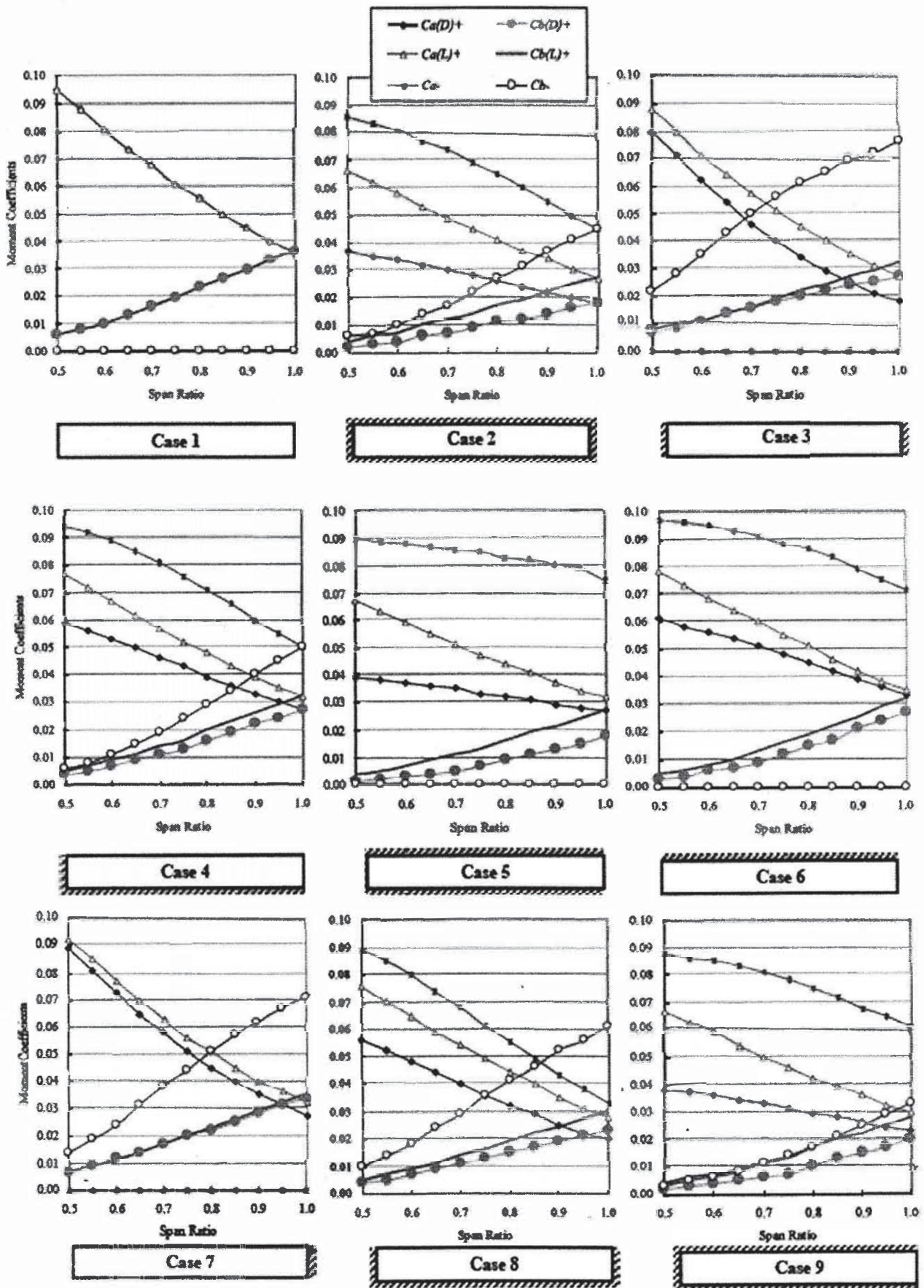


Fig. 1.5: Moment coefficients for different support conditions

University of Asia Pacific
Department of Civil Engineering
Mid Term Examination Fall 2017
Program: B. Sc. Engineering (Civil)

Course Title: Design of Concrete structures II
Time: 1 hour

Course Code: CE 317(Section B)
Full Marks: 30

[Assume Reasonable Values for Any Missing Data]

Question No. 1 is COMPULSORY and answer ANOTHER one from Question 2 and 3

1. One side of a rectangular footing is limited to 8 ft. and the footing supports an 18 insquare tied interior column reinforced with eight no.8 bars. The column carries dead load of 250 kips and live load of 180 kips. (20)

- (i) Estimate footing size and factored net soil pressure.
(ii) Check thickness of footing for beam shear and punching shear.
(iii) Design reinforcement of the footing.

The base of the footing is 5 ft below grade and allowable soil pressure is 5 ksf.

Use normal weight concrete with $f'_c = 4$ ksi and $f_y = 60$ ksi. Unit weight of soil 100 pcf, unit weight of concrete 150 pcf.

2. A prestressed rectangular beam 450 mm by 700 mm has a simple span of 10 m and is loaded by a uniform load of 50 kN/m including its self-weight. The prestressing tendon is located 145 mm below c.g.c of the prestressed member and produces an effective prestress of 1550 kN. Compute top and bottom fiber stresses in concrete at midspan section. (10)

3. A retaining wall is to retain a bank 18 ft high whose horizontal surface is subjected to a live load surcharge of 330 psf as shown in Figure 1 (in the next page).

Given: The unit weight of the backfill is 110 pcf and unit weight of concrete 150 pcf angle of internal friction $\phi = 35^\circ$, base friction coefficient 0.5, allowable soil bearing pressure 5 ksf.

Calculate factor of safety of the retaining wall against overturning. (10)

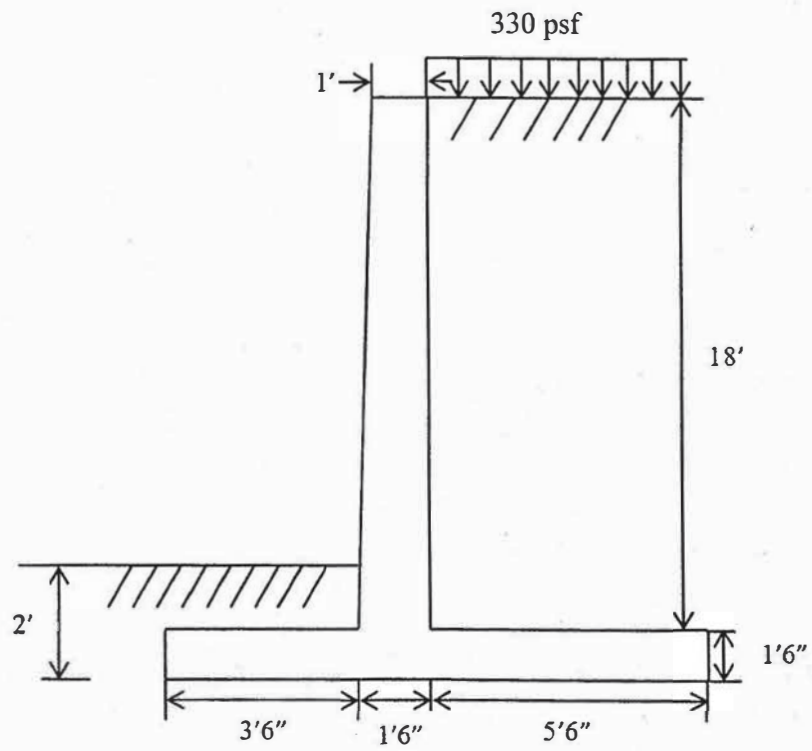


Figure 1

CE 317 FORMULA SHEET

Footing

$$A_{req} = \frac{D + L}{q_a}$$

$$q_{max/min} = \frac{P}{A} \pm \frac{Mc}{I}$$

Minimum Steel, $A_{s,min} = \frac{3\sqrt{f'_c}}{f_y} b_w d \geq \frac{200b_w d}{f_y}$

Retaining wall

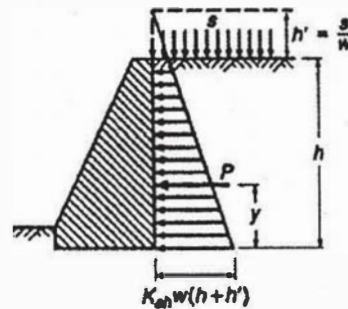
$$p_h = K_0 w h$$

$$K_{ah} = \frac{1 - \sin \phi}{1 + \sin \phi} \quad K_{ph} = \frac{1 + \sin \phi}{1 - \sin \phi}$$

Unit weights w , effective angles of internal friction ϕ , and coefficients of friction with concrete f

Soil	Unit Weight w , pcf	ϕ , deg	f
1. Sand or gravel without fine particles, highly permeable	110-120	33-40	0.5-0.6
2. Sand or gravel with silt mixture, low permeability	120-130	25-35	0.4-0.5
3. Silty sand, sand and gravel with high clay content	110-120	23-30	0.3-0.4
4. Medium or stiff clay	100-120	25-35°	0.2-0.4
5. Soft clay, silt	90-110	20-25°	0.2-0.3

* For saturated conditions, ϕ for clays and silts may be close to zero.



$$y = \frac{h^2 + 3hh'}{3(h + 2h')}$$

$$P = \frac{1}{2} K_{ah} w h (h + 2h')$$

Prestressed Concrete

Fibre stress

$$f_{top} = \frac{-P}{A} + \frac{Fey}{I} - \frac{My}{I}$$

$$f_{bottom} = \frac{-P}{A} - \frac{Fey}{I} + \frac{My}{I}$$

University of Asia Pacific
Department of Civil Engineering
Midterm Examination Fall 2017
Program: B.Sc. Engineering (Civil)

Course Title: Environmental Engineering II
Time: 1 hour

Course Code: CE 333
Full Marks: 30

There are Four (4) questions. Answer any Three (3).

1. Design rectangular sedimentation tanks using following dataset and equations. Assume any missing data. [10]
- Average flow rate, $Q_{av}=20,000 \text{ m}^3/\text{d}$.
 - Peak hourly flow rate, $Q_p=40,000 \text{ m}^3/\text{d}$.
 - Specific gravity of the particles to be removed, $s=1.25$.
 - Diameter of the particles, $d=100 \mu\text{m}$.
 - Darcy-Weisbach friction factor, $f=0.025$.
 - Scouring material constant, $k=0.05$.

$$V_H = \left[\frac{8k(s-1)gd}{f} \right]^{1/2} \quad \text{BOD/TSS removal} = \frac{t}{a+bt}$$

2. (a) Write short notes on: (i) wet sanitation system and (ii) offsite sanitation systems. [5]
(b) Explain the main differences between VIP and ROEC latrines. [5]
3. (a) With a schematic diagram explain the main mechanisms of septic tank systems. [5]
(b) How corrosion of sewer materials occur? Explain the approaches of sewer maintenance. [5]
4. (a) Explain floatation process for oil and grease removal from wastewater. [5]
(b) Draw flow diagrams of: (i) preliminary treatment process and (ii) in-line, off-line equalization tanks. [5]

University of Asia Pacific
Department of Civil Engineering
Midterm Examination
Fall 2017
Program: B.Sc Engineering (Civil)

Course Title: Transportation Engineering 1
Full Marks: 20

Course Code: CE 351
Time: 1 hour

There are **Three** questions. Answer **two** of them

1. Following spot speed data was collected during conducting speed studies at certain section of an urban road. Determine: 10
- a) Safe speed d) Median speed and
 b) Design speed e) Lower limit of speed
 c) Average speed

Speed Range (mph)	No. of Vehicle
20 - 25	0
25 - 30	47
30 - 35	66
35 - 40	120
40 - 45	125
45 - 50	35
50 - 55	30
55 - 60	21
60 - 65	15
65 - 70	8
70 - 75	2

2. a) Compare angular and parallel method of parking. 4
 b) Classify traffic signs by using a flow diagram and briefly explain any one of them with figure. 5
 c) Briefly explain VMS. 1
3. a) Calculate the AADT for the following data. Data collection was conducted on Wednesday in February. MEF for February is 1.976. 7

Hour	Volume
7:00-8:00 a.m.	1150
8:00-9:00 a.m.	960
9:00-10:00 a.m.	680
10:00-11:00 a.m.	1049
11:00-12:00 p.m.	770

- b) Write down the methods of data collection techniques for origin-destination survey 3

Table for Question 3 a)

Table 1 Hourly Expansion Factors for a Rural Primary Road

Hour	Vol.	HEF	Hour	Vol.	HEF
6:00-7:00 a.m.	294	42.01	6:00-7:00 p.m.	743	16.6
7:00-8:00 a.m.	426	28.99	7:00-8:00 p.m.	706	17.5
8:00-9:00 a.m.	560	22.05	8:00-9:00 p.m.	606	20.4
9:00-10:00 a.m.	657	18.8	9:00-10:00 p.m.	489	25.3
10:00-11:00 a.m.	722	17.11	10:00-11:00 p.m.	396	31.2
11:00-12:00 p.m.	667	18.52	11:00-12:00 a.m.	360	34.3
12:00-1:00 p.m.	660	18.71	12:00-1:00 a.m.	241	51.2
1:00-2:00 p.m.	739	16.71	1:00-2:00 a.m.	150	82.3
2:00-3:00 p.m.	832	14.84	2:00-3:00 a.m.	100	124
3:00-4:00 p.m.	836	14.77	3:00-4:00 a.m.	90	137
4:00-5:00 p.m.	961	12.85	4:00-5:00 a.m.	86	144
5:00-6:00 p.m.	892	13.85	5:00-6:00 a.m.	137	90.2
Total daily volume =		12350			

Table 2 Daily Expansion Factors for a Rural Primary Road

Day of Week	Volume	DEF
Sunday	7,895	9.515
Monday	10,714	7.012
Tuesday	9,722	7.727
Wednesday	11,413	6.582
Thursday	10,714	7.012
Friday	13,125	5.724
Saturday	11,539	6.51
Total weekly volume =		75,122

University of Asia Pacific
Department of Civil Engineering
Mid Examination Fall 2017
Program: B.Sc. Engineering (Civil)

Course Title: Engineering Hydrology
Time: 1 hours

Course Code: CE 363
Full marks:60

Assume any reasonable value, if not given

Answer All the Questions

1. a. Explain reasons to introduce Pan Coefficient to measure evaporation using evaporimeters? (5x3=15)

- b. A catchment has seven rainfall stations, their recorded rainfalls in a year are given below:

Station	A	B	C	D	E	F	G
Rainfall (cm)	507	529	530	510	509	504	501

Determine the optimum number of stations for an error of 12%.

- c. Discuss the factors on which rate of evaporation is dependent.

2. Bangladesh Meteorological Department recorded following wind speeds at 9 m elevation in 2010-2015 for the month of December. (5)

Year	2010	2011	2012	2013	2014	2015
Wind Speed (kph)	1.40	1.30	1.25	2.22	2.11	1.50

Determine average wind speed at 1 m elevation for the month of December.

3. If the air temperature is 15 °C and the relative humidity 35 percent, calculate the corresponding vapor pressure, specific humidity, saturated temperature and air density. Assume standard atmospheric pressure (101.3 kPa). (10)

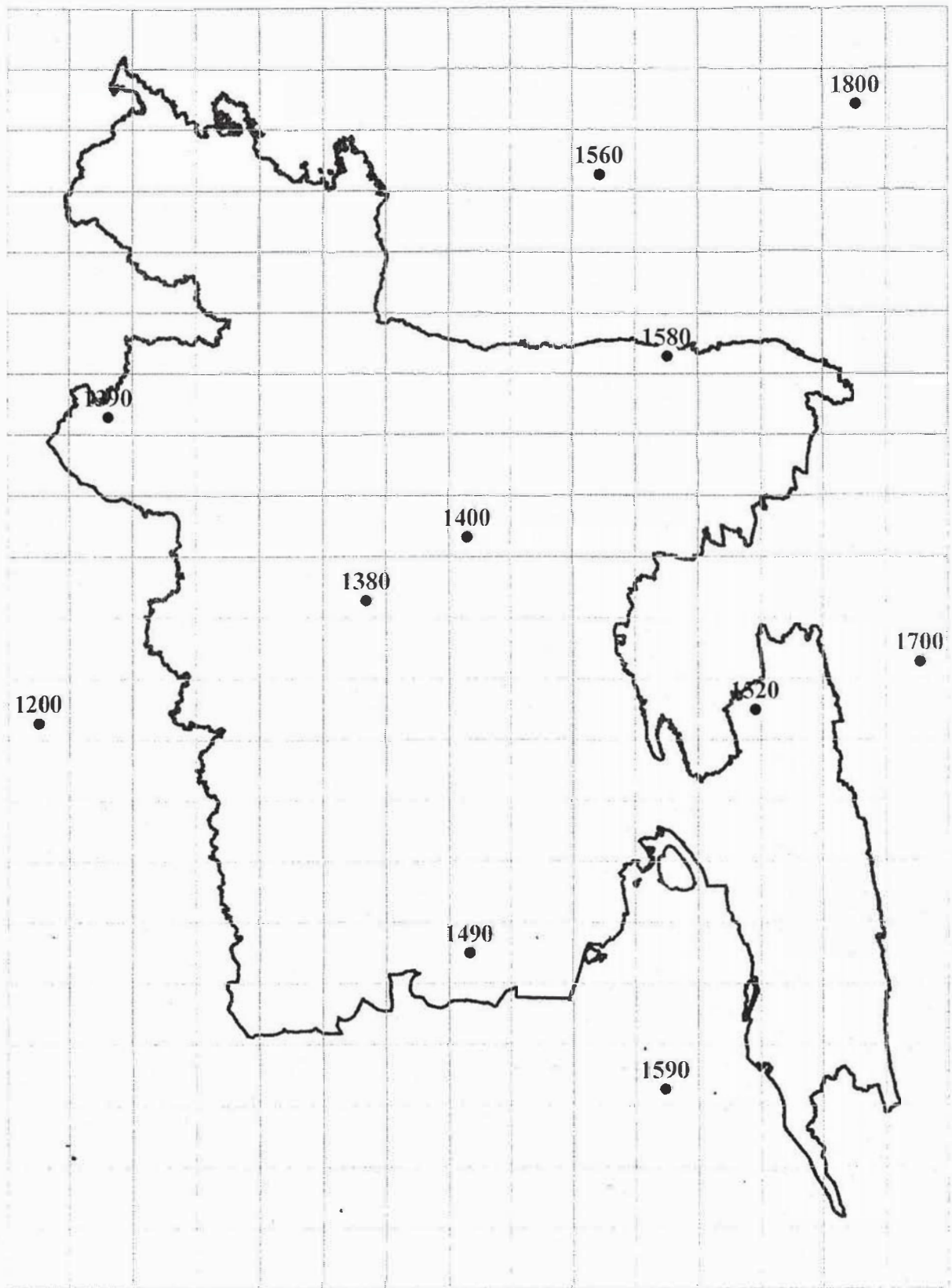
4. A reservoir had an average surface area of 20 km² in a month. In that month, the mean rate of inflow = 20 m³/s, outflow = 15 m³/s, monthly rainfall = 10 cm and change in storage = 16 Mm³. Assuming the seepage losses to be 1.8 cm, estimate the evaporation in that month. (10)

5. Assuming, there are 12 rain-gauge stations in Bangladesh, their geographic positions and recorded rainfalls in mm are shown in the Figure 1. Sketch free hand the isohyets by choosing any isohyetal interval. (10)

6. In an arbitrary area, there are six rain gauge stations. The locations and corresponding recorded precipitations are given Figure 2. Only draw (free hand) possible no. of polygon using Thiessen Polygon Method. (10)

Name : _____ Reg. # _____

Figure 1: (Question: 5). Attach this sheet with your answer script:



Name : _____ Reg. # _____

Figure 2: (Question: 6). Attach this sheet with your answer script:

