University of Asia Pacific
Department of Civil Engineering
Midterm Examination (Fall 2015)
Program: B.Sc. Engg (3rd year 1st semester)

Course Title: Principles of Accounting **Course: ACN 301** **Credit Hours: 2.0**
Time : 1 hr **Full marks : 20**

PART ONE
[Answer any one from the followings]

Q.1. The bank statement for Jose Orozco Company shows a balance per bank of **$4,150** on June 30, 2014. On this date the balance of cash per books is **$3,969.85.**

Items to be reconciled:

a) There were bank service charges for June of $25.
b) A bank memo stated that Bao Dais note for $900 plus interest earned $36; less bank collection fee $5.50 has been collected on June 26. No entry has been made on Orozco's book regarding this transaction.
c) **Deposits in transit:** June 30 deposit (received by bank on July 2). $2,890.
d) **Outstanding checks:** $2,136.05.
e) NSF check from J. R. Baron for $453.20.
f) **Book Errors:** A customer's check for $90 has been entered as $60 in the cash receipts journal by Orozco on June 15.
g) **Book Errors:** Check no. 742 in the amount **$491** had been entered in the cashbook as **$419**, and check no 747 in the amount **58.20** had been entered as **$582**. Both checks had been issued to pay for purchase of equipment.

Instructions:
Prepare a bank reconciliation statement for the month of June. **(10)**

Q.2. Jay Cutler owns and manages a computer repair service, which had the following trial balance on December 31, 2014 (the end of its fiscal year).

MEGA REPAIR SERVICE
Trial Balance
December 31, 2014

Cash	$ 8,000	
Accounts Receivable	15,000	
Supplies	13,000	
Prepaid Rent	3,000	
Equipment	20,000	
Accounts Payable		$19,000
Owner's Capital		40,000
	$59,000	$59,000

Summarized transactions for January 2012 were as follows.

1. Advertising costs, paid in cash, $1,000.
2. Additional supplies acquired on account $4,200.
3. Miscellaneous expenses, paid in cash, $2,000.
4. Cash collected from customers in payment of accounts receivable $14,000.
5. Cash paid to creditors for accounts payable due $15,000.
6. Repair services performed during January: for cash $6,000; on account $9,000.

Instructions

(a) Prepare journal entries to record each of the January transactions. (Omit explanations.)
(b) Post the journal entries to the accounts in the three column ledger. (Add accounts as needed.) **(6+4)**

Q.3. SMEC BD Ltd began business on January 2014. The company provides real estate service to customers. The adjusted trial balance of the company for the year 2014 is as follows: (all figures are in '000BDT)

SMEC BD LTD.
Trial Balance (Adjusted)
December 31, 2014

	Debit	Credit
Cash	14,500	
Accounts Receivable	23,600	
Prepaid Insurance	1,600	
Land	56,000	
Building	106,000	
Equipment	48,000	
Accounts Payable		10,400
Unearned Rent Revenue		1,800
Mortgage Payable (Long term)		100,000
Smec, Capital		120,000
Smec, Drawing	20,000	
Service Revenue		75,600
Rent Revenue		26,200
Salaries Expense	30,000	
Advertising Expense	17,000	
Utilities Expense	15,800	
Insurance Expense	1,500	
Depreciation Expense- Building	2,500	
Accumulated depreciation-Building		2,500
Depreciation Expense- Equipment	3,900	
Accumulated depreciation-Equipment		3,900
Interest Expense	10,000	
Interest Payable		10,000
Total	**350,400**	**350,400**

Instructions:
Prepare a classified balance sheet at December 31, 2014. (Owner's equity statement shows at December 31 Owner's capital is 121,100. No need to prepare an Income Statement or an Owner's Equity Statement.) (10.0)

Q.4. The Bear Motel opened for business on May 1, 2015. Its trial balance before adjustment on May 31 is as follows.

BEAR MOTEL
Trial Balance
May 31, 2015

	Debit	Credit
101 Cash	$ 3,500	
126 Supplies	2,080	
130 Prepaid Insurance	2,400	
140 Land	12,000	
141 Buildings	60,000	
149 Equipment	15,000	
201 Accounts Payable		$ 4,800
208 Unearned Rent Revenue		3,300
275 Mortgage Payable		40,000
301 Owner's Capital		41,380
429 Rent Revenue		10,300
610 Advertising Expense	600	
726 Salaries and Wages Expense	3,300	
732 Utilities Expense	900	
	$99,780	$99,780

In addition to those accounts listed on the trial balance, the chart of accounts for Bear Motel also contains the following accounts and account numbers: No. 142 Accumulated Depreciation—Buildings, No. 150 Accumulated Depreciation—Equipment, No. 212 Salaries and Wages Payable, No. 230 Interest Payable, No. 619 Depreciation Expense, No. 631 Supplies Expense, No. 718 Interest Expense, and No. 722 Insurance Expense.

Other data for adjustments:

(a) Prepaid insurance is a 1-year policy starting May 1, 2015.
(b) A count of supplies shows $750 of unused supplies on May 31.
(c) Annual depreciation is $3,000 on the buildings and $1,500 on equipment.
(d) Two-thirds of the unearned rent revenue has been earned.
(e) Salaries of $750 are accrued and unpaid at May 31.

Instructions

Journalize the adjusting entries on May 31, 2015. **(10.0)**

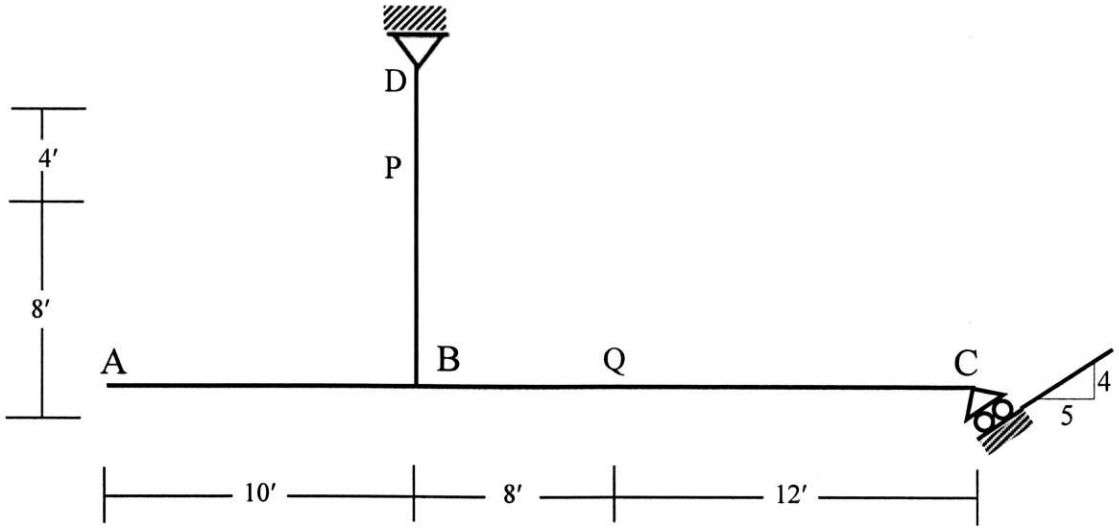
University of Asia Pacific
Department of Civil Engineering
Final Examination Fall 2015
Program: B. Sc. Engineering (Civil)

Course Title: Structural Analysis & Design I
Time: 1 Hour

Course Code: CE 311 (A)
Full Marks: 40 (=4×10)

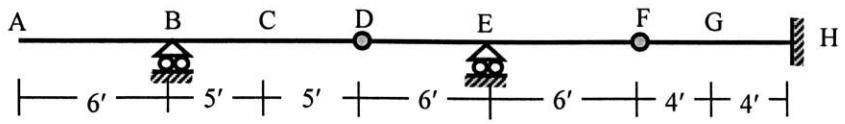
*There are **Five** question. Answer any **Four***

1. For the Frame shown below, draw IL for V_P, M_Q, Dy (Load moves from A to C).

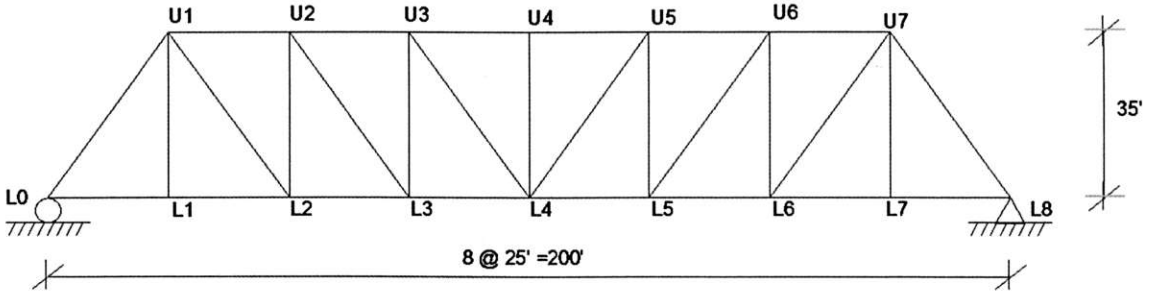


2. For the beam shown below (B and D are Internal Hinges), draw the influence lines for

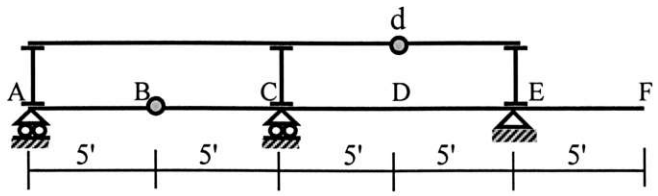
(i) R_H
(ii) V_{ER}, V_{EL} V_F
(iii) M_G



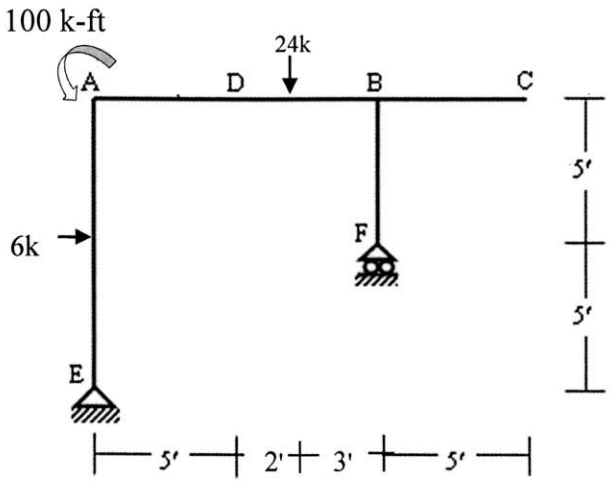
3. For the truss shown below, draw the influence lines for U_2U_3, LoU_1 and U_5L_4. Note, each bottom chord joint consists of a cross girder and load moves over the floor beam placed over the girders.



4. For the plate girder shown below, draw the influence lines for V_D and M_C.
[B and d are internal Hinges]



5. For the frame shown below, draw the SFD and BMD.



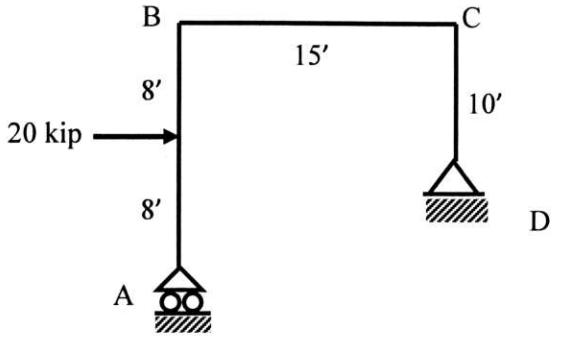
University of Asia Pacific
Department of Civil Engineering
Mid Term Examination Fall 2015
Program: B.Sc. Engineering (Civil)

Course Title: Structural Engineering I **Course Code: CE 311(B)**

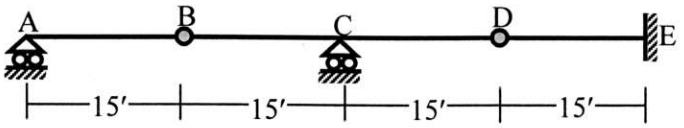
Time: 1 hour **Full Marks: 40**

[Answer any **four** (04) out of following **five** (05) questions]

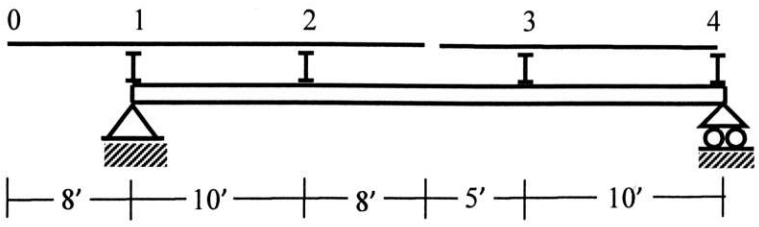
1. Draw SFD and BMD for beam BC of the following Frame [10]



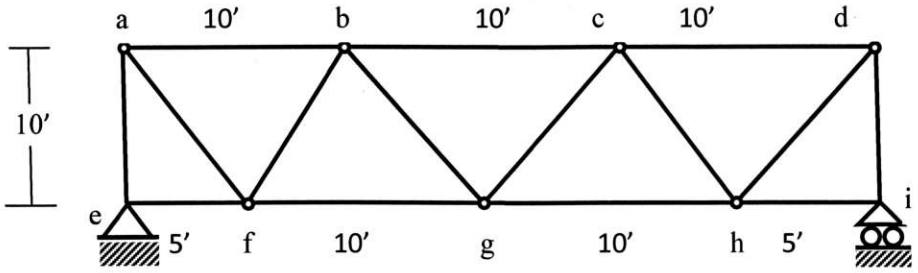
2. For the beam shown below, draw the influence lines for R_C, V_{BL}, V_{DL}, M_E. [10]



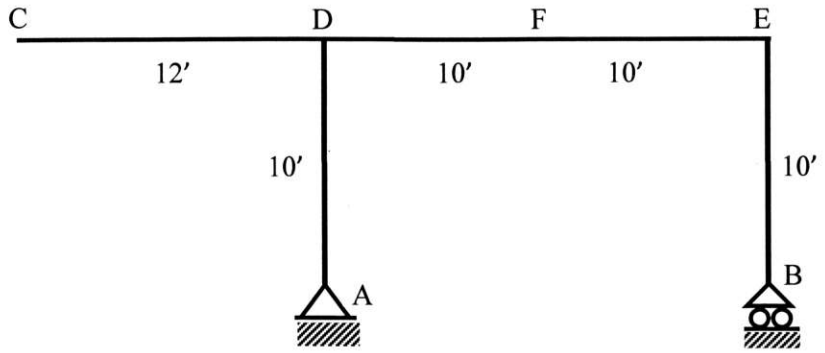
3. For the Plate Girder shown, draw Influence Line for (i) FBR_1 (ii) M_2. Unit load moves over floor beams. [10]



4. For the truss shown, draw influence lines for F_{af} and F_{ab}. Note, each top chord joint consists of a cross girder and unit load moves over the floor beam placed over the cross girders. [10]



5. For the frame shown below, draw the influence lines for R_{AY} and M_F. Unit load moves over the beam CE. [10]



University of Asia Pacific
Department of Civil Engineering
Mid Term Examination Fall 2015
Program: B.Sc. Engineering (Civil)

Course Title: Design of Concrete Structures I | Course Code: CE 315(A)
Time: 1 hour | Full Marks: 60

[Answer any **three** (03) out of following **four** (04) questions]

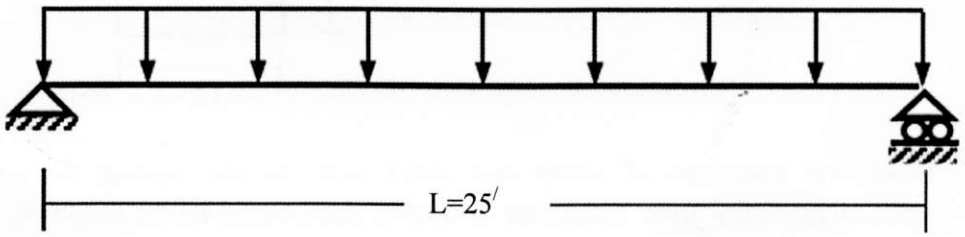
1. (a) What are the fundamental assumptions for reinforced concrete behavior? [05]

   (b) A rectangular column of 12″x16″ has 6#8 bars. Determine the axial compressive load if concrete undergoes a strain of 0.0003. [10]
   [Given that $f_c' = 4$ ksi, $f_y = 60$ ksi].

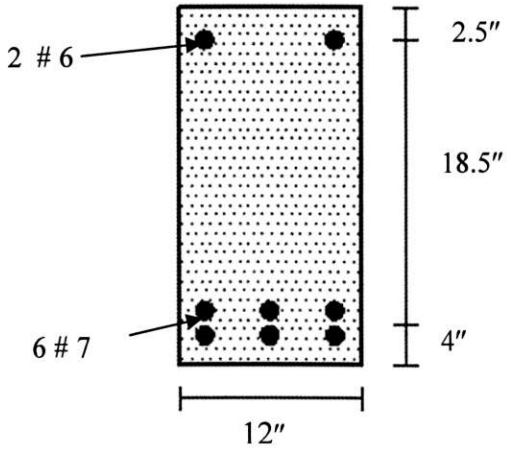
   (c) What is the balanced steel ratio (ρ_b)? Why does the ACI recommend a maximum steel ratio (ρ_{max}) less than balanced steel ratio ρ_b? [05]

2. Use WSD or USD Method to design the simply supported singly reinforced RC beam with working loads as shown for flexure only. Given that $f_c' = 3$ ksi, $f_y = 60$ ksi, $f_{call} = 1.35$ ksi, $f_{sall} = 24$ ksi. [20]

W_{DL}=1.5 k/ft (excluding self weight), W_{LL}=0.75 k/ft

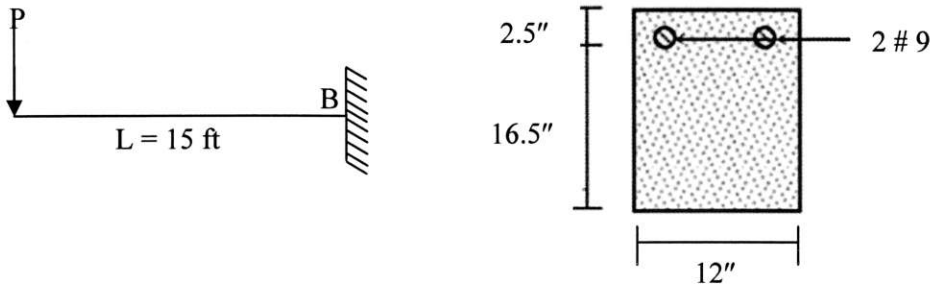


3. (a) In the figure shown below, calculate the ultimate positive moment capacity of the following beam. Follow USD method. [Given that $f_c' = 5$ ksi, $f_y = 60$ ksi,]. [16]



(b) Explain the difference between analysis and design of an RC section. [04]

4. (a) In the figures shown below, calculate value of the point load P shown in the figure which will produce first crack at support section (section B). Neglect self weight of the beam [Given that $f_y = 60$ ksi and $f_c' = 3$ ksi, $f_r = 7.5\sqrt{f_c'}$]. [15]



(b) Show the variations of stress and strain over an RC section as it is stressed gradually from uncracked to cracked and ultimate failure condition. [05]

Formula (CE 315)

$P = A_c f_c + A_s f_s$

$P = f_c\{A_g + (n-1)A_s\}$

$P = 0.85 f_c' A_c + A_s f_y$

$P = A_c f_{ct} + A_s f_s$

$P = A_s f_y$

$E_c = 57000 \sqrt{f_c'}$

$f_r = 7.5 \sqrt{f_c'}$

$M_c = 0.5 f_c k j b d^2 = R\, bd^2$

$M_s = A_s f_s j d$

$k = -\rho n + \sqrt{\{(2\rho n + (\rho n)^2\}}$

$k = \frac{n}{n+r}$

$j = 1 - k/3$

$\rho_b = \frac{\alpha f_c'}{f_y} \frac{\varepsilon_u}{\varepsilon_u + \varepsilon_y}$

$\rho_{max} = \frac{\alpha f_c'}{f_y} \frac{\varepsilon_u}{\varepsilon_u + \varepsilon_t}$

$M_n = A_s f_y (d - \frac{a}{2})$

$M_n = \rho f_y b d^2 (1 - 0.59 \rho \frac{f_y}{f_c'})$

$M_u = \Phi M_n$

$\gamma f_c' ab = A_s f_y$

$\rho_{min} = \frac{3\sqrt{f_c'}}{f_y} \geq \frac{200}{f_y}$

$\varepsilon_t = \frac{-c + d_t}{c} \varepsilon_u$

$M_{1n} = A_s' f_y (d - d')$

$M_{2n} = (A_s - A_s') f_y (d - \frac{a}{2})$

$0.85 f'_c ab = (A_s - A_s') f_y$

$\overline{\rho}_{max} = \rho_{max} + \rho'$

$\overline{\rho}_{cy} = \gamma \beta_1 \frac{d'}{d} \frac{f_c'}{f_y} \frac{\varepsilon_u}{\varepsilon_u - \varepsilon_y} + \rho'$

$f_s' = E_s[\varepsilon_u - \frac{d'}{d}(\varepsilon_u + \varepsilon_t)]$

$\Phi = 0.483 + 83.3\varepsilon_t$ (For $0.002 < \varepsilon_t < 0.005$)

Table 1 Bar diameter and area of bar

d (No.)	2	3	4	5	6	7	8	9	10
A_s (in^2)	0.05	0.11	0.20	0.31	0.44	0.60	0.79	1.00	1.27
d (mm)	8	10	12	16	19	22	25	28	31
A_s (in^2)	0.08	0.12	0.18	0.31	0.44	0.59	0.76	0.95	1.17

University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination Fall 2015
Program: B.Sc. Engineering (Civil)

Course Title: Design of Concrete Structures I — Course Code: **CE 315 (B)**

Time: 1 hour — Full Marks: 60

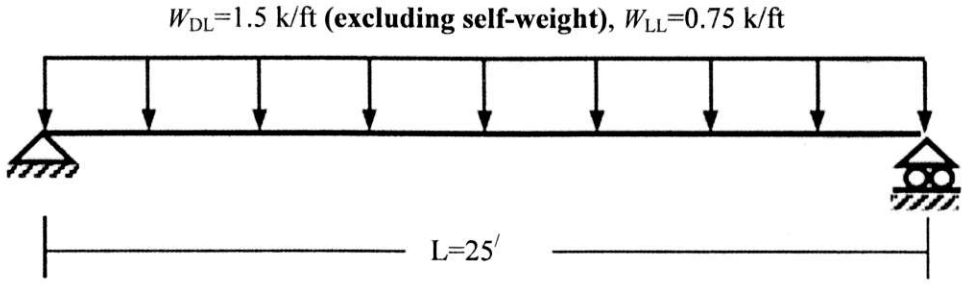
[Answer any **three** (03) out of the following **four** (04) questions]

1. (a) What are the fundamental assumptions for reinforced concrete behavior? [05]

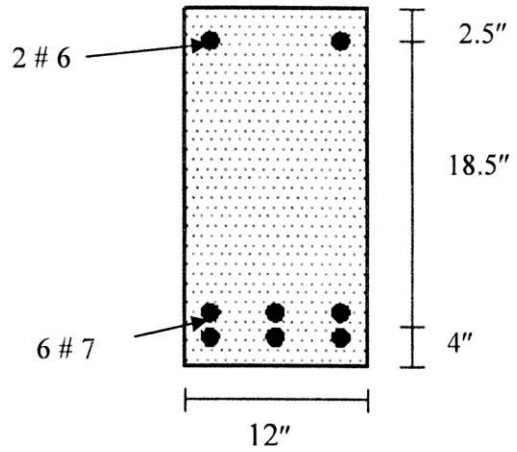
   (b) A rectangular column of 12″x16″ has 6#8 bars. Determine the axial compressive load if concrete undergoes a strain of 0.0003. [10]
   [Given that $f_c' = 4$ ksi, $f_y = 60$ ksi]

   (c) What is the balanced steel ratio (ρ_b)? Why does the ACI recommends a maximum steel ratio (ρ_{max}) less than ρ_b? [05]

2. Use WSD or USD Method to design the simply supported singly reinforced RC beam with working loads as shown for flexure only. Given that $f_c' = 3$ ksi, $f_y = 60$ ksi, $f_c = 1.35$ ksi, $f_s = 24$ ksi. [20]

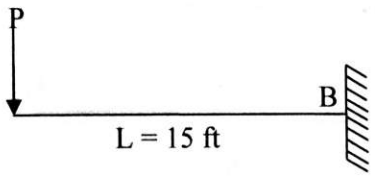


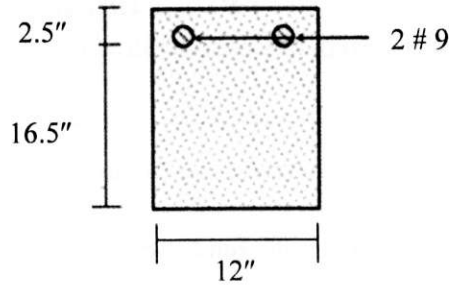
3. (a) In the figure shown below, calculate the design positive moment capacity of the beam. Follow USD method [Given that $f_c' = 5$ ksi, $f_y = 60$ ksi]. [15]



   (b) Explain the difference between analysis and design of an RC beam section. [05]

4. (a) In the figures shown below, calculate value of the **point load P** shown in the figure which will produce first crack **at section B**. Neglect self weight of the beam [Given that $f_y = 60$ ksi and $f_c' = 3$ ksi]. [15]





Section B

(b) Show the variations of stress and strain over an RC section as it is stressed gradually from uncracked to cracked and ultimate failure condition [05]

$P = A_c f_c + A_s f_s$

$P = f_c\{A_g + (n-1)A_s\}$

$P_{ultimate} = 0.85 f_c' A_c + A_s f_y$

$P = A_c f_{ct} + A_s f_s$

$P_{tensile} = A_s f_y$

$E_c = 57000 \sqrt{f_c'}(psi)$

$f_r = 7.5 \sqrt{f_c'}$

$M_c = 0.5 f_c k j b d^2 = R\, bd^2$

$M_s = A_s f_s j d$

$k = -\rho n + \sqrt{\{(2\rho n + (\rho n)^2\}}$

$k = \frac{n}{n+r}$

$j = 1 - k/3$

$\rho_b = \frac{\alpha f_c'}{f_y} \frac{\varepsilon_u}{\varepsilon_u + \varepsilon_y}$

$\rho_{max} = \frac{\alpha f_c'}{f_y} \frac{\varepsilon_u}{\varepsilon_u + \varepsilon_t} \quad (\alpha = 0.85\beta_1)$

$M_n = A_s f_y (d - \frac{a}{2})$

$M_n = \rho f_y b d^2 (1 - 0.59\rho \frac{f_y}{f_c'})$

$M_u = \Phi M_n$

$\gamma f_c' ab = A_s f_y$

$\rho_{min} = \frac{3\sqrt{f_c'}}{f_y} \geq \frac{200}{f_y}$

$\boldsymbol{\varepsilon}_t = \frac{-c + d_t}{c} \boldsymbol{\varepsilon}_u$

$M_{1n} = A_s' f_y (d - d')$

$M_{2n} = (A_s - A_s') f_y (d - \frac{a}{2})$

$0.85 f'_c ab = (A_s - A_s') f_y$

$\overline{\rho}_{max} = \rho_{max} + \rho'$

$\overline{\rho}_{cy} = 0.85\beta_1 \frac{d'}{d} \frac{f_c'}{f_y} \frac{\varepsilon_u}{\varepsilon_u - \varepsilon_y} + \rho'$

$f_s' = E_s[\varepsilon_u - \frac{d'}{d}(\varepsilon_u + \varepsilon_t)]$

$\Phi = 0.483 + 83.3\varepsilon_t \quad (\text{For } 0.002 < \varepsilon_t < 0.005)$

Table 1 Bar diameter and area of bar

d (No.)	2	3	4	5	6	7	8	9	10
A_s (in^2)	0.05	0.11	0.20	0.31	0.44	0.60	0.79	1.00	1.27
d (mm)	8	10	12	16	19	22	25	28	31
A_s (in^2)	0.08	0.12	0.18	0.31	0.44	0.59	0.76	0.95	1.17

University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination Fall 2015
Program: B. Sc. Engineering (Civil)

Course Title: Environmental Engineering I — Course Code: CE 331
Time- 1 hour — Full marks: 50

There are **THREE** questions. Question **1** is mandatory. In addition, answer any **ONE** between questions **2** and **3**. *(25*2 = 50)*

1. (a) A 100 mm diameter tubewell is sunk 35 m below static groundwater level. The depth of water in the tubewell while pumping is 33m. The radius of drawdown is 30 m and the coefficient of permeability of the aquifer is 0.5 l/s/m^2. Calculate the probable discharge and specific capacity of the well. (8)

   (b) Define Permeability. Provide the expression for Darcy's law explaining all the relevant parameters in the equation. State at least three natural ways of groundwater recharge. (2+2+3)

   (c) Where in the conveyance system does the galvanic corrosion occur? How can it be prevented? (2+3)

   (d) Water from Turag river was tested and suspended solids concentration was measured up to 50 mg/L. If 85% removal of solids from the river water sample is achieved in a sedimentation tank, what weight of solids will be deposited per day in the tank? Consider the flow rate of 1 million gallons per day through the tank. (5)

2. (a) What is Bayliss curve? A water sample has total alkalinity of 100 mg/L as $CaCO_3$ and calcium ion concentration of 45 mg/L as Ca^{2+}. Determine the values of pAlk and pCa^{2+} for the sample. (3+5)

   (b) What are the main processes in water cycle? Discuss interference of wells with figure. (2+5)

   (c) Mention at least 3 design considerations of an intake. (3)

   (d) Discuss "Alkalinity" and "Turbidity" as important water quality parameters. On what factors does the dosage of a coagulant depend? (4+3)

3. (a) Define aquifer and aquiclude. What is cone of depression and how is it formed? (4+3)

(b) Mention the internal forces that act on the conveyance pipes. What are the common problems in conveyance system and how could those be detected? (2+4)

(c) Compare Slow sand filters and Rapid sand filters. (5+7)

A 1,550m^3/hour drinking water plant needs rapid mix basins for chemical addition. If the detention time is 60 seconds, determine the volume of the tank. If the volume of one tank cannot exceed 8 m^3, how many tanks will be needed? What is the power in watts that needs to be supplied if the velocity gradient G is 80 sec^{-1}? Assume that the absolute viscosity of the water is 8.91×10^{-4} m^2/sec.

Given Formula:

$Q = \{\pi k (D^2 - d^2)\} / \{\log_e (R/r)\}$.

$$G = \sqrt{\frac{P}{\mu V}}$$

Overflow rate $= Q/BL$

3.78 L = 1 G

7.48 G = 1 ft^3

University of Asia Pacific
Department of Civil Engineering
MidTerm Examination
Fall 2015
Program: B.Sc. Engineering (Civil)

Course Title: Geotechnical Engineering I — **Course Code**: CE 341
Time: 1 hour — **Full Marks**: 20

Answer all the questions. **(4x5=20 marks)**

1. a) Classify the following soil. The properties of the subgrade soil are found as follows. 3
Percent finer than 0.075 mm = 65%
Percent finer than 0.425 mm = 60%
Percent finer than 0.6 mm = 62%
Percent finer than 4.75 mm = 75%
Liquid limit = 35%
Plastic limit = 25%

b)) What are the effective size, uniformity coefficient and coefficient of curvature for the given soil? Given that percent of material coarser than 0.075 mm = 90%; percent finer than 0.425 mm = 30%; percent finer than 0.8 mm = 60%; percent finer than 4.75 mm = 80%. 2

2. a) Calculate the compression index, coefficient of compressibility and coefficient of volume compressibility for the given saturated clay soil data (normally consolidated). The stress on the soil is increased from 350 to 680 kPa. Given that, under 350 kPa effective stress, void ratio is found 0.55. The void ratio is found 0.44 under 680 kPa of effective stress. 3

b) The above soil is then unloaded from 680 kPa to 250 kPa. Draw the e-logσ' curve. 2
Calculate over-consolidation ratio for the following cases:
(i) when the stress on the soil was 350 kPa during loading path;
(ii) when the stress on the soil was 350 kPa during unloading path;
(iii) when the stress on the soil was 450 kPa during loading path.
(iv) when the stress on the soil was 450 kPa during unloading path. 5

3. a) Derive the expression of estimating primary consolidation settlement for normally consolidated clay. 4

b) Sketch the soil profiles demonstrating one way drainage and both way drainage for primary consolidation settlement. 1

4. Calculate the total stress, effective stress and pore water pressure: (a) at the top of the clay layer; (b) the middle of the saturated clay layer. (Fig 1). 5

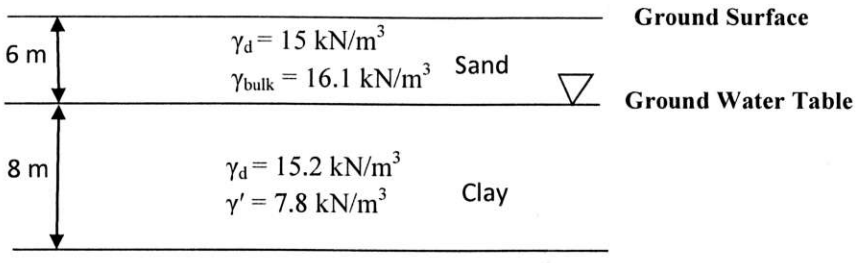


Figure 1

University of Asia Pacific
Department of Civil Engineering
Mid Term Examination Fall 2015
Program: B.Sc. Engineering (Civil)

Course Title: Open Channel flow | Course Code: CE 361
Time: 1 Hour | Full Marks: 80

All notations have their usual meaning. Assume any reasonable data, if not given

Answer all the Questions

1. (a) Write down the classifications of open channel. (05)

   (b) For a triangular channel with s= 2, compute the critical depth and velocity if Q=14 m^3/s and α=1. (Use Newton Raphson method). (15)

2. (a) Prove that in a critical flow Froude number is equal to unity. (05)

   (b) Water flows in an open channel at a depth of 3 m and a mean velocity of 2 m/s. Compute the discharge and depth of flow if the channel is circular with a diameter of 2.5 m. If elementary waves are created in these channels, determine the speeds of the wave fronts upstream and downstream. (15)

3. (a) Sketch the specific energy curve with brief explanation. (04)

   (b) In a wide channel velocity varies along a vertical as $u = 4 (z/h)^{1/2}$ where h is the total depth and u is the velocity at a distance z from the channel bottom. Calculate the depth average velocity (U) and energy co-efficient (α) if the total depth is 10 m. (16)

4. (a) Derive the expression of energy coefficient (α) and momentum coefficient (β). (08)

   (b) A broad crested weir is built in a rectangular channel off width 2 m. The height of the weir crest above the channel bed is 1.20 m and the head over the weir is 0.80 m. Calculate the discharge. (12)