University of Asia Pacific
Department of Civil Engineering
Midterm Examination (Spring 2016)
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**

Section A
[Answer all Questions]

Q.1. Jay M Cutler owns and manages a engineering consultancy service, which had the following trial balance on December 31, 2015 (the end of its fiscal year).

MEGA CONSULTANTS LTD.
Trial Balance
December 31, 2015

Cash	$ 12,000	
Accounts Receivable	15,000	
Supplies	13,000	
Prepaid Rent	3,000	
Equipment	20,000	
Accounts Payable		$9,000
Accumulated depreciation-Equipment		4000
Unearned Revenue		10,000
Owner's Capital		40,000
	$63,000	$63,000

Summarized transactions for January 2016 were as follows:
Jan 5: Advertising costs, paid in cash, $1,000.
Jan 7: Additional supplies acquired on account $4,200.
Jan 15: Cash collected from customers in payment of accounts receivable $14,000.
Jan 17: Cash paid to creditors for accounts payable due $7,000.
Jan 20: Repair services performed during January: for cash $16,000; on account $5,000.
Jan 22: Wages for January, paid in cash, $3,500.
Jan 25: Jay's drawings during January were $3,000.

Adjustment data consist of:
1. Supplies on hand $1,300.
2. Prepaid rent of 1000 were expensed during the month.
3. Depreciation on equipment is $100 per month.
4. Unearned service revenue of $1,450 is earned.

Instructions:
a. **Journalize the September transactions.** **(7)**
b. **Journalize the adjustment data.** **(4)**

P.T.O.

Section B
[Answer any one from the followings]

Q.2. The comparative statements of Softbyte Engineers Company are presented below.

SOFTBYTE ENGINEERS COMPANY
Balance Sheet
December 31, 2015

Assets	2015	2014
Current assets		
Cash and cash equivalents	$21,000	$ 18,000
Short-term Investment	18,000	15,000
Accounts receivable (net)	92,000	74,000
Inventories	84,000	70,000
Total current assets	**215,000**	**177,000**
Property, plant, and equipment (net)	423,000	383,000
Total assets	**$638,000**	**$560,000**
Liabilities and Stockholders' equity		
Current liabilities		
Accounts Payable	$112,000	$ 110,000
Income Tax Payable	$23,000	20,000
Total Current liabilities	135,000	130,000
Long-term liabilities	130,000	80,000
Total liabilities	265,000	210,000
Stockholders' equity		
Common stock	150,000	150,000
Retained Earnings	223,000	200,000
Total Stockholders' equity	**373,000**	**350,000**
Total liabilities and stockholders' equity	**$638,000**	**$560,000**

SOFTBYTE ENGINEERS COMPANY
Income Statement
For the Years Ended December 31, 2015

	2015	2014
Sales	$600,000	$520,000
Less: Cost of goods sold	415,000	354,000
Gross profit	185,000	166,000
Less: Operating expenses	146,000	134,800
Net income	$ 39,000	$ 31,200

Compute the following ratios for 2015 and 2014 and make comments.

i. Current Ratio
ii. Profit Margin Ratio
iii. Quick or Acid Test Ratio
iv. Debt to Total Assets Ratio. **(8+1)**

Q.3. SMEC BD Ltd began business on January 2015. The company provides real estate service to customers. The adjusted trial balance of the company for the year 2015 is as follows: (all figures are in '000BDT)

SMEC BD LTD.
Trial Balance (Adjusted)
December 31, 2015

	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 Design Revenue		1,800
Mortgage Payable (Long term)		100,000
Smec, Capital		120,000
Smec, Drawing	20,000	
Consultancy, Revenue		75,600
Design, Revenue		26,200
Salaries Expense	30,000	
Advertising Expense	17,000	
Utilities Expense	15,800	
Insurance Expense	1,500	
Depreciation Expense	6,400	
Accumulated depreciation-Building		2,500
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, 2015, if the balance of Owner's Equity Statement is 121,100. [Note that you do not need to prepare Income Statement and Owner's Equity Statement] (9)

University of Asia Pacific
Department of Civil Engineering
Mid Term Examination Spring 2016
Program: B.Sc. Engineering (Civil)

Course Title: Environmental Engineering I (Water Supply Engineering) Course Code: CE 331
Time: 1 hour Full Marks: 30

There are Three (3) questions. Answer all the questions.

1. (a) What are the main objectives of water supply systems? [2]
   (b) Draw a neat diagram of a public water supply system. Why ground water is being considered as a safe source (when compared with surface water) for water supply system? [4]
   (c) Enlist the main factors for the design and location of intake structures. What are the common units for expressing water demand? [4]

2. (a) Define instantaneous water demand. [2]
   (b) What are the factors that affect per capita water consumption? In tropical countries which type of water consumption influences overall water demand? [4]
   (c) With a neat diagram explain hydrological cycle. Why higher amount of water is not available at greater depths of an aquifer? [4]

3. (a) What is the main source of incrusting water? How incrusting water influences well performance? [2]
   (b) With necessary diagrams, derive the following discharge equation for an unconfined aquifer. [4]

$$Q = \frac{\pi K_f (h_2^2 - h_1^2)}{\ln(r_2/r_1)}$$

   A well is 0.2 m in diameter and pumps from an unconfined aquifer 30 m deep at an equilibrium (steady-state) rate of 1200m^3 per day. Two observation wells are located at distances 50 and 100m, and they have been drawn down by 0.3 and 0.4 m, respectively. What is the coefficient of permeability?
   (c) With a neat engineering diagram describe the operation principles of a rower pump tubewell. Why continuous slot type screens include V-shaped openings? [4]

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University of Asia Pacific
Department of Civil Engineering
Mid Term Examination Spring 2016
Program: B.Sc. Engineering (Civil)

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

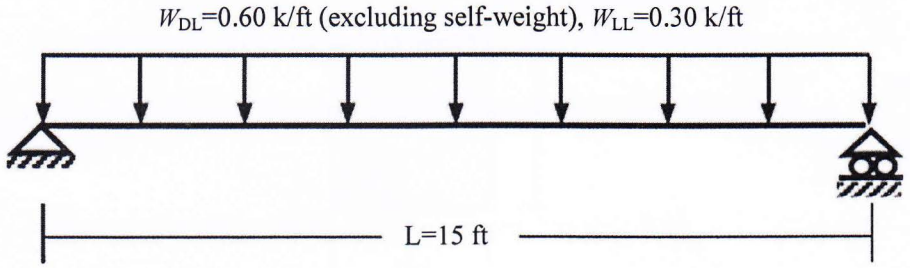
[Answer any **three** (03) out of following **four** (04) questions]

1. (a) What is a 'transformed' RC section? Explain with reference to cracked and uncracked section. [05]

   (b) A rectangular column of 12″x16″ has 6#8 bars. Determine the axial compressive load if steel undergoes a strain of 0.00025. [10]
   [Given that $f_c' = 3.5$ ksi, $f_y = 60$ ksi].

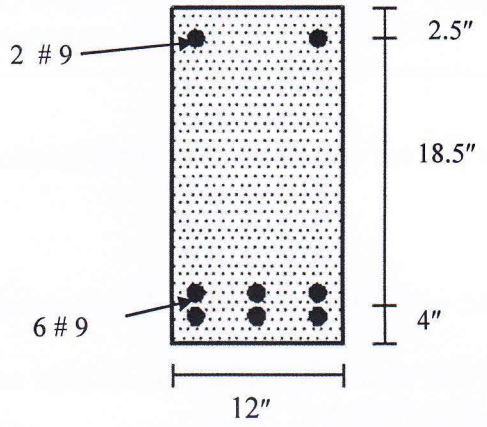
   (c) Mention different types of beam failure under flexure. Which type of failure is desirable and why? [05]

2. (a) 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. [17]



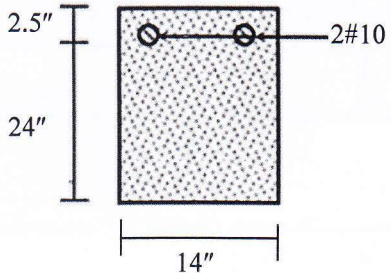
   (b) What is RC? Explain why steel and concrete are used in conjunction in RC [03]

3. (a) In the figure shown below, calculate the ultimate positive moment capacity of the following beam. Follow USD method. [Given that $f_c' = 4.5$ ksi, $f_y = 60$ ksi,]. [16]



(b) Explain how factor of safety is ensured in WSD and USD method. [04]

4. (a) Calculate the 'Cracking' negative moment capacity of the RC cross-sectional area shown below. Also calculate corresponding compressive stress in concrete and tensile stress in steel. [Given that $f_y = 60$ ksi and $f_c' = 3$ ksi, $f_r = 7.5\sqrt{f_c'}$]. [15]



(b) What is a doubly reinforced RC beam? Explain how it differs from a singly reinforced beam. [05]

Formula (CE 315)

$P = A_c f_c + A_s f_s$

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

$P = 0.85 f_c' A_c + A_s f_y$

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

$P = A_s f_y$

$E_c = 57000 \sqrt{f_c'}$

$f_r = 7.5 \sqrt{f_c'}$

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

$M_s = A_s f_s j d$

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

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

$j = 1 - k/3$

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

$\rho_{max} = \frac{\gamma \beta 1 f_c'}{f_y} \frac{\varepsilon_u}{\varepsilon_u + \varepsilon_t}$

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

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

$M_u = \Phi M_n$

$\gamma f_c' ab = A_s f_y$

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

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

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

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

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

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

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

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

$\Phi = 0.483 + 83.3 \varepsilon_t$ (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

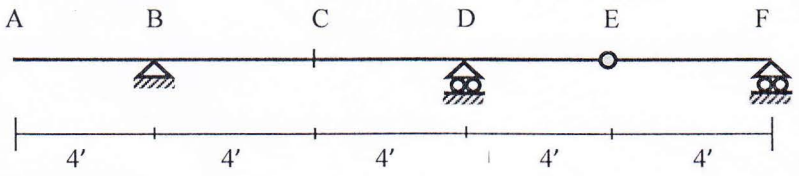
University of Asia Pacific
Department of Civil Engineering
Mid Term Examination, Spring 2016
Program: B. Sc. Engineering (Civil)

Course Title: Structural Analysis & Design I | Course Code: CE 311
Time: 1.00 Hour | Full Marks: 30 (=10×3) **Section A**

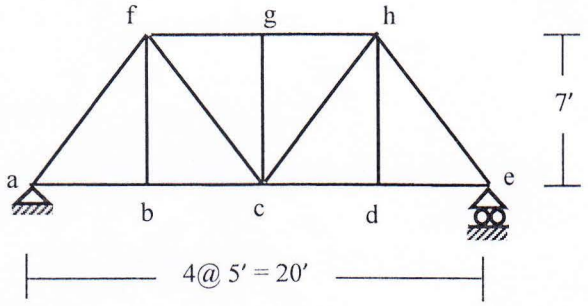
*Answer any **three (03)** of the following **four (04)** questions.*
Assume any missing data reasonably.

1. Draw influence lines for [10]
(a) Bending moment at C
(b) Bending moment at B
(c) Shear force at the left of D
(d) Shear force at C
(e) Vertical reaction at B

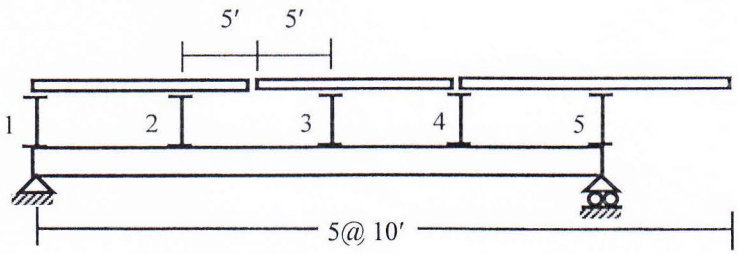
for the beam shown below



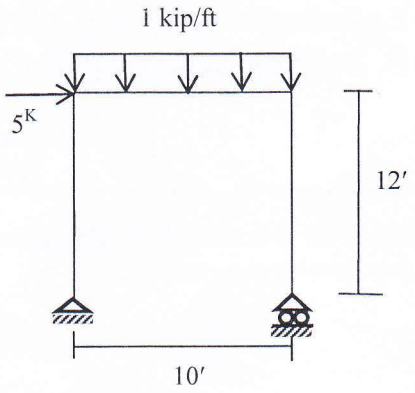
2. For the truss shown below, draw the influence lines for bar forces in member gh, fc and cd [Load moves over the bottom chord]. [10]



3. Draw influence lines for shear force in panel 2-3, bending moment at panel point 4 of the girder with floor beam system shown in figure below. [10]



4. Draw the shear force and bending moment diagrams for the frame shown in figure below. [10]



University of Asia Pacific
Department of Civil Engineering
Mid Term Examination
Spring 2016
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 = 22%
Percent finer than 0.425 mm = 30%
Percent finer than 0.6 mm = 60%
Percent finer than 4.75 mm = 75%
Liquid limit = 35%
Plastic limit = 25%

b) Determine the uniformity coefficient and coefficient of curvature of the given soil data? 2
Given Data: Effective size = 0.18 mm; Percent finer than 0.425 mm = 30%;
Percent finer than 0.8 mm = 60%; Percent finer than 4.75 mm = 90%.

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

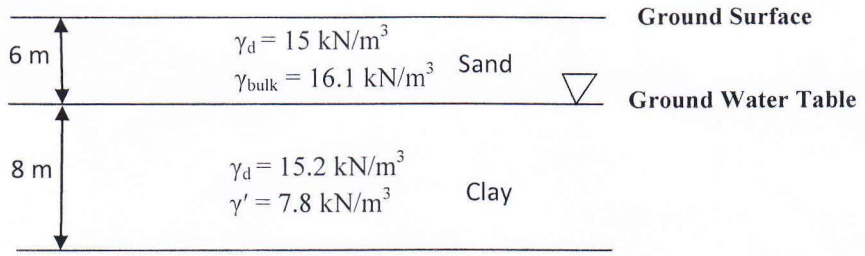


Figure 1

3(a) Calculate the unconfined compressive strength of a cohesive soil sample from the following data: diameter and height of the specimen are 40 mm and 80 mm, respectively. Axial compression = 0.5 cm; Deviator load at failure is 637 N. 2

(b) Draw a Mohr circle from the following information: cell pressure = 180 kPa; deviator stress = 300 kPa. Write the co-ordinates of the points where Mohr circle intersects x-axis. 2

(c) Differentiate between the stress-strain diagrams of dense sand loose sand, with the help of diagrams. 1

4(a) Draw the Mohr circles of a soil element under active and passive conditions. 2

(b) Calculate the coefficients of lateral earth pressure, if angle of internal friction is 27 degree. 1.5

(c) Why does no tensile crack zone exist if the soil is under passive condition? When can it be expected? 1.5

University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination Spring 2016
Program: B. Sc. Engineering (Civil)

Course Title: Open Channel Flow — Course Code: CE 361
Time- 1 hour — Full marks: 50

There are **FOUR** questions. Answer any **THREE** questions. *(20*3 = 60)*

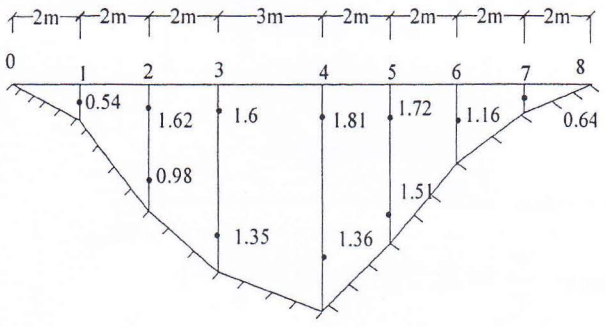
1. (a) Show the pressure distribution in parallel, concave and convex flows in a figure and mention in each of the cases if the pressure is hydrostatic, less than hydrostatic or more than hydrostatic. (6)

   (b) Show that "At the critical state of flow, the specific energy is the minimum for a given discharge". (4)

   (c) A circular channel 3.0 m diameter carries a discharge of 6.0 m^3/s. Compute the critical depth and velocity assuming $\alpha = 1.15$. Use Trial and Error Method. (10)

2. (a) Discuss the applicability of continuity, energy and momentum equations in understanding the flow beneath a sluice gate. Provide figure. (6)

   (b) The current meter readings (m/s), width and total depth of different points of a certain river section are given in the following figure and table. Compute the discharge and mean velocity of the entire section. (14)



Gauge Location	Total Depth (m)
0	0
1	1.5
2	4.0
3	5.7
4	6.8
5	4.9
6	2.7
7	1.3
8	0

3. (a) Derive a general expression for Hydraulic Exponent (M) for Critical Flow Condition. By using the derived expression, compute the hydraulic exponent (M) for a trapezoidal channel with b = 10 m, s = 2 and h = 2 m. (6+4)

(b) Water flows at a velocity of 2.0 m/s and a depth of 2.5 m in a long rectangular channel which is 6.0 m wide. Compute the height of a smooth upward step in the channel bed to produce critical flow. Also calculate the depth of flow produced by a smooth upward step of 0.40 m. Assume $\alpha = 1.0$. (5+5)

4. (a) State the conditions that are applicable for uniform flow. Provide examples on where the flow tends to be uniform. (5)

(b) Derive the law of Torricelli by considering that a constant level is maintained in a vessel with atmospheric pressure at the water surface and at the discharge point. (6)

(c) A rectangular channel is 6 in wide and laid on a slope of 0.25%. The channel is made of concrete (k_s = 2 mm) and carries water at a depth of 0.5 m. Compute the mean velocity of flow. (9)

Given Formula:

Trapezoidal channel	Circular Channel
$A = (b + sh)h$	$h = \frac{d_o}{2}\left[1 - cos\frac{\omega}{2}\right]$
$P = b + 2h\sqrt{1 + s^2}$	$\omega = 2cos^{-1}\left(1 - \frac{2h}{d_o}\right)$
$B = b + 2sh$	$A = (\omega - sin\omega)\frac{d_o^2}{8}$
	$B = d_o \sin\frac{\omega}{2}$
	$P = \frac{\omega d_o}{2}$
	Note that ω is in radian

1. **Hydraulically smooth surface:** $\frac{U}{u^*} = 5.75\ log\left(\frac{3.64u^*R}{v}\right)$

2. **Hydraulically rough surface:** $\frac{U}{u^*} = 5.75\ log\left(\frac{12.2R}{k_s}\right)$

3. **Transition regime:** $\frac{U}{u^*} = 5.75\ log\left(\frac{12.2R}{k_s + 3.35\frac{v}{u^*}}\right)$