3-1

University of Asia Pacific

Department of Civil Engineering

Mid-term Examination Fall-2018

Program: B. Sc in Civil Engineering (3rd Year/ 1st Semester)

Course Title: Principles of Accounting Course Code: ACN - 301 Credit: 2.00
Time: 1.00 Hour Full Marks: 20

Instructions: *Answer all questions. Figures in the right margin indicate marks. Answers should be brief, relevant and neat and clean. Different parts of a question must be answered in order of sequence.*

Question No. 1 **3**

Define accounting. Identify the external users of accounting.

Question No. 2 **3**

Briefly discuss the accounting equation and its components.

Question No. 3 **8+6=14**

Russel Co., owned by Russel Helms, began operations in June. The balances of the accounts at 30 June are – Cash $9,000; Accounts Receivable $5,000; Supplies $2,000; Notes Payable $1,000 and Capital $15,000.

During July following transaction have been completed-

July 1 The company purchased equipment for $6,000 by paying $1,200 cash and agreeing to pay the balance in a three month notes payable.
4 The company completed work for a customer worth $5,000 and 40% of the value immediately collected in cash and remaining on account.
9 Russel Helms invested additional $20,000 cash in the company
12 Completed work for a customer on credit in the amount of $3,400.
14 Took a loan of $5,000 from Federal Bank with a Notes Payable
17 The company purchased office supplies for $500 cash.
23 Received $2,400 cash for the work completed on July 12.
27 Russel Helms withdrew $600 of supplies from the company for personal use.
30 Incurred $250 for this month's utility bill and made cash payment for salary expenses $3,000.

Required: you are required to -

a) Show the effects of the transactions on the accounting equation through tabular analysis using the following column headings -

Cash; Accounts Receivable; Supplies; Equipment; Accounts Payable; Notes Payable;, Capital; Drawings; Revenues; and Expenses.

b) Prepare an Income Statement, Statement of changes in Equity and Balance Sheet for Russel Co. for the period.

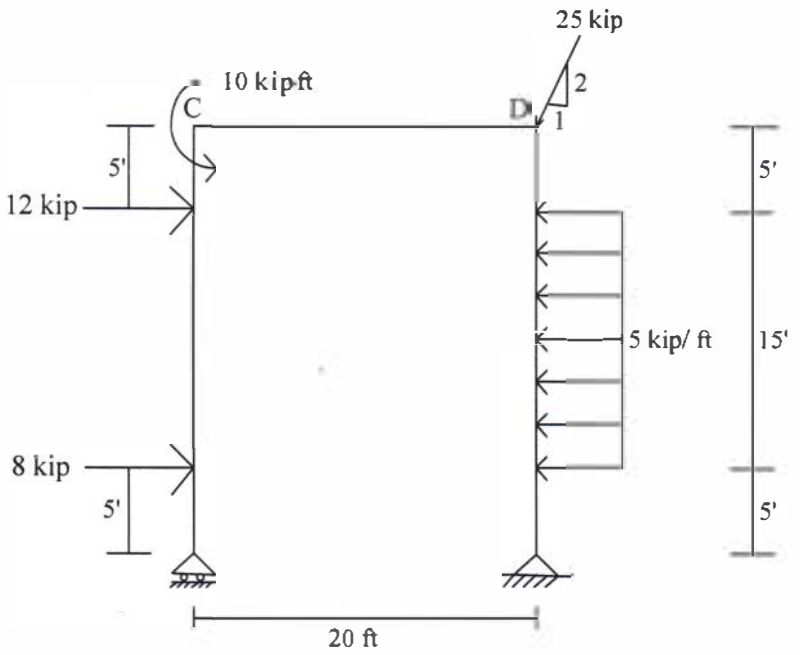
University of Asia Pacific
Department of Civil Engineering
Mid Term Examination ~~Spring~~ Fall 2018
Program: B. Sc. Engineering (Civil)

Course Title: Structural Engineering I
Time: 1.00 Hour

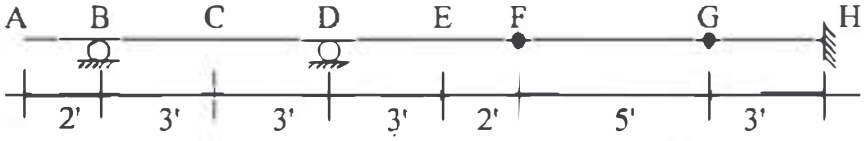
Course Code: CE 311
Full Marks: 30 (=3×10)

There are four (04) questions. Answer any three (03).
Assume any missing data reasonably.

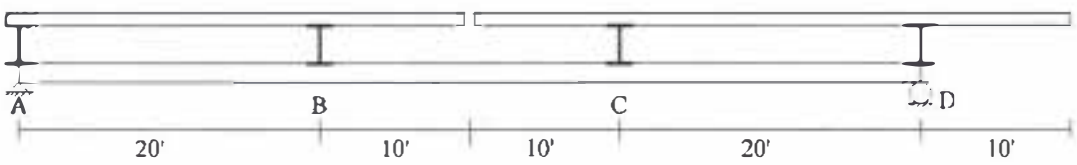
1. Draw shear force and bending moment diagram of **the member CD only** for the structure shown in the figure below.



2. For the beam shown below, draw influence line for
(i) Reaction at D, (ii) Moment at C, (iii) Shear at E, (iv) Shear at F and (v) Moment at H.
Note that F and G are internal hinges.

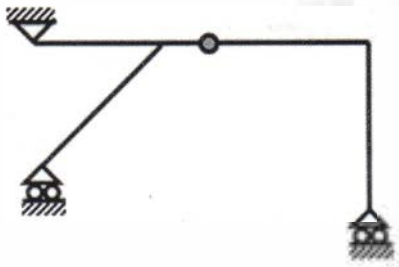


3. Girder AB supports a floor system as shown in the figure below. Draw influence line for
i. Support reaction at A
ii. Shear in panel A-B
iii. Moment at point C
iv. Floor beam reaction at D

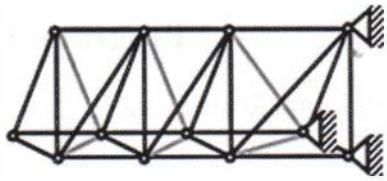


4. a) Determine whether the structures are statically and geometrically stable or unstable. Also, calculate the degree of statical indeterminacy. (2+8)

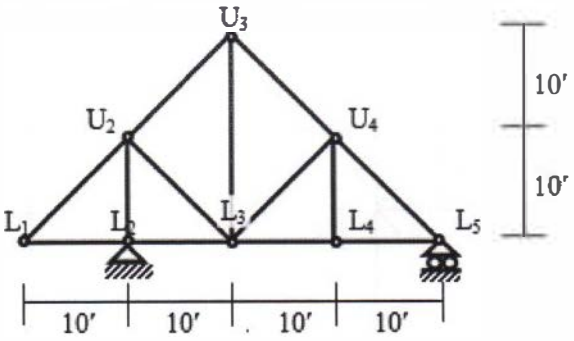
i.



ii.



b) For the truss shown below, draw influence lines for U_3U_4 and L_3L_4 Note, each bottom chord joint consists of a cross girder and load moves over the floor beam placed over the girders.



University of Asia Pacific
Department of Civil Engineering
Mid-Term Examination Fall 2018

Course Code: CE 315
Course Title: Design of Concrete Structures- I

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

Answer all the questions.
Each question carries equal marks

1. (a) Show the variations of stress and strain over an RC section as it is stressed gradually from uncracked to cracked and ultimate failure condition.
   (b) What is the balanced steel ratio (ρ_b)? Why does the ACI recommend a maximum steel ratio less than ρ_b?
   (c) What are the load and strength reduction factors? Explain why they are used in USD?

2. Determine the design moment capacity of the beam shown in Fig 1, for which f_y = 60 ksi and f_c' = 3 ksi.

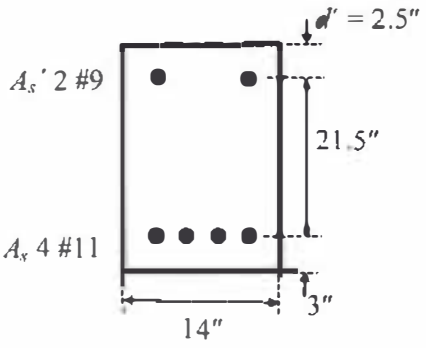


Fig 1

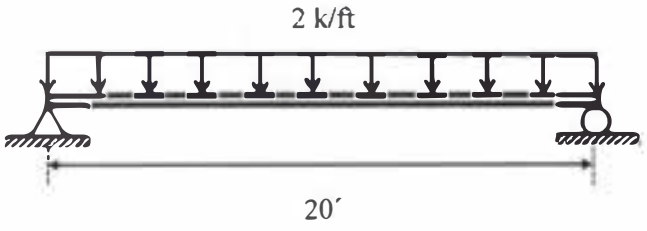


Fig 2

3. Use WSD Method to design the simply supported RC beam (Fig 2) with a span of 20 ft and loaded with 2 k/ft excluding the self- weight. Given, f_y = 50 ksi and f_c' = 3 ksi.

Formulae

$$\rho_{max} = 0.85\beta_1 \frac{f_c'}{f_y} \frac{\epsilon_u}{\epsilon_u + 0.004}$$

$$\varphi = 0.483 + 83.3\epsilon_t$$

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

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

$$A_{s,min} = \frac{3\sqrt{f_c'}}{f_y} bd \geq \frac{200bd}{f_y}$$

$$M_{n1} = A_s' f_y (d - d')$$

$$M_{n2} = (A' - A'_s) f_y \left(d - \frac{a}{2}\right)$$

$$a = \frac{(A_s - A'_s) f_y}{0.85 f_c' b}$$

$$\bar{\rho}_b = \rho_b + \rho'$$

$$\frac{c}{d'} = \frac{\epsilon_u}{\epsilon_u - \epsilon_Y}$$

$$\rho_{cy} = 0.85\beta_1 \frac{f_c'}{f_y} \frac{d'}{d} \frac{\epsilon_u}{\epsilon_u + \epsilon_Y} + \rho'$$

$$f_s' = \epsilon_u E_s \frac{c - d'}{c}$$

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

$$j = 1 - \frac{k}{3}$$

$$M = \left[\frac{f_c (kj)}{2}\right] bd^2$$

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

Course Title: Environmental Engineering I | Course Code: CE 331
Time: 1 hour | Full Marks: 40

Answer any Two (2). Assume data if not available.

1. (a) Show all the elements of a Piped Water Supply System with a neat sketch. **[5]**

   (b) What is an aquifer? Derive the equation of well discharge of a confined aquifer. **[3+7]**

   (c) Design population is a governing factor in designing a water supply system. Estimate the design population of an area for designing a piped water supply system having a design period of 30 years from 2011, with the following data using incremental increase method: **[5]**

Year	1961	1971	1981	1991	2001	2011
Population (million)	8	10	12	16	20	25

2. (a) Draw a neat sketch of a typical pond sand filter (PSF). "Any types of ponds are not feasible for constructing PSF"—justify the statement. **[5+5]**

   (b) Show, with figure(s), different types of pump heads. As a water supply engineer, you need to deliver 500,000 gph water from an intake well of a river bank to the treatment plant. Total length of rising main from the intake well to the treatment plant is 1000 ft and the static head is 70 ft. Design the suitable pumping unit with an efficiency of 80%. Assume: Velocity of water in the raising main = 15 fps; Frictional factor = 0.007. **[3+7]**

3. (a) Explain the limitations of using RWHS as an alternative water supply option in Bangladesh. **[5]**

   (b) Write short notes on i) design period of water supply system ii) variations of water demand iii) sand trap of a tubewell. **[15]**

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

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

Answer the following questions. **(6 + 4 + 10 = 20)**

1. Given data:
   60% material is finer than 4.75 mm
   30% material is finer than 1.05 mm
   90% material is coarser than 0.65 mm
   Material in the pan = 10.3%
   Liquid limit = 35%
   Plastic limit = 25%

   Classify the following soil according to Unified Soil Classification System (USCS). 6

2. Calculate the effective stress at the depth of 6.5 m below the ground level (Figure 1). 4

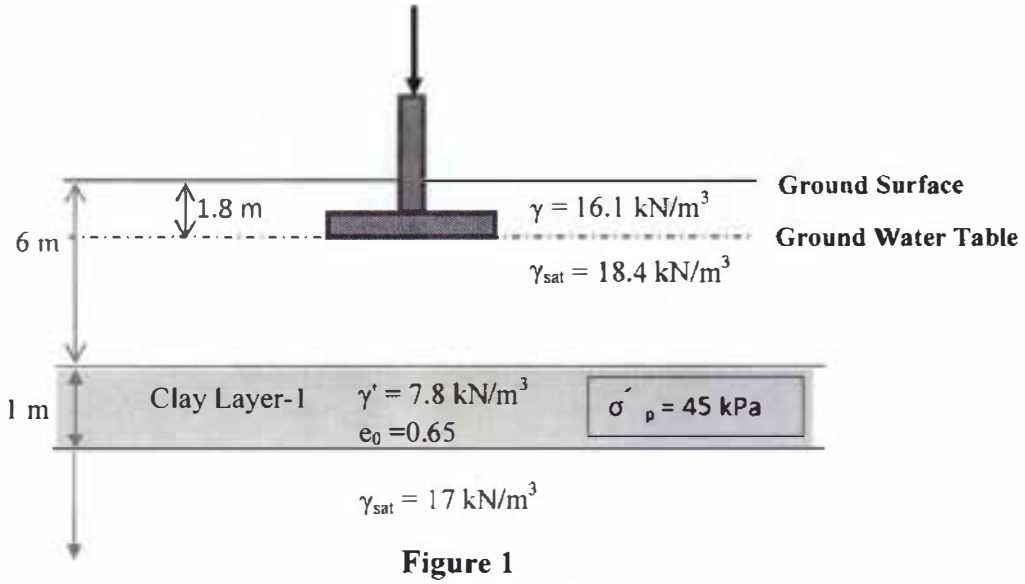


Figure 1

3. The e-logσ' curve (Figure 2) is drawn from one-dimensional consolidation test results from a clay specimen collected from 6.5 m below the ground surface (Figure 1).

   (i) Calculate compression index . 1
   Also calculate coefficient of volume compressibility between 4 ksf and 8 ksf of σ' . 1

   (ii) Calculate the increase in stress at the mid-depth of the clay layer due to the footing under 1200 kN vertical load. Use 2:1 slope for stress distribution. 2

   (iii) Calculate the primary consolidation settlement of the clay layer (Figure 2). Use the compression index calculated in question# 3(i). 4

   (iv) Calculate the coefficient of consolidation. 2
   In the laboratory, the specimen took 24 hours 15 mins to complete 50% degree of consolidation under a given vertical pressure.

Effective Stress (ksf)	Void ratio (e)
0.1	1.404
1	1.404
4	1.375
8	1.227
16	1.08
32	0.932

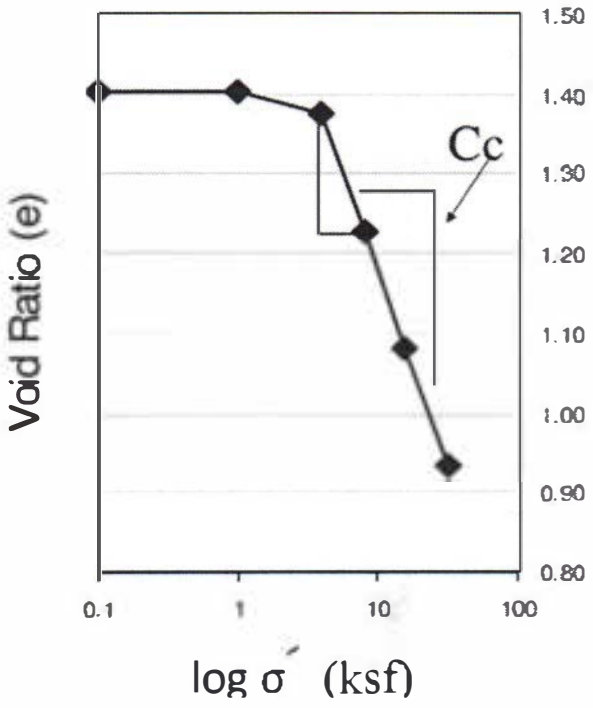


Figure 2

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

Course Title: Open Channel Flow | Course Code: CE 361
Time- 1 hour | Full marks: 60

There are **Three** questions. Answer all the questions. *(20*3 = 60)*
[Assume reasonable data if any]

1. (a) Differentiate between "Pipe flow" and "open channel flow". (6)

(b) Demonstrate the notations for "Steady Spatially Varied Flow" and "Unsteady Rapidly Varied Flow". (6)

OR

Explain why an elementary wave can move upstream in subcritical flow, but not in supercritical flow.

(c) Water flows in an open channel at a depth of 1 m and a mean velocity of 3m/s. Compute the discharge and determine the state of flow if the channel is circular whose diameter is 2.5 m. (8)

2. (a) State the expression for "Energy equation" **OR** "Momentum equation". (3)

(b) Compute the critical depth and velocity in a trapezoidal channel with b = 5 m, s = 1.5, α=1.12 and Q = 30 m^3/s by either bisection method **OR** Newton-Raphson method. (17)

3. (a) Explain why uniform flow can be steady only **OR** derive the expression for friction velocity. (6)

(b) Discuss the relevant locations of control section/structure with respect to subcritical and supercritical flow conditions. **OR** define "Transitions" with examples. (6)

(c) 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. Assume α = 1.0. (8)

Given Formula:

$\bar{U} = \frac{\int_0^A u\, dA}{A}$ $\alpha = \frac{\int_0^A u^3\, dA}{\bar{U}^3 A}$ $\beta = \frac{\int_0^A u^2\, dA}{\bar{U}^2 A}$	Trapezoidal channel $A = (b + sh)h$ $P = b + 2h\sqrt{1 + s^2}$ $B = b + 2sh$	Circular Channel $h = \frac{d_o}{2}\left[1 - cos\frac{\omega}{2}\right]$ $\omega = 2cos^{-1}\left(1 - \frac{2h}{d_o}\right)$ $A = (\omega - sin\omega)\frac{d_o^2}{8}$ $B = d_o \sin\frac{\omega}{2}$ $P = \frac{\omega d_o}{2}$ *Note that ω is in radian*

$$u^* = \sqrt{(gRS_0)}$$

$$Z_c = \frac{Q}{\sqrt{g}/\propto} \quad ; \qquad Z = A\sqrt{D}$$

$$Fr = U/\sqrt{(gD)}$$

$$Re = UR/\nu$$

$$Fr^2 = \frac{\propto Q^2 B}{gA^3}$$