3-1

University of Asia Pacific
Department of Civil Engineering
Mid-Term Examination, Spring - 2019
Program: B. Sc. Engineering

Course Title: Principles of Accounting Course Code: ACN 301 Credit: 02
Time: 1 Hour Full Marks: 20

(Answer ALL the Questions.)

1. Mention the purposes of accounting. Describe the need of accounting for engineering. **(1+2 = 3)**

2. Jamshed Chowdhury started his own delivery service, Jamshed Deliveries, on June 1, 2016.

June 1	Jamshed invested Tk. 10,000 cash in the business.
2	Purchased equipment for Tk. 5,000 cash and a note payable of Tk. 2,000.
3	Received legal services of Tk. 800 for the business on account.
5	Performed services worth Tk. 8,000: Tk. 5,000 cash is received from customers and the balance of Tk. 3,000 is billed to customers.
9	Withdrew Tk. 200 cash for personal use.
12	Purchased supplies for Tk. 150 on account.
15	Borrowed Tk. 3,000 from the bank on a note payable.
20	Received a cash payment of Tk. 1,250 for services provided on June 5.
23	Made cash payment of Tk. 600 on the note payable.
26	Paid part-time employee salaries Tk. 250.

Requirement: Apply the extended version of accounting equation and show the effects of the above transactions on the accounting equation using the following format. **(7)**

Assets				=	Liabilities		+	Owner's Equity				
Date	Cash	+ Accounts Receivable	+ Supplies	+ Equipment	= Notes Payable	+ Accounts Payable	+	Owner's Capital	− Owner's Drawings	+ Revenues	− Expenses

3. Wonderland Park was started on April 1 by Belal Hossain. The following selected events occurred during April.

Apr. 1	Belal invested Tk. 35,000 cash in the business.
8	Billed Daily Star for advertising expense of Tk. 1,800.
12	Hired a park manager at a salary of Tk. 4,000 per month, effective May 1.
13	Paid Tk. 1,650 cash for a one-year insurance policy.
20	Received cash of Tk. 6,800 for services provided.
25	Sold 200 ticket books for Tk. 5 each. Each book contains 5 coupons that enable the holder to use any one of the entertainment services provided by Wonderland Park.
30	Paid Tk. 900 for the balance due on April 8.

Requirements:

(a) Journalize the transactions. **(3.5)**

(b) Post to the ledger accounts. **(4.5)**

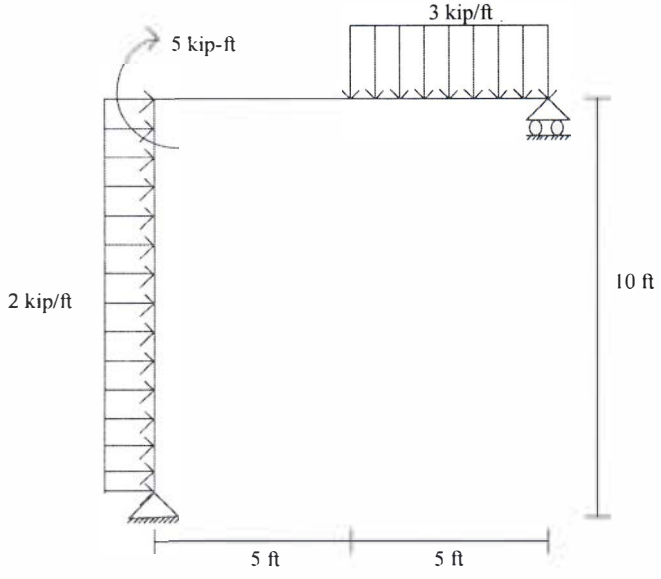
(c) Prepare a trial balance on April 30, 2016. **(2)**

University of Asia Pacific
Department of Civil Engineering
Mid Term Examination Spring 2019
Program: B.Sc Engineering (Civil)

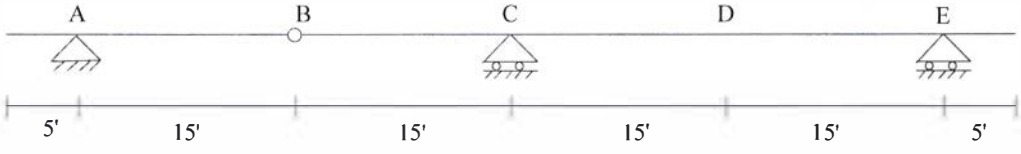
Course Title: Structural Engineering I | Course Code: CE 311
Time: 1.00 Hour | Full Marks: 30 (=3×10)

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

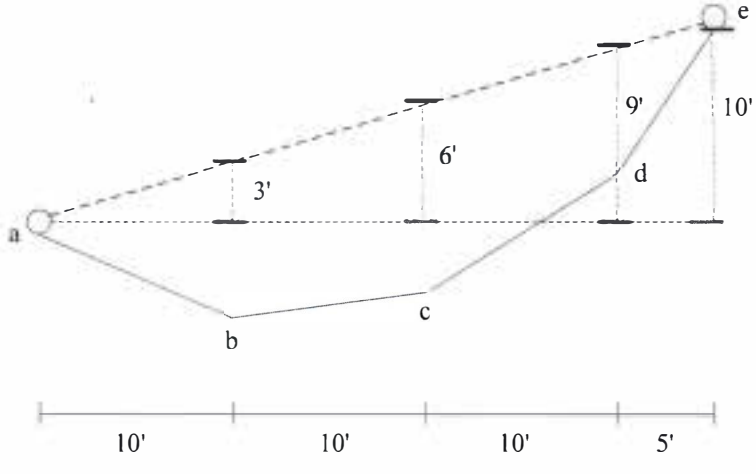
1. Draw the shear force and bending moment diagram for the structure shown in the figure below.



2. For the beam shown below, draw influence lines for the following:
(i) Reaction at E, (ii) Shear just left of E, (iii) Shear just left of C, (iv) Moment at D and (v) Reaction at A.



3. The following cable has maximum sag of 10′. At points b, c and d; 5 kip, 10 kip and 4 kip loads are applied respectively. Calculate the cable length, maximum and minimum cable tension.



University of Asia Pacific
Department of Civil Engineering
Program: B.Sc. in Civil Engineering
Mid-Term Examination Spring 2019

Course Code: CE 315 | Time: 1 (one) Hour
Course Title: Design of Concrete Structures- I | Full Marks: 60

*Answer **all** the questions. (**Assume** reasonable value for any **missing data**)*

1. (a) What is the USD method of RC design? Mention its differences from the WSD method. (10)

   (b) A column has a cross section of 16″× 20″ and is reinforced by six #9 bars as shown in **Figure 1**. (10)
   Determine the axial load that will stress the concrete to 1200psi.
   Given, f'_c=4000psi, f_y= 60000psi, E_s= 29×10^6psi.

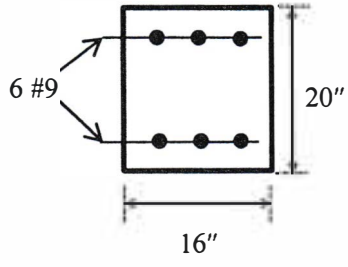


Figure 1: Cross section of the column

2. (a) Design (concrete dimensions and steel area) a simply supported rectangular beam of 15feet span for moment using USD method. The beam has to carry a uniformly distributed computed dead load (including its self-weight) of 2.50 k/ft and a service live load of 1.5 k/ft. Given, $f_c' = 3$ ksi, $f_y = 60$ksi, $\beta_1 = 0.85$, $\phi = 0.9$ (15)

   (b) Compute the uniformly distributed load 'W_{LL}' that will produce the first tension crack at the section B of the RC rectangular beam shown in **Figure 2**. Consider self-weight of beam for your calculation. Given, f'_c=4000psi, f_y= 60000psi (10)

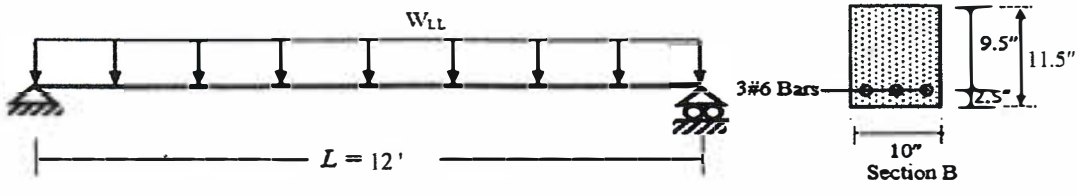


Figure 2: RC rectangular beam and its section

3. Analyze the section of the beam to as shown in **Figure 3** to determine the design moment capacity. (15)
Given, f_y = 60 ksi, f_c' = 5 ksi, E_s= 29×10^{6}psi,β_1= 0.8 and use $\epsilon_y = f_y/E_s$

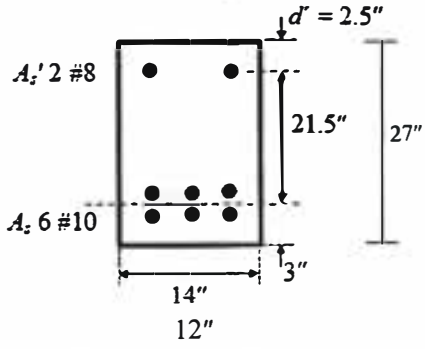


Figure 3: RC rectangular beam section

Formulae

$P_c = f_c A_c$

$P_s = f_s A_{st}$

$f_s = nf_c$

$P = f_c[Ag + (n-1)A_{st}]$

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

$$\rho_{0.005} = 0.85\beta_1 \frac{f_c'}{f_y} \frac{\epsilon_u}{\epsilon_u + 0.005}$$

$$\rho_b = \alpha \frac{f_c'}{f_y} \frac{\epsilon_u}{\epsilon_u + \epsilon_y}$$

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

$$c = \frac{\rho f_y d}{\alpha f_c'}$$

$f_r = 7.5\sqrt{f_c'}$

$f = My/I$

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

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

$A_s = \rho bd$

$$a = \frac{A_s f_y}{0.85 f_c' b}$$

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

$$\rho' = A'_s / bd$$

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

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

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

$c = a/\beta_1$

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

$$\epsilon_t = \epsilon_u \frac{dt - c}{c}$$

$$\bar{\rho}_{cy} = 0.85\beta_1 \frac{f_c'}{f_y} \frac{d'}{d} \frac{\epsilon_u}{\epsilon_u + \epsilon_y} + \rho'$$

University of Asia Pacific
Department of Civil Engineering
Midterm Examination Spring 2019
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) Explain the term "Water Demand Management" in a water supply system. **[5]**

   (b) What are the major challenges of using ground water as a source of water supply system in Bangladesh? Derive the equation of well discharge of an unconfined aquifer. **[3+7]**

   (c) Estimate the design population of an area for designing a piped water supply system having a design period of 40 years from 2011, with the following data: **[5]**

Year	1961	1971	1981	1991	2001	2011
Population (million)	18	20	22	26	30	35

2. (a) Draw a neat sketch of a typical pond sand filter (PSF) **OR** a typical No. 6 Handpump Tubewell. **[5]**

   (b) As a water supply engineer, you need to deliver water to Dhanmondi residential area, Dhaka, having inhabitants of 40000 with daily water demand of 140 lpcd. Design the suitable pumping unit with an efficiency of 80%. Assume: Velocity of water = 15 fps; Frictional factor = 0.007; Pumping time = 9 hours daily; Total length of pipe = 2500 ft; The static head is 70 ft. **[10]**

   (c) Explain the term "design period" of a water supply system. **[5]**

3. (a) What are the critical elements of Rain Water Harvesting System (RWHS)? Explain where and how this alternative water supply option would be appropriate in Bangladesh. **[2+3+3]**

   (b) "Metering of water improves the efficiency of a water supply system"- justify this statement. What are the challenges encountered in metering of a water supply system? **[3+3]**

   (c) What is Fire demand? Compute the fire demand for the city having 45,000 inhabitants. **[3+3]**

University of Asia Pacific
Department of Civil Engineering
Mid Term Examination
Spring 2019
Program: B.Sc. Engineering (Civil)

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

Answer the following questions.

1. Given data: 6

   60% material is finer than 2.75 mm
   30% material is finer than 0.85 mm
   90% material is coarser than 0.15 mm
   Material in the pan = 8.3%
   Liquid limit = 38%
   Plastic limit = 27%

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

2. Calculate the effective stress at the depth of 5.5 m below the ground level (Figure 1). 2

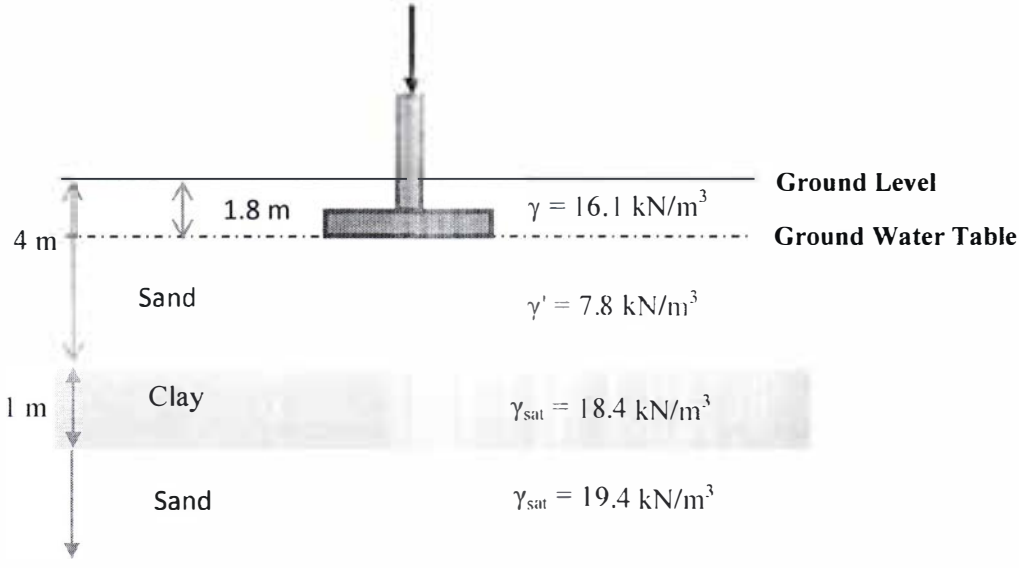


Figure 1

3. A drained direct shear test was carried out on a given soil sample and yielded the following results: 6

P (N)	108	202	295	390	484	576
Q(N))	172	227	266	323	374	425

Area of shear box: 60 mm x 60 mm
P = Normal Load
Q = Shear Load
Determine the angle of internal friction for the soil. Use graph paper.

4. Two consolidated drained triaxial tests were carried out on given soil sample and yielded the following results: 6

	Test-1	Test-2
Effective cell pressure (kN/m^2)	160	320
Deviator stress at failure (kN/m^2)	118	240

Determine the shear strength parameters for the soil. Use graph paper.

University of Asia Pacific
Department of Civil Engineering
Mid Term Examination Spring 2019
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) How can you physically identify whether the flow in an open channel is laminar or turbulent? (5)

(b) Deduce the expression for the pressure head correction for curvilinear flow. (7)

(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 triangular with s =2. (8)

2. (a) Derive the momentum equation **OR** discuss the applicability of the governing equations. (6)

(b) Prove that at critical condition, $E_c = 1.5h_c$. (6)

(c) The depth upstream of a vertical sluice gate in a rectangular channel is 2 m and the discharge under the gate is 30.67 m^3/s. The channel is 6 m wide. Compute the downstream depth. (8)

3. (a) Define 'friction velocity' and 'laminar sublayer' **OR** discuss the classification of boundaries in an open channel. (6)

(b) State the assumptions on which Chezy's Formula has been developed. (5)

(c) A trapezoidal channel has a bottom width of 6 m, side slope 1.5, depth of flow of 2.0 m, n = 0.025 and S_0 = 0.0001. Assuming that the flow is uniform, i) compute Q, ii) compute C, f, u*. (9)

Given Formula:

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

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

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

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

$$Re = UR/\nu$$

Uniform flow formulae:

$$U = CR^{1/2}S_f^{1/2} \quad ; \qquad U = \sqrt{(8g/f)}\, R^{1/2}S_f^{1/2} \quad ; \qquad U = (1/n)\, R^{2/3}S_f^{1/2}$$