University of Asia Pacific
Department of Civil Engineering
Midterm Examination (Fall 2017)
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**

Q.1. At the end of its first month of operations, Watson Development Ltd. has the following adjusted trial balance on December 31, 2016.

Account title	Debit	Credit
Cash	9,700	
Accounts Receivable	900	
Prepaid Insurance	1,000	
Supplies	900	
Equipment	15,000	
Notes Payable		7,000
Accounts Payable		1,600
Watson, Capital		14,000
Watson, Drawing	600	
Service Revenue		14,500
Rent Revenue		800
Salary Payable		600
Interest Payable		50
Unearned Rent		500
Salaries Expense	9,600	
Depreciation Expense	350	
Accumulated depreciation-Equipment		350
Rent Expense	1,500	
Supplies Expense	200	
Utilities Expense	600	
Insurance Expense	50	
Total	**39400**	**39400**

Instructions:

A. **Prepare an Income Statement for the month ended December 31, 2016.**

B. **Prepare an Owner's Equity Statement for the month ended December 31, 2016.**

C. **Prepare a balance sheet at December 31, 2016.** **(3+2+5)**

Q.2. Jessica Alba is a licensed architect. During the first month of the operation of her business, the following events and transactions occurred.

April 1 Invested $30,000 cash into business.
1 Hired a secretary-receptionist at a salary of $500 per week payable monthly.
2 Paid office rent for the month $800.
3 Purchased architectural supplies on account $1,500.
10 Completed blueprints on a carport and billed client $1,200 for services.
20 Received $1,500 cash for services completed.
30 Paid secretary-receptionist for the month $2,000.

Instructions

A. Journalize the transactions.

B. Post to the ledger accounts.

C. Prepare a trial balance.

(5+3+2)

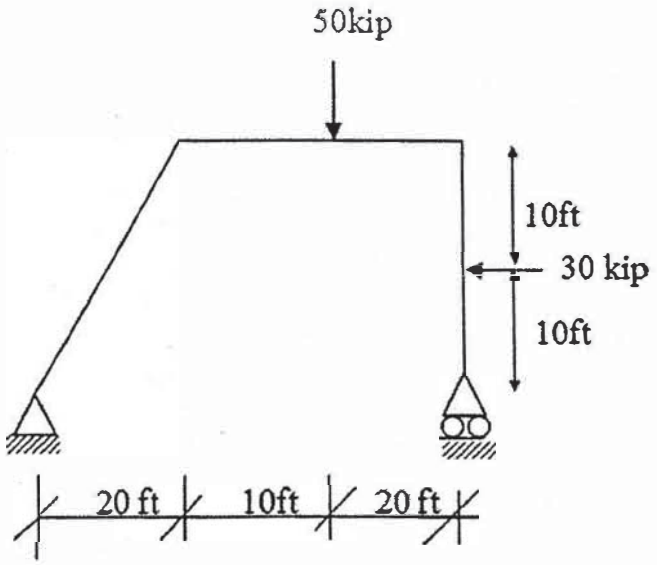
University of Asia Pacific
Department of Civil Engineering
Mid Term Examination Fall 2017
Program: B. Sc. Engineering (Civil)

Course Title: Structural Engineering I Course Code: CE 311
Time: 1 hour Full Marks: 30(=10 x3)

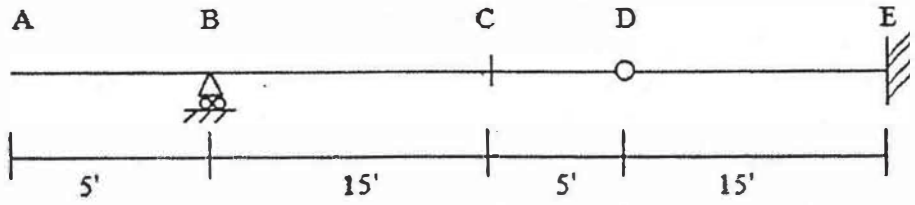
[Assume Reasonable Values for Any Missing Data]

There are **FOUR** questions. Answer any **THREE**.

1. Draw AFD, SFD and BMD of the following Frame. **(10)**

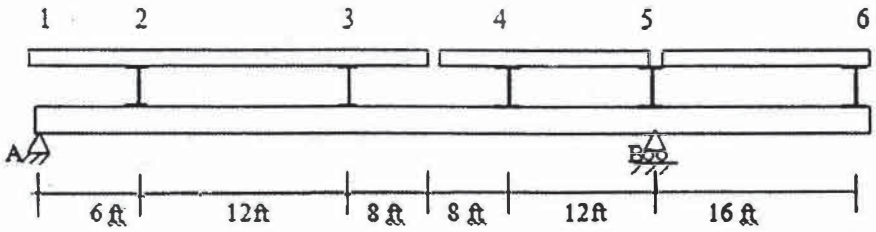


2. For the beam shown below, draw Influence lines for (i) Reaction at B, (ii) Shear at C, (iii) Shear just right of B and (iv) Moment at E (v) Moment at C. **(10)**



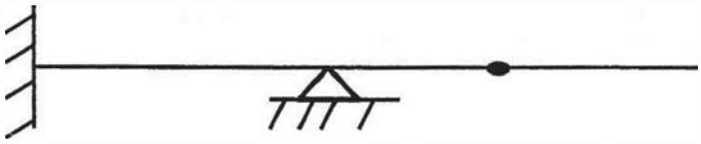
3. Draw influence line for: **(10)**

i. Bending moment at panel point 3 and 4.
ii. Shear force in panel 3-4.
iii. Floor beam reaction at panel point 2 and 3.



4. Check whether the following structures are stable or unstable. Also calculate the degree of statical indeterminacy. **(10)**

i.



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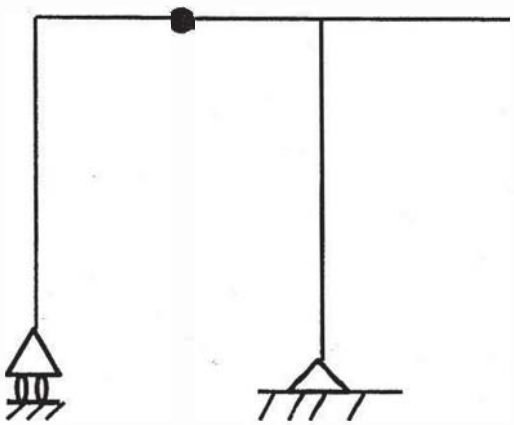

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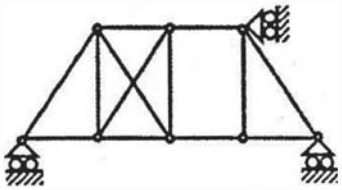
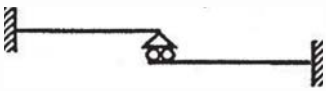


iv.



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

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

Time- 1 hour — Full marks: 45

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

Assume any missing data reasonably.

1. A 24 $in.$ diameter column is made of with concrete. The area of reinforcement equals 2.1 percent of the gross cross section (that is, $As = 0.021\,Ag$) and $fy = 60\,ksi$. For this column section, determine (a) the axial load the section will carry at a concrete stress of $1200\,psi$; (b) the ultimate load if the section is loaded slowly; (c) the ultimate load if the section is loaded rapidly; and (d) the ultimate load if the reinforcement in the column is raised to 6.5 percent of the gross cross section and the column is loaded slowly. Comment on your answer, especially the percent of the load carried by the steel and the concrete for each combination. (15)

2. A rectangular beam that must carry a service live load of 2.47 $kips/ft$ and a calculated dead load of 1.05 $kips/ft$ on an 18 ft simple span is limited in cross section for architectural reasons to 10 in. width and 20 in. total depth. If $fy = 60{,}000\,psi$ and $f\,c' = 4000\,psi$, what steel area(s) must be provided? (15)

3. a. Compute the uniformly distributed load W_{LL} that will produce the first crack at the section B of the RC rectangular beam shown in Figure 1. Consider self-weight of beam for your calculation. Given, $fc = 4\,ksi, fy = 60\,ksi$ (12)

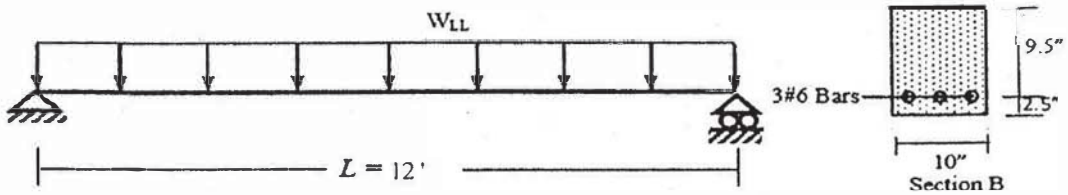
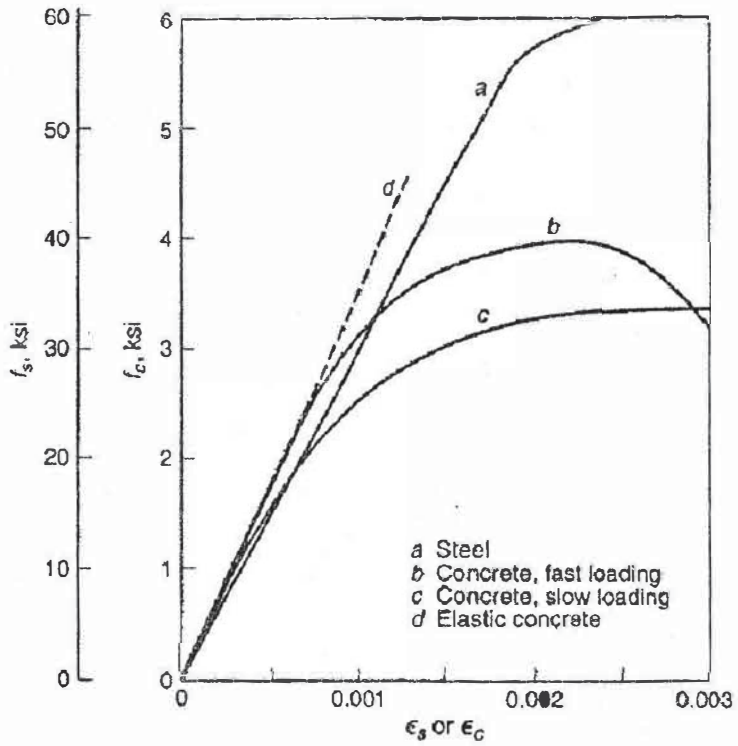


Figure:1

b. Write down the practical consideration in design of beam, selection of bar and spacing (03)

4. A rectangular beam has the dimensions $b = 12\,in, h = 23\,in$ and its reinforced with three no 7 bars. The concrete cylinder strength $fc' = 4000\,psi$ and tensile strength in bending is 475 psi. The yield point of steel is $fy = 60000\,psi$. Determine following issue and make a comments for bending moment M=120 kip-ft. (15)

   i) Check the section is uncrack or crake.
   ii) Draw the stress distribution curve
   iii) If the section is crack, how to make it uncrack.



Formulae:

1. $P_c = f_c A_c + f_s A_{st}$
2. $P_c = f_c [A_g + (n-1) A_{st}]$
3. $P_{nc} = 0.85 f_c' A_c + f_y A_{st}$
4. $P_t = f_t [A_g + (n-1) A_{st}]$
5. $P_{nt} = f_y A_{st}$
6. $k = -\rho n + \sqrt{\{(2\rho n + (\rho n)^2\}}$
7. $j = 1 - k/3$
8. $E_c = 57500\sqrt{f_c'}$
9. $f_T = 6\sqrt{f_c'}$
10. $M_c = 0.5 f_c k j b d^2$
11. $M_s = f_s j d$
12. $a = \frac{A_s f_y}{0.85 f_c' b}$
13. $\rho_b = \frac{0.85\beta_1 f_c'}{f_y} \times \frac{\epsilon_u}{\epsilon_u + \epsilon_s}$
14. $\rho_t = \frac{0.85\beta_1 f_c'}{f_y} \frac{\epsilon_u}{\epsilon_u + \epsilon_t}$
15. $\rho_{min} = \frac{3\sqrt{f_c'}}{f_y} \geq \frac{200}{f_y}$
16. $M_{n1} = A_S f_S (d-d')$
17. $M_{n2} = (A_S - A_s')f_s(d - \frac{a}{2})$
18. $A_{s'} = \frac{M_{n2}}{f_{s'}(d-d')}$
19. $\phi = 0.483 + 83.3\epsilon_t$
20. $0.85 f_c' \beta_1 bc + A_{s'} \epsilon_u E_S (c-d')/c = A_s f_y$
21. $M_u = \emptyset \rho f_y b d^2 \left(1 - \frac{0.59\rho f_y}{f_c'}\right)$

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

Course Title: Environmental Engineering I | Course Code: CE 331
Time: 1 hour | Full Marks: 30

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

1. (a) What is water demand management? Draw the figure showing the locations of water losses in a water supply system. [2+3]
   (b) Discuss all the elements of a Water Supply System with neat sketch. What are the governing factors for the design of a Water Supply System? [7+3]

2. (a) What are the problems of using groundwater as drinking water source in Bangladesh? [2]
   (b) Discuss the main consideration for selecting a pond while construct a PSF. [4]
   (c) What are the purposes of using pump in a water supply system? Design a suitable set of pumping unit to deliver 500,000 gph 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 60 ft. Assume: Velocity of water = 15 fps; Fictional factor = 0.0075; Pump efficiency = 70%. [3+6]

3. (a) Make a list of factors affecting the water demand in a Water Supply System. [4]
   (b) What is sustainable development? Discuss the role of water in sustainable development. [4]
   (c) Discuss the advantages of rainwater harvesting system in terms of economic and environmental viewpoints. Calculate the amount of rainwater available for a family (5 person) having a roof area of 20 m^2 in the central region of Bangladesh, where rainfall intensity is 2.5 m/yr. Assume a runoff coefficient of 0.70. [3+4]

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

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

Answer the following questions. **(5 + 15 = 20)**

1. Apply Unified Soil Classification System (USCS) for classifying soil using the given soil parameter and the information (sieve analysis results) given in the question the following questions.
Given Information:
$C_u = 2.8$
$C_c = 0.5$
Liquid limit = 35%
Plastic limit = 25%

(i) Percent finer than 0.075 mm = 10.5 2
Percent retained on No. 4 sieve = 38%

(ii) Percent finer than 0.075 mm = 60.5 3
Percent retained on No. 4 sieve = 8%

2. The following data are obtained from one-dimensional consolidation test.
The void ratio after 100% consolidation under 150 kN/m^2 was 0.945 and that under 300 kN/m^2 was 0.812.
Under both the stresses, the soil was normally consolidated.
Under 300 kN/m^2 vertical stress, the specimen experienced 55% consolidation in 48 hours.

(i) Determine compression index, coefficient of volume compressibility, coefficient of consolidation and coefficient of permeability of the clay soil. 4

(ii) If the vertical stress is decreased to 250 kPa vertical stress, calculate the pre-consolidation pressure and over-consolidation ratio (Also mention if the soil is in NC or OC state). 2

(iii) If the specimen represents a 1.5 m thick clay layer at a depth of 4 m below the ground, and increase in stress at the mid-depth of the clay layer (due to construction of foundation and superstructure) is found 170 kN/m^2, calculate the primary consolidation settlement. Use the compression index calculated in question# 2(i). 5
Initial porosity = 0.5
Saturated unit weight (average) = 16 kN/m^3
In field condition, pre-consolidation pressure = 70 kPa

(iv) Recalculate the primary consolidation settlement of the clay layer under the same pressure from footing (question 3(iii), if the soil was over-consolidated in field condition. 1

(v) Recalculate the primary consolidation settlement, if everything remains the same as given in question 3(iii), except the clay layer is at the depth of 9 m below the ground level. 3

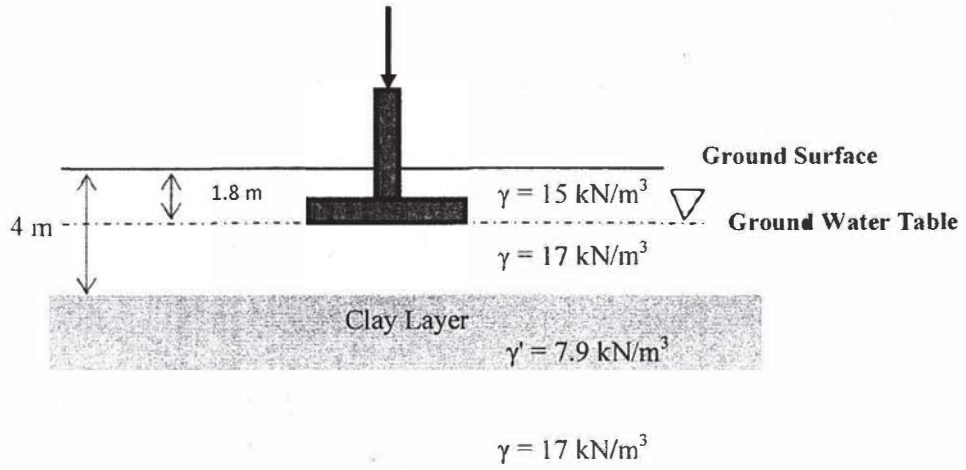

Ground Surface
1.8 m
γ = 15 kN/m³
Ground Water Table
4 m
γ = 17 kN/m³
Clay Layer
γ' = 7.9 kN/m³
γ = 17 kN/m³

Figure 1

University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination Fall 2017
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) Define any two types of open channel flow from the following with notation and examples: (5)

   i) Unsteady Rapidly Varied flow, ii) Steady Spatially Varied flow, iii) Steady Gradually varied flow

   (b) Show the pressure distribution in curvilinear flow and compare with hydrostatic pressure. (6)

   OR

   Derive the general expression for evaluating the total pressure head at the bottom of a water column.

   (c) In a wide river the velocity varies along a vertical as $u = 1+2z/h$, where h is the total depth and u is the velocity at a distance z from the channel bottom. The river is 5 m deep. i) Compute the discharge per unit width, ii) determine the state of flow. (9)

2. (a) State the expressions of the three governing equations for steady one-dimensional flow mentioning the laws those are based on. (9)

   OR

   Discuss the usefulness and applicability of the governing equations for steady one-dimensional flow.

   (b) A broad-crested weir is built in a rectangular channel of width 1m. The height of the weir crest above the channel bed is 0.6 m and the head over the weir is 0.4m. Calculate the discharge. (11)

   OR

   Compute the critical depth and velocity in a trapezoidal channel with b = 6m, s= 2, α=1.12 and Q = 30 m^3/s by either bisection method or Newton-Raphson method.

3. (a) Show that at the critical state of flow, discharge is maximum for a given specific energy. (6)

   OR

   Derive a general expression for hydraulic exponent M.

   (b) Discuss the classification of different types of boundaries in uniform open channel flow on the basis of roughness elements and viscosity. (6)

OR

Define control or control sections/structure with example. Explain how the location of a control in a channel is fixed based on the state of flow?

0(c) Compute the critical depth and velocity in a circular channel with d_0 = 3m and Q = 5 m^3/s by the trial and error method, if α =1. (8)

OR

An open channel lined with concrete (d_{50} = 1.5 mm) is laid on a slope of 0.1%. The channel is trapezoidal with b = 6 m and s =2. Compute the uniform flow discharge in the channel if the depth of flow is 2m. Also, compute the numerical values of Chezy's C and friction factor f.

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 $h = \frac{d_o}{2}\left[1 - cos\frac{\omega}{2}\right]$ $\omega = 2cos^{-1}(1 - \frac{2h}{d_o})$ $A = (\omega - sin\omega)\frac{d_o^2}{8}$ $B = d_o \sin\frac{\omega}{2}$ $P = \frac{\omega d_o}{2}$ *Note that ω is in radian*

1. **Hydraulically smooth surface:** $\frac{U}{u^*} = 5.75\, log\, (\frac{3.64u^*R}{\upsilon})$
2. **Hydraulically rough surface:** $\frac{U}{u^*} = 5.75\, log\, (\frac{12.2R}{k_s})$
3. **Transition regime:** $\frac{U}{u^*} = 5.75\, log\, (\frac{12.2R}{k_s + 3.35\frac{\upsilon}{u^*}})$

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

Broad Crested Weir: $Q = 1.705b(h_1 + \frac{U_1^2}{2g})^{1.5}$

$Z_c = \frac{Q}{\sqrt{g}/\alpha}$; $Z = A\sqrt{D}$; $Fr = U/\sqrt{(gD)}$

Uniform flow formulae:

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