3-1

University of Asia Pacific
Department of Civil Engineering
Mid-Term Examination Fall 2023
Program: B.Sc. in Civil Engineering

Course Title: Principles of Accounting | Course Code: ACN 301

Time: 1 hour | Credit Hour: 2 | Full Marks: 20

Submit your question inside your answer script

1. a. What is accounting? Who are the users of accounting? (5)

Or

b. Define revenue recognition and matching principle of accounting.

2. Mr. X started his own engineering firm, XYZ Firm, on July 1, 2022. The following transactions occurred during the month of July. (7)

July 1: Mr. X invested TK 100,000 cash in the business.
2: Purchased some computers for TK 120,000 on account.
3: Paid TK 15,000 for office rent for the month.
5: Performed TK 40,000 of services on account.
15: Received a cash payment of TK 12,500 for services provided.

Show the effects of the previous transactions on the accounting equation using the following format.

Assets			= **Liabilities** +	**Owner's equity**		
Cash +	Account Receivables +	Equipment =	Accounts Payable +	Owner's capital +	Revenue -	Expense

3. a. Prepare the journal entry and "Cash" ledger for the following transaction: (8)

August 1: Mr. Y invested TK 200,000 cash in an IT firm named SOFT IT.
2: SOFT IT performed services of TK 50,000 to its clients.
8: SOFT IT provided employees' salaries of TK 60,000.
9: Mr. Y withdraw TK 20,000 for personal use.
22: SOFT IT purchased supplies TK 2,000 on account.

Or,

b. Moon Architecture firm has the following information on May 31,2022:

Cash TK 3,400
Accounts Receivable 4,900
Equipment 64,000
Service Revenue 8,100
Advertising Expense 600
Accounts Payable 800
Notes Payable TK 30,000
Rent Expense 1,200
Maintenance and Repairs Expense 400
Gasoline Expense 2,500
Insurance Expense 400

a. Prepare an income statement.
b. Prepare a balance sheet. [Hints: Owner's equity: TK 41,500]

University of Asia Pacific
Department of Civil Engineering
Mid-Term Examination, Fall 2023
Program: B.Sc. in Civil Engineering

Course Title: Structural Engineering I | Course Code: CE 311
Time: 1 hour | Credit Hour: 3.0 | Full Marks: 40

ANSWER ALL QUESTIONS.

Assume reasonable value of missing data, if any.

Part-A

1. (a) The beam shown in ***Fig.1***, draw influence line for (i) Reaction at **F**, (ii) Shear just left of **D**, and (iii) Bending moment at **E** **[8]**
   (b) Calculate the maximum value (both positive and negative) of moment at **E** of the beam shown in ***Fig.1*** for the combination of **[6]**
   - Self-weight of 5k/ft
   - Moving Live Load of 9 k/ft
   - Moving Point Live Load of 60kip

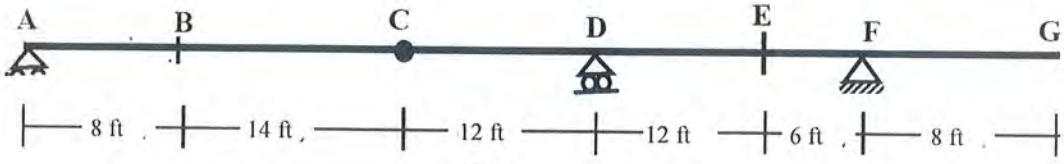


Fig.1

Part-B

2. Draw the axial force, shear force and bending moment diagram for the frame shown in ***Fig.2***. **[14]**

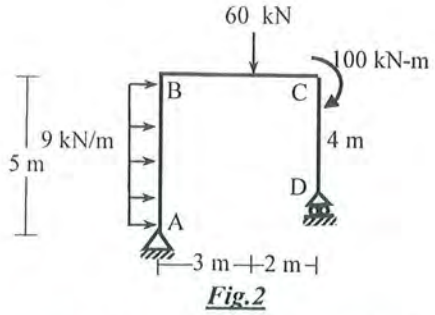


Fig.2

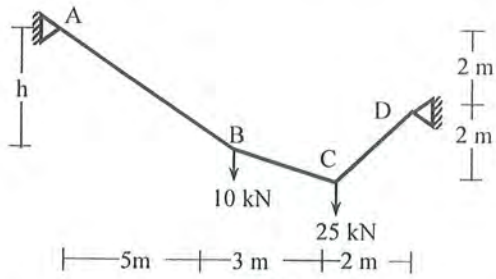


Fig.3

3. Analyze the cable and determine the length and tension in each cable segment. Also, calculate the dimension of **h**. **[8]**
4. Calculate the degree of Static Indeterminacy for the structures shown in ***Fig.4*** and ***Fig.5***. Also, check whether the structures are stable. **[4]**

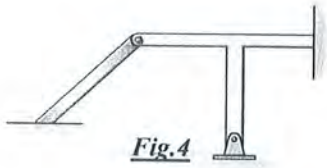


Fig.4

Fig.5

University of Asia Pacific
Department of Civil Engineering
Mid-Term Examination Fall 2023
Program: B.Sc. in Civil Engineering

Course Title: Design of Concrete Structures I Course Code: CE 315 Credit: 3.0
Time: 1 hour Full Marks: 50

Answer all questions

Question 01: **[5+5=10]**

a. Explain with diagram how fundamental assumptions of reinforced concrete are applied to analysis of reinforced concrete beams.
b. Brielfy explain the reason why ACI recommends a maximum steel ratio (ρ_{max}) is less than the balanced steel ratio (ρ_b).

Question 02: **[20]**

Figure 1 shows a building plan with beam layout. Design the concrete cross section and the steel area equired for a simply supported rectangular beam (C2-D2) as shown in the following figure, that is to carry a computed dead load of 1.20 kips/ft and a service live load of 2.30 kips/ft. Material strengths are $f_c' = 4000$ psi and $f_y = 60{,}000$ psi.

Question 02: **[20]**

A simply supported beam (B1-C1, in Fig 1). has cross section of the beam is as shown in Fig. 2, $f'_c = 3$ ksi, and $f_y = 60$ ksi, Analyze the section to determine the allowable uniformly distributed service live load on the beam assuming the dead load is that due to beam weight. The beam is reinforced with three no. 8 bars ($A_s = 2.37$ in^2).

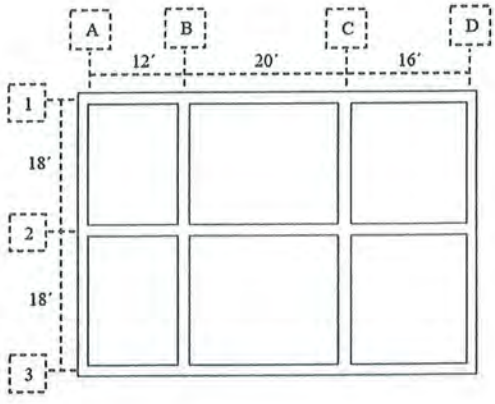


Figure 1: Beam layout

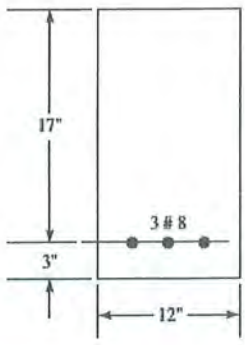


Figure 2: RC beam section

Formulae

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

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

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

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

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

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

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

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

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

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

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

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

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

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

University of Asia Pacific
Department of Civil Engineering
Mid Term Examination Fall 2023
Program: B. Sc. Engineering (Civil)

Course Title:Environment Engineering I Credit hour: 3.0 Course Code: CE 331
Time- 1 hour Full marks: 60

There are **Two** questions. Answer all the questions. *(30*2 = 60)*
[Assume reasonable data if any]

1(a) Analyze the sources of water from your comminity tubewell (groundwater) and another from river Buriganga. With qualitative knowledge on the quality of the water from both sources (groundwater and surface water), provide flow charts of treatment units for both of the sources (separately) if you want to consider those sources for water distribution purpose after treatment. (6+6)

OR

Analyze the following cases to answer with justification (mention when/why to use, what to use and how to use):

i) Removal of non-carbonate hardness
ii) Using Roughing Filters

(b) Answer the following :

i) Application of Water Softening (why and how) (8)

OR

Filter Back washing (why and how)

ii) A treatment plant processes 50,000 cubic meter of water per day. It requires 40 mg/L alum to bring down turbidity to 6 NTU while it requires 50 mg/L to bring it down to 5 NTU. Select the optimum dose and analyze the requirement of alum on annual basis. (10)

2. (a) Explain water stability using Bayliss Curve. (4)

(b) Langelier Saturation Index for two specific water sample are found as -0.17 and 0.28 in lab.Comment on the stability of these two water sample. (6)

(c) In a coastal area, residents noticed an alarming increase in salinity levels in their local water supply and a decline in the water levels of their wells. The local authority then initiated investigations to understand the factors contributing to the groundwater problem. (4)

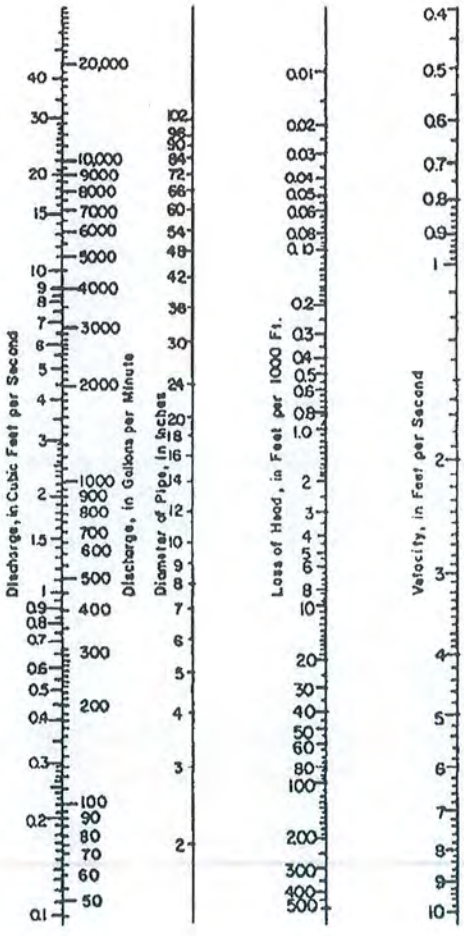
i. What is the reason for increasing salinity in drinking water of that coastal area?
ii. What are the associated problems with ground water development in our country?

(d) A tube well is 0.46 m in diameter. The unconfined aquifer is of 18 m depth. After drawdown depth of water is 12 m in the well. If discharge of pumping well is 2000 m^3/day and radius of circle of influence is 275 meters, calculate the coefficient of permeability of soil. Use following equation: (8)

$$Q = \frac{\pi K\,(D^2 - d^2)}{ln\,(\frac{R}{r})}$$

(e) A 10 inch new cast iron pipe is discharging 1080 gpm for C=120. What is the loss of head per 1000 ft and the velocity of water? (8)
Note: Q is proportional to C

Hazen William's Nomograph for C=100 is attached below.



University of Asia Pacific
Department of Civil Engineering
Midterm Examination Fall-2023
Program: B.Sc. Engineering (Civil)

Course Title: **Geotechnical Engineering I (Soil Mechanics)** Course Code: **CE 341**

Time: 1 hour Credit Hour: 3.0 Full Marks: 60

*[There are **Four** questions here. **Answer all** the questions. Assume reasonable values of any data, if missing. Digits in the right margin inside the 1st parentheses indicates marks]*

1. (a) Mention the salient characteristics of black cotton soil, boulder clay and loess. (4½)

(b) The volume of a flaky particle is 0.04 mm^3 and the minimum radius of the particle edges is 0.004 mm. What is the value of roundness or sphericity of the particle? (3)

(c) A cone penetration test was performed on a silty clay sample and the following results were obtained: (7½)

Trial No.	1	2	3	4	5
Cone Penetration (mm)	16	18	19.5	22	24.5
Water Content (%)	50	52	54	57	60

Determine the liquid limit of the soil and also check the result for a single point method using a relevant data.

2. (a) Classify different types of soils based on particle size according to AASHTO (T88). (3½)

(b) List and define different types of secondary structures in soils. (4½)

(c) Explain the concept of Shrinkage limit.

A saturated clay sample has a volume of 62.3 cm^3 and a weight of 117.5 gm. On drying, the sample attains a volume of 47.7 cm^3 and a weight of 85.8 gm. Determine the shrinkage limit, Shrinkage ratio and specific gravity of soil solids (G_s) of the sample. Assume unit weight of water to be 0.9982 gm/ cm^3. (7)

3. From SPT test, an undisturbed soil sample was collected from the field in a steel Shelby tube for laboratory evaluation. The tube sample has a radius of 3.5 cm, length of 61 cm, and a moist weight of 45 N. If the moisture content and specific gravity of soil solids are 11.5% and 2.68 respectively, then calculate the following: (10)

(a) Porosity of the soil sample.
(b) Degrees of saturation and air content.
(c) Effective unit weight.

4. During construction of a highway, Modified Proctor compaction test has been conducted in the laboratory on a silty sand sample and the following results were obtained: (10+10)

Moisture content (%)	Dry density (kg/m³)
12	1666
14	1726
16	1757
18	1753
20	1707
22	1654

The following are the results of a field density test performed on the same soil using sand cone method.

Calibrated dry mass of Ottawa sand = 2135 kg
Volume of jar = 1.326 m^3

Weight of jar + cone + sand (before filling the hole) = 11.11 kg
Weight of jar + cone+ sand (after filling the hole) = 7.10 kg
Calibrated mass of Ottawa sand to fill the cone = 1.579 kg

Weight of wet soil from hole = 3.27 kg
Moisture content of wet soil = 26.27 %

(a) Determine the maximum dry density in laboratory and optimum moisture content.

(b) If the specification of this highway project demands 100%±2% relative compaction to be achieved, then check whether the field compaction meets the demand or not.

University of Asia Pacific
Department of Civil Engineering
Mid Term Examination, Fall 2023
Program: B.Sc. in Civil Engineering

Course Title: **Open Channel Flow** Course Code: **CE 361**

Time: **1 hour** Credit Hour: **3.00** Full Marks: **40**

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1. (a) Compare between small and large slope in open channel. **(5)**

   (b) Determine the hydraulic exponent for critical flow computation (M) for a triangular section. **(5)**

2. Water flows at a velocity of 1.6 m/s and a depth of 2 m in a long rectangular channel 3.7 m wide. **(5+1)**

   (a) Estimate the contraction in width of the channel for producing critical flow and the change in water level produced by this contraction. Neglect energy losses and take $\alpha = 1$.

   (b) Determine if a critical flow can be generated by reducing the channel width to 0.5 m.

3. Determine the numerical values of α, β for the following velocity measurements along a vertical in a wide channel, when the total depth is 4 m. **(8)**

Distance from channel bottom, z (m)	0	1.5	3	4
Velocity at a distance z from the channel bottom, u (m/s)	0	2.04	3.53	5.92

4. (a) Explain how manning's roughness coefficient is affected by channel roughness, silting and scouring, channel irregularity and alignment. **(5×2=10)**

   (b) Prove the relationship between Chezy's C and Manning's n is: $C = \frac{1}{n} * R^{1/6}$

5. Prove that hydraulic exponent of triangular channel is 5.33, when conveyance is expressed by Manning formula. (Use the formula attached in the question paper) **(6)**

Necessary formulae

1. Hydraulic exponent, N=$\frac{2h}{3A} * (5B - 2R\frac{dP}{dh})$, where B=top width, A= area, R= hydraulic radius and P= perimeter of the channel
2. Uniform flow formula: Manning: Q=$\frac{1}{n}AR^{2/3}S^{1/2}$
3. Uniform flow formula: Chezy: Q=$CAR^{1/2}S^{1/2}$
4. $M = \frac{h}{A}\left(3B - D\,\frac{dB}{dh}\right)$
5. $\frac{Uc^2}{2g} = \frac{D_c}{2}$
6. $\boldsymbol{\alpha = \frac{1}{U^3 h}\int_0^h u^3 dz = \frac{\sum u^3 \Delta A}{U^3 A}}$
7. $\boldsymbol{\beta = \frac{1}{U^2 h}\int_0^h u^2 dz = \frac{\sum u^2 \Delta A}{U^2 A}}$