

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

Course Title: Professional Practices & Communication
 Time: 1 hour

Course Code: CE 403
 Full Marks: 40

[Assume Reasonable Values for Any Missing Data]

SECTION – A

There are **TWO** questions in this section. Answer any **ONE**.

1. (a) With the help of a flow chart describe the tendering process & Mention the role of the Tender Evaluation committee. (10)
 (b) In order of priority list the items that form the 'Contract Documents' and mention the situations which may lead to forfeiture of the Tender Security. (10)

2. (a) Prepare a standard BOQ for the Mat foundation of a building 40' x 60' in plan. (10)
 (b) Roads and Highways Department is to build a bridge with an estimated cost of BDT 200 crore. The bridge has a total length of 250m with five equal spans of 50m each. Prepare the Tender Data Sheet (TDS). Include at least five items. (10)

SECTION – B

There are **TWO** questions in this section. Answer any **ONE**.

3. (a) Define Communication. Describe internal operational and external operational channels of communication with necessary examples. (2+8=10)
 (b) What are the 7 Cs of effective communication? Briefly explain the issues the message sender should consider for the message to be "considerate". (3+7=10)

4. (a) What are the traits of an effective communicator? Explain with necessary examples how communication is affected by differences in Convention of Meaning. (3+7=10)
 (b) Explain the phases of problem solution in a group. (5)
 (c) How would you make an effective opening for an oral presentation? (5)

University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination Fall 2017

Course No: CE 425
Course Title: Structural Engineering X
(Concrete Technology)

Time: 1 Hour
Full Marks: 60

Answer any 5 (five) questions out of 6 (six) questions

1. What are the advantages of using blended cement (BC)? The long-term strength of BC beyond a couple of months is higher than ordinary cement concrete, explain why? (7+5)
2. Write causes of segregation of concrete. What are the effects on concrete due to segregation? What are the necessary precautions should be taken to avoid segregation? (4+4+4)
3. Using schematic diagram, explain the mechanism for successful pumping concrete. Describe how to improve the flow of concrete. (7+5)
4. Write advantages and disadvantages of ready-mix concrete? Make comparison between transit mixed ready mix and volumetric mixed ready mix. (7+5)
5. What is superplasticizer? Describe the effect of superplasticizer on the properties of fresh and hardened concrete. What is the function of air entrained admixture? (2+6+4)
6. What do you mean by interfacial transition zone? Describe the effect of microstructure on the strength and durability of concrete. (3+9)

University of Asia Pacific
Department of Civil Engineering
Mid Term Examination Spring 2017

Course Title: Structural Engineering V
Time: 1 hour

Course Code: CE 415
Full Marks: 60

(Answer any three out of four Questions)

1. A simply supported prestressed concrete beam is loaded with a uniform live load of $w_{LL} = 53 \text{ kN/m}$ excluding its self-weight as shown in Figure 1. Location of prestressing tendon is also shown at mid span section of the beam which produces an effective prestress of 1620 kN.

Calculate extreme fiber stresses by *load balancing method* and show stress distribution at mid span.

Given: $\gamma_c = 24 \text{ kN/m}^3$; $b_1 = 900 \text{ mm}$; $b_2 = 270 \text{ mm}$; $t_1 = 150 \text{ mm}$; $t_2 = 120 \text{ mm}$; $h = 1020 \text{ mm}$; c.g.s = 115 mm; $L = 12.9 \text{ m}$. (20)

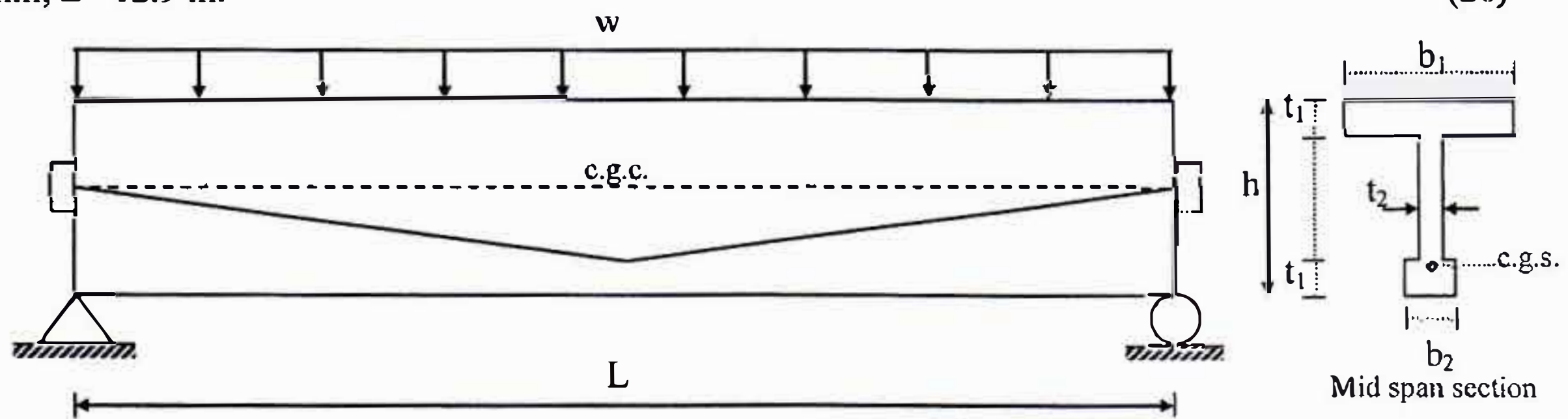


Figure 1

2. a) For the prestressed concrete beam shown in Figure 1, check whether the mid span section is cracked or uncracked. (16)

Given, effective prestress in tendon = 1280 kN; c.g.s = 115 mm; uniform load on beam, $w = 44.06 \text{ kN/m}$; $b_1 = 700 \text{ mm}$; $b_2 = 210 \text{ mm}$; $t_1 = 150 \text{ mm}$; $t_2 = 120 \text{ mm}$; $h = 920 \text{ mm}$; $L = 13 \text{ m}$; $f'_c = 30 \text{ MPa}$.

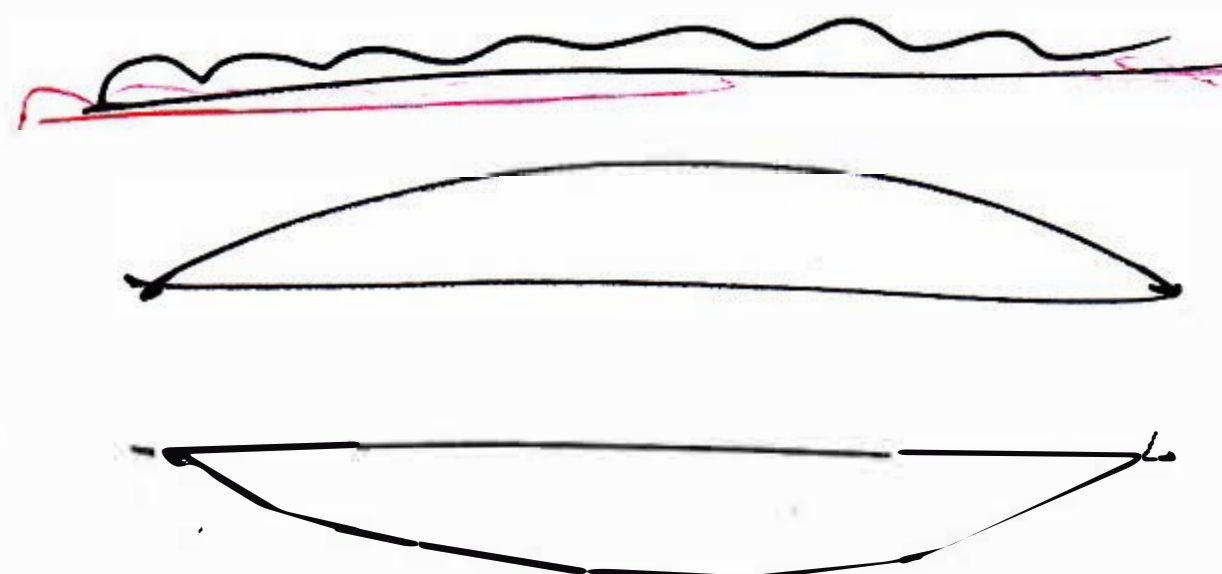
b) Write a short note on basic differences between reinforced concrete and prestressed concrete. (4)

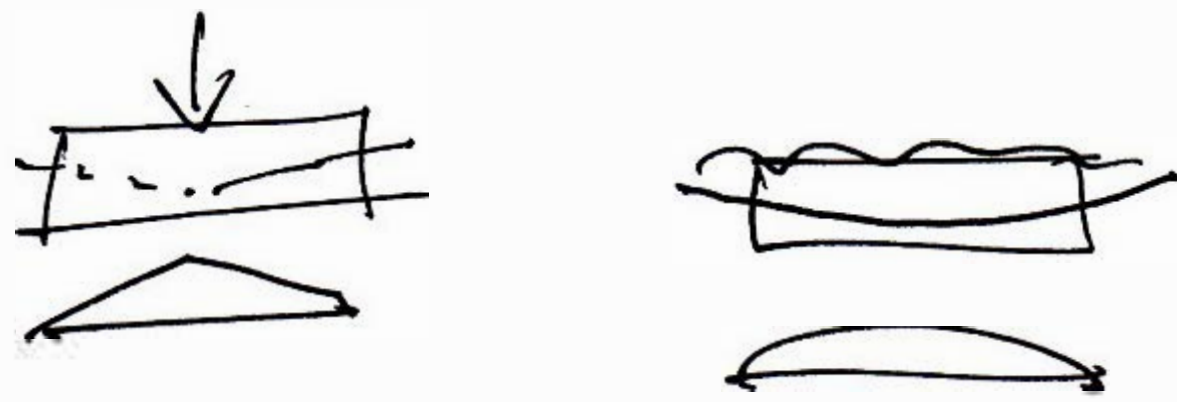
3. a) Calculate ultimate moment capacity of the section shown in Figure 1. (14)

Given: $b_1 = 600 \text{ mm}$; $b_2 = 200 \text{ mm}$; $t_1 = 120 \text{ mm}$; $t_2 = 100 \text{ mm}$; $h = 750 \text{ mm}$; c.g.s = 105 mm; $f'_c = 28 \text{ MPa}$; $f_{pu} = 1100 \text{ MPa}$; $A_{ps} = 1705 \text{ mm}^2$.

b) Discuss briefly any two time dependent losses of prestressed concrete. (6)

4. a) Show variation of steel stresses with load for bonded and unbonded tendons. (8)





b) Calculate the change of pre-stress due to elastic shortening at section a-a for the pre-tensioned pre-stressed concrete beam shown in **Figure 2**. The beam is subjected to a uniformly distributed load of 2.5 kip/ft including self-weight. (12)

Given: effective pre-stress of steel = 560 kip; $f'_c = 4.5$ ksi; $E_s = 29000$ ksi.

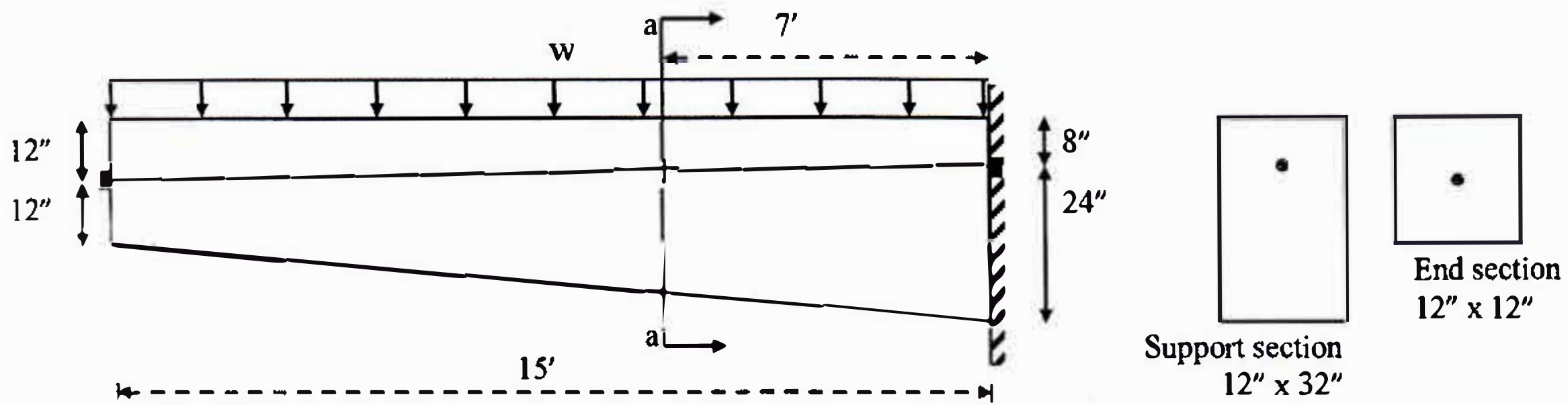


Figure 2

Formulae CE 415

$$1. f_c = -\frac{F}{A} \pm \frac{Fey}{I} \pm \frac{My}{I}$$

$$2. f_c = -\frac{F}{A_g} \pm \frac{Fey}{I}$$

$$3. f_c = -\frac{F}{A} \pm \frac{Mc}{I}$$

$$4. \Delta f_s = n \left[-\frac{F}{A} \pm \frac{Fe^2}{I} \pm \frac{Me}{I} \right]$$

$$5. ES = K_{es} E_s \frac{f_{cir}}{E_{ci}}$$

$$6. f_{ps} = f_{pu} \left\{ 1 - 0.5 \rho_p \left(\frac{f_{pu}}{f'_c} \right) \right\}$$

$$7. \rho_p = \frac{A_{ps}}{bd}$$

$$8. a = \frac{A_{ps} f_{ps}}{0.85 f'_c b}$$

$$9. \omega_p = \frac{\rho_p f_{ps}}{f'_c} \leq 0.30$$

$$10. M_u = \phi A_{ps} f_{ps} \left(d - \frac{a}{2} \right)$$

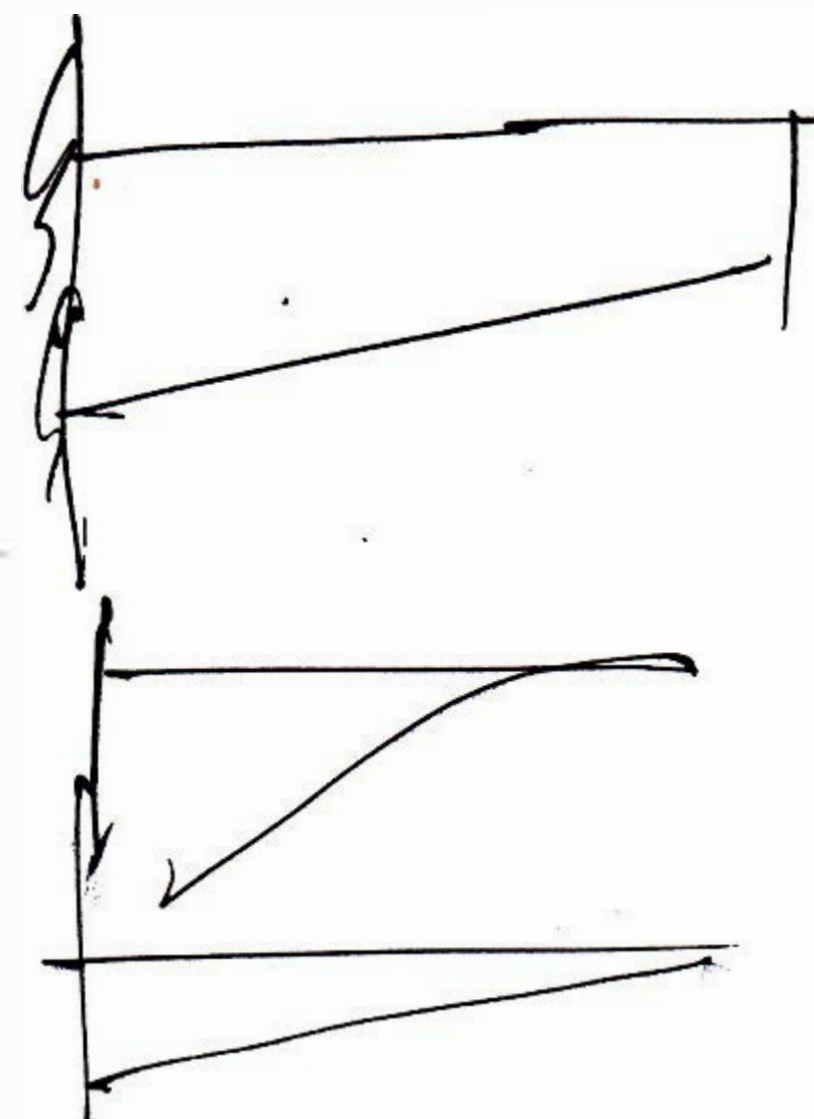
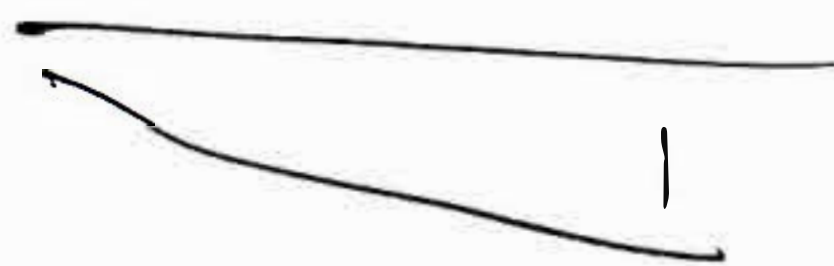
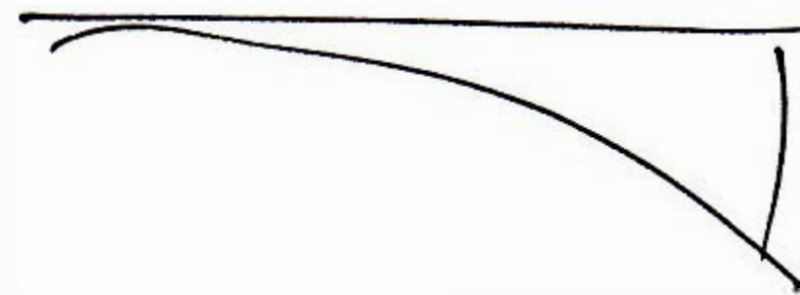
$$11. A_{pf} = \frac{\{0.85 f'_c (b - b_w) h_f\}}{f_{ps}}$$

$$12. A_w = A_{ps} - A_{pf}$$

$$13. \rho_w = \frac{A_w}{b_w d}$$

$$14. \omega_{pw} = \frac{\rho_w f_{ps}}{f'_c} \leq 0.30$$

$$15. M_u = \phi [A_{pf} f_{ps} \left(d - \frac{h_f}{2} \right) + A_{pw} f_{ps} \left(d - \frac{a}{2} \right)]$$



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

Course Title: Environmental Engineering III
 Time: 1 hour

Course Code: CE 431
 Full Marks: 30

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

1. (a) Define sustainability of solid waste management. [3]
 (b) Discuss the effect of poor management of solid waste in terms of environmental view point. [6]
 (c) Explain i) Chemical properties of solid waste ii) Proximate analysis [3+3]

2. (a) What is Life Cycle Analysis (LCA) in solid waste management? [3]
 (b) What are the strategic options needed to consider in waste minimization at source. Give some examples also. [6]
 (c) Calculate the size of a storage container with the following data: [6]
 Number of population need to be served = 50,000
 Average rate of waste generation = 5 kg/cap/d
 Weekly frequency of collection = 3.5
 Waste density = 150 kg/m³.
 Capacity margin = 50%.

3. (a) Categories the solid waste collection system. Compare the merits and demerits of hauled-container and stationary-container systems of solid waste management. [3]
 (b) What is source reduction/waste minimization? How can you calculate source reduction? [6]
 (c) Solid wastes from Farmgate, Dhaka (commercial area) are to be collected using a stationary container collection system. With the following data determine the truck capacity: [6]
 Container volume = 5 m³
 Container utilization factor = 0.7
 Average number of containers at each location = 2
 Collection-vehicle compaction ratio = 3.0
 Average drive time between container location = 20 minutes
 Container unloading time = 10 minutes
 One-way haul distance = 2.5 km
 Speed limit = 56 km/hr
 Time from garage to 1st container location = 30 minutes
 Time from last container location to garage = 15 minutes
 Number of trips to disposal site per day = 2

$$T_{tot} = (PT_{tot} + q + m + nx)$$

$$PT_{tot} = C_r uc + (S-1)(dbc)$$

$$C_r = \frac{V_z}{V_f} \quad M_{dc} = \frac{V_d}{V_z}$$

$$L = \frac{(t_1 + t_2) + M_{dc} (PT_{tot} + q + m + nx)}{1 - W}$$

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

Course Title: Environmental Engineering IV
Time- 1 hour

Course Code: CE 433
Full marks: 50

There are **THREE** questions. Answer all the questions (20+15+15= 50).
[Assume reasonable data if any]

1. (a) Define Environmental pollution. (3)
- (b) Differentiate between point and non-point sources of pollution. List down the principal sources of any **two** of the following : (6)
- i) Oxygen demanding waste ; ii) pathogens ; iii) nutrients and
iv) toxic metals
- (b) If a water body is manifested with ecosystem upset subjected to mortality and reproductive impairment, which water quality variables should be checked through analysis? Which uses of this water should be prevented? (4)

OR

Write a short note on Thermal Pollution.

- (c) For a BOD test, initial DO = 8.67 mg/L. After 5 days, DO = 3.8 mg/L. If dilution factor = 50 and $k = 0.22$ /day, calculate BOD₅, ultimate CBOD and BOD remaining after 5 days. (7)
2. (a) List down the effects/problems of any **two** of the following pollutants in a water body: (4)
- i) Nutrients ; ii) Suspended solids ; iii) Heavy metal ; iv) persistent organic pollutants
- (b) Why is cBOD not equal to COD? (4)
- (c) What are the possible ways of controlling release of P into lakes? State the limitations of Oxygen Sag equation. (7)

OR

A wastewater treatment plant discharges phosphorus through its effluent in a lake that has surface area of $200 \times 10^6 \text{ m}^2$. The effluent flow rate is $0.5 \text{ m}^3/\text{s}$ and its phosphorus concentration is 10 mg/L (10 g/m^3). The lake is fed by a stream having $30 \text{ m}^3/\text{s}$ of flow with no phosphorus. If the phosphorus settling rate is 10 m/year and the phosphorous concentration in the lake is 0.053 mg/L , what should be the loading of phosphorus to keep the average lake concentration below 0.01 mg/L ?

3. (a) What are the factors affecting self-purification capacity of streams? (5)

OR

What measures should be taken to protect groundwater?

(b) Which are the criteria air pollutants? Define AQI. (5)

OR

Discuss any two particle deposition mechanisms in human body.

(c) List down the terms that are used to describe particulate matter (PM). What are the major effects of SO_x? (5)

OR

Show the simplified atmospheric nitrogen cycle in a schematic. What are the major effects of NO_x?

Given Formula:

$$\text{BOD}_m \cdot V_m = \text{BOD}_w \cdot V_w + \text{BOD}_d \cdot V_d$$

$$\text{BOD}_t = L_0 (1 - e^{-kt})$$

$$P = \frac{S}{Q + v_s \cdot A}$$

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

Course Title: Environmental Engineering VIII (GIS)
Time- 1 hour

Course Code: CE 531
Full marks: 35

Part A: Answer any 1 (ONE) from the following 2 (TWO) questions (15*1 = 15)

1. a. What do you understand by geographic information? What are the key components of GIS? How do you use GIS for decision support? (2+1+2)
b. Show the concept of vector and raster data type with diagram. Write down the limitations of raster data structure. (3+2)
c. Name six areas of raster GIS application. Write short notes on the following two:
 - i. Geographic coordinate systems (2+1.5*2)
 - ii. ArcGIS desktop module

2. a. Name the methods for digitizing spatial information. Describe the heads up digitizing process. Which method is an easy to use tool to convert a raster to a vector? (1+3+1)
b. Write down the projection properties. What are the parameters for the classification of map projection? Name the two projection systems mostly used in Bangladesh? (2+2+1)
c. Name any four digitizing errors with diagram. Write short notes on the following two:
 - i. Thematic data (2+1.5*2)
 - ii. Coordinate Transformation

Part B: Answer the following three questions (3.5+11+5.5=20)

3. Answer the following questions in **one line**. (1.5+1+1)
 - a. What are ArcView, Arc Info, and Arc Editor?
 - b. What features are contained in 'Status' area?
 - c. Name the two statistics you need to check to correct/ minimize the error during geo-referencing.

You have been provided shape files of **Ward 19 (Gulshan area)** of Dhaka City Corporation (DCC). Answer **Question 4 and 5** using this dataset with mentioned shp. files. As your answer, write down the steps you followed, and provide necessary screenshots to support your answer.

(assume all the units in meter)

4. Answer the following questions. (1+3+3+4)
- Add feature *water body*. Create two different shp. files of '*Banani lake*' and '*Gulshan lake*'.
 - Add features *f_path*, *grave*, and *green_spc*. Find out the total area of the following features: i. Footpath, ii. Graveyard, and iii. Open/ green space of Gulshan area.
 - Add feature *slum*. Find the total slum area in Gulshan.
 - Add *bld_storied* and *rail line*. Identify the buildings that are within 50 meter distance from the rail line. Also, show the classification of these rail line adjacent buildings based on the no. of floors as follows. [Use **BLD_T** field to find the no. of floors]

| | |
|--------------------------|---|
| 1 to 3 storied buildings | 9 to 10 storied buildings |
| 4 to 6 storied buildings | Semi pucca (consider 58 and 77 as semi pucca) |
| 7 to 8 storied buildings | Slum area (consider 500 as slum area) |

Show the final screenshot as output.

5. Perform the following tasks using *bld_storied* feature. [Use **BLD_T** field] (1.5+2+2)
- What is the total number of buildings in Gulshan that are:
 - Under construction (code 100)
 - Semi pucca (code 77)
 - Kutchha (code 76)
 - Prepare a map showing the classification of building floors as follows. Exclude code 58 (void), code 76 (kutchha), code 77 (semi pucca), 100 (under construction), and 500 (slum).

| | |
|----------------------------|----------------------------|
| 1 to 6 storied buildings | 16 to 20 storied buildings |
| 6 to 10 storied buildings | More than 20 storied |
| 10 to 16 storied buildings | |

- Consider buildings with 7 to 28 storied as high rise. Calculate the total building area of each building. Provide the final screenshot as your answer.

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

Course Title: Environmental Engineering VII
Time- 1 hour

Course Code: CE 531(B)
Full marks: 50

Answer all the following questions
(Assume any missing value)

1. Write down answers of the following questions [10*2=20]

(a) Suppose the arc catalogue window is not visible in your ArcMap project, from where you can get that back?

(b) You are not being able to edit any feature even though you have clicked the option start editing. How can you do that?

(c) Write down six Geo-processing operators.

(d) What is choropleth map? Write down the steps of its formation.

- (e) Show the path of labels in GIS.
- (f) Show the path of Graduated symbols in GIS.
- (g) Where is the create Graph option in GIS.
- (h) What are the components of GIS?
- (i) Suppose you have the number of male, female and children. What should you do to get the total population?
- (j) You want to add particular location of some entities. What should be the add field type?

2. What do you understand by GIS data structure? How do we describe geographical features? Show the Concept of Vector and Raster data type with a diagram.

[5]

- 3.** Road map of ward 35 has been given. Prepare a shape file of Secondary road from the given file. Now select the buildings which are less than or equal to 12 storied. Classify the building according to their use. Label the building with storied number. Now due to some emergency incident you need to extend your secondary road by 10 m on each side.do you think this decision will disturb the existing buildings (which you have selected)for this extension? **[10]**
- 4.** Geo reference the Image given in your exam folder. **[5]**
- 5.** Soil pattern of Bangladesh (shape file) is given. What are the common soil types of Sylhet District and Chitagong District. Select the Chittagong district soil pattern and create a map of it.Export the map. **[3+3]**
- 6.** You need to create a file geodatabase for a system running with four operators. you need to input their name, their age, their birthplace, their birthweight. How many feature class do you need for that? Which co-ordinate system you will choose for that? please show the necessary steps. **[4]**

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

Course Title: Structural Engineering VI (Design of Steel Structures)
 Time: 1 hour

Course Code: CE 417
 Full Marks: 30

Answer all 03 (Three) questions
 [Assume Reasonable Values for Any Missing Data]

1. (a) State the relative advantages of structural steel compared to R.C.C. (3)
- (b) Select the lightest unequal-leg angle tension member 18 feet long to resist a service dead load of 30 (7) kips and a service live load 60 kips. Use A36 steel ($F_u = 58$ ksi). The connection is shown in **Figure 1**. It shall be connected to a gusset plate using 6 nos. 3/4- in dia. bolts in two rows as shown. Neglect **block shear failure mode** and follow **LRFD** principle. Assume $U=0.8$ and preferable $L/r \leq 300$.

| Shape | A_g (in ²) | r_x (in) | r_y (in) | r_z (in) |
|-----------|--------------------------|------------|------------|------------|
| L6×4×9/16 | 5.31 | 1.90 | 1.14 | 0.861 |
| L6×4×1/2 | 4.75 | 1.91 | 1.14 | 0.864 |
| L6×4×7/16 | 4.18 | 1.92 | 1.15 | 0.867 |
| L6×4×3/8 | 3.61 | 1.93 | 1.16 | 0.870 |

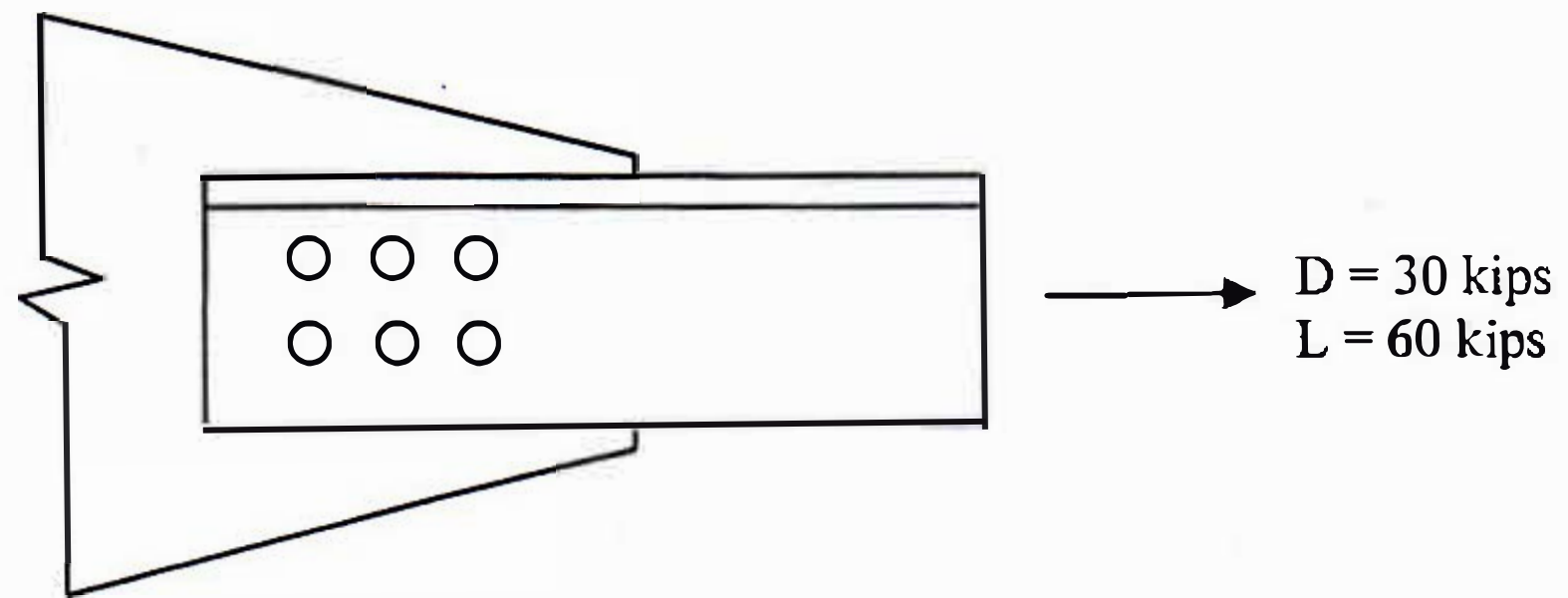


Figure 1

2. (a) What are the types of steel shapes based on process of forming? Compare between them. (Relevant (3) sketches are necessary)
- (b) Investigate the tension capacity of the plate PL 8×5/8 attached to a gusset plate with six bolts as (7) shown in **Figure 2**. Consider **block shear mode only** and assume uniform tension stress. The material is A36 ($F_u = 58$ ksi) and bolts are 3/4- in dia. with standard holes. Use both **ASD and LRFD** methods.
- Block shear capacity: Nominal strength

$$R_n = 0.6F_y A_{gv} + U_{bs} F_u A_{nt}$$

$$R_n = 0.6F_u A_{nv} + U_{bs} F_u A_{nt}$$

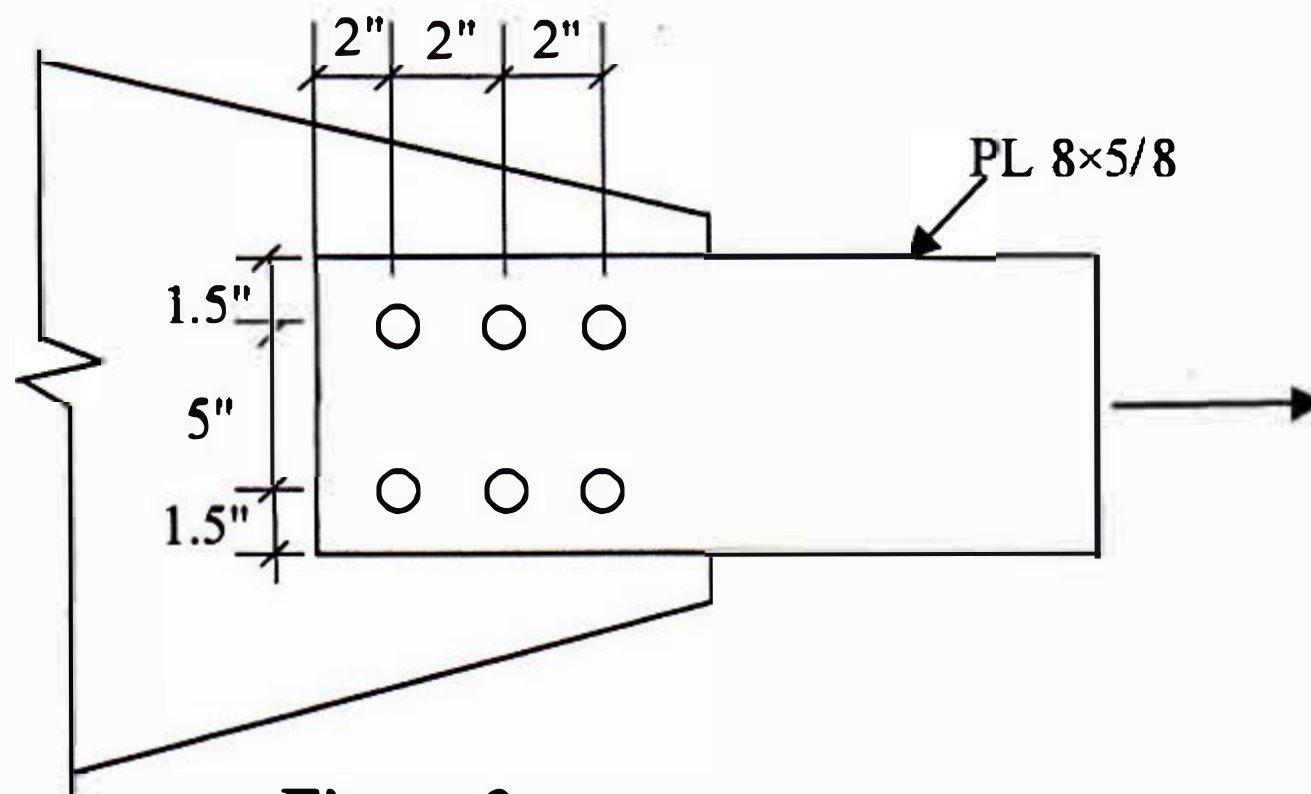


Figure 2

3. (a) What is residual stress? What are the sources of residual stress? Describe with neat sketches. (3)
- (b) Determine the number of 3/4-in dia A325 bolts ($F_y=90$ ksi, $F_u=120$ ksi) in standard holes and show neat sketch of the bolted connection required to carry 10 kips dead load and 40 kips live load on the plates shown in Figure 3 if A36 steel is used ($F_u=58$ ksi). Assume the portion of double lap splice is a bearing type connection with **threads excluded from the shear planes** and a **double row of bolts** is used. Use AISC-LRFD method and **ignore block shear mode**. (7)

Nominal strength, $R_n = F_{nv} m A_b$ (shear)

$$R_n = 1.2 L_c t F_u \leq 2.4 F_u d t \text{ (bearing)}$$

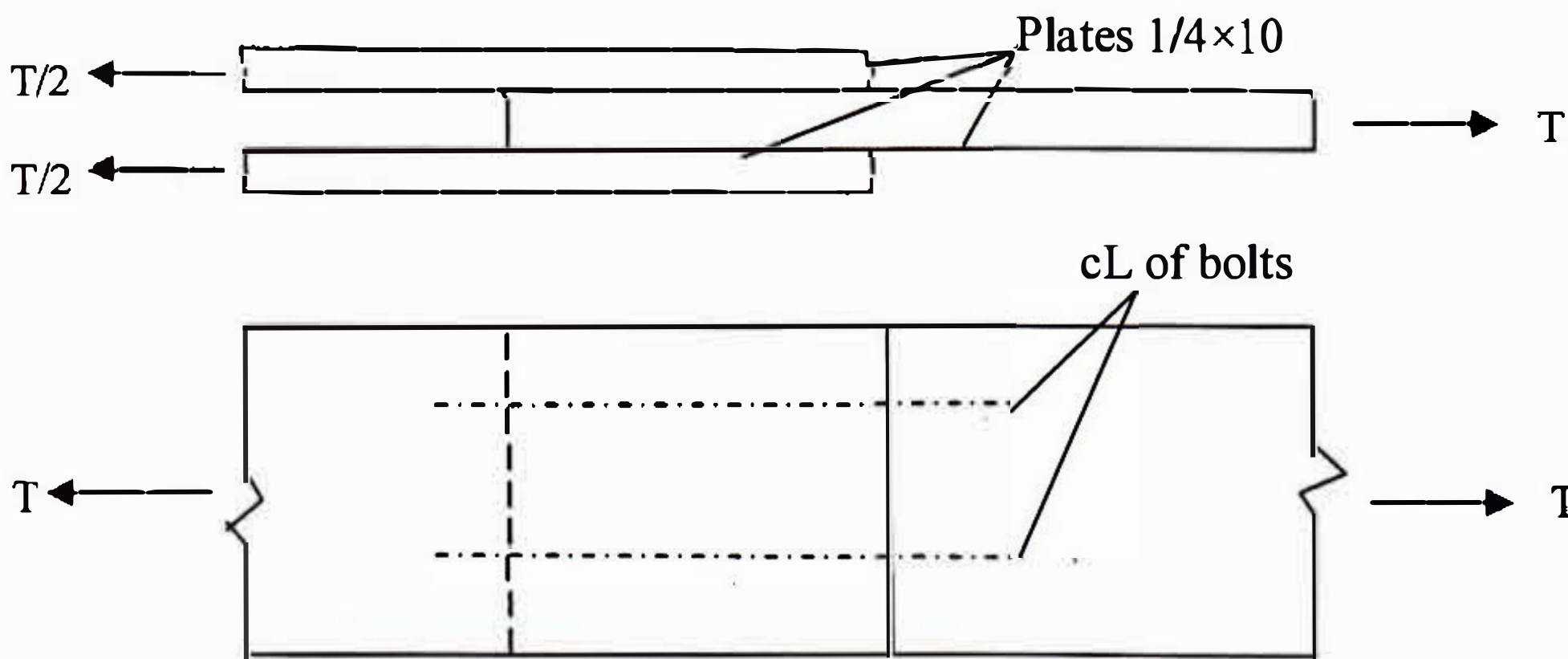


Figure 3

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

Course code: CE 437

Course title: Environmental Engineering VI (Environmental Management)

Time: 60 Minutes

Total marks: 20

Answer all questions

1. Assess the relationship between ecosystem, environment and biodiversity. 2.5
2. Explain the following: i) Environmental Management; ii) Tundra Biome; v) Environmental Impact Assessment; iv) ISO 14001; v) Biomass. 5
3. Explain (with conceptual diagram) how increasing diversity can stabilize ecosystem functioning. 4
4. What are the differences between goal, aim and objective? How can you set SMART environmental objectives for an organization? 2+ 2
5. According to the Kigali Amendment (2016) to the Montreal Protocol on Substances that deplete the Ozone Layer, what are the phase down schedule of HFCs for developing countries (Group 1). 2.5
6. Explain greenhouse effect. 2