1-1

University of Asia Pacific
Department of Civil Engineering
Midterm Examination Fall 2019
Program: B.Sc. Engineering (Civil)

Course Title: Introduction to Civil & Environmental Engineering — Course Code: CE 107
Time: 1 hour — Full Marks: 40

There are Five Questions. Answer All the Questions.

PART I

1. (a) Explain i) Environment ii) Environmental Engineering iii) Environmental Ethics [6]
   (b) With a neat sketch clearly mention the different layers of atmosphere. [4]

2. (a) Describe the relationship between Human and Environment. [6]
   (b) Differentiate between Green Engineering and Traditional Engineering. [4]

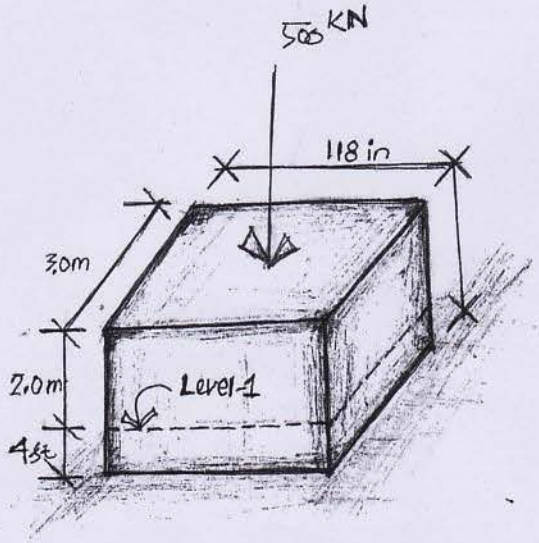
PART II

3. (a) Mention few simple points (at least two for each) related to the understanding of science, engineering and technology. [4.5]
   (b) What should be the major foci of any civil engineering project? [1.5]

4. (a) Define Civil Engineering as per ASCE. [2]
   (b) What are the major divisions of civil engineering? Also mention the names of some other participatory inevitable sub-fields that are involved in any civil engineering project. [2]

5. (a) Calculate (showing unit detail) the weight of a brick (W_b) in kg, lb and gm if its size is about 241.3 mm x 11.43 cm x 2.75 in. Consider γ_{bm} = 122.5 lb/ft^3. [4]

   (b) Calculate stress at Level 1 and pressure on the ground for the concrete block (showing unit detail) as shown below in kip/in^2 (ksi) and N/mm^2. γ_c = 140 lb/ft^3. [6]



University of Asia Pacific
Department of Basic Sciences and Humanities
Mid-Semester Examination Fall – 2019
Program: B. Sc Engineering (CE)

Course Title: Physics | Course Code: PHY-101 | Credit: 3.00
Time: 1.00 Hour | Full Mark: 60

N.B- There are **Four** Questions. Answer **three** questions including **Q-1** and **Q-2**. Figures in the right margin indicate marks.

1. State and explain Stoke's law and prove that $\eta = \frac{2r^2(\rho - \sigma)g}{9v}$, where the terms have their meanings. **[20]**

2. (a) Write down four postulates of the kinetic theory of gases. **[10]**

   (b) At what Celsius temperature will oxygen molecules have the same root mean square velocity as that of hydrogen molecules at -100^0C? **[10]**

3. What is called Cantilever? Prove that depression $y = \frac{Wl^3}{3YI_g}$ at the free end of the cantilever, where the terms have their usual meanings. **[20]**

OR

4. Define elastic fatigue. State and explain stress-strain diagram of a metallic wire. **[20]**

University of Asia Pacific
Department of Basic Sciences & Humanities
Mid-Semester Examination, Fall-2019
Program: B.Sc. in Civil Engineering

Course Title: Mathematics-I | Course Code: MTH 101
Credit: 3.00 | Time: 1.00 Hour | Full Marks: 60

There are **Four** questions. Answer **Three** including question **1, 4**. All questions are of equal values, indicated in the right margin.

1. (a) Define continuity of the function. Show that $f(x) = \begin{cases} -\cos x, & x < 0 \\ \cos x, & x \geq 0 \end{cases}$ is continuous at $x = 0$. **10**

(b) Investigate the differentiability of the function $f(x) = \begin{cases} x^2 + 1, & x \leq 1 \\ 2x, & x > 1 \end{cases}$ at $x = 1$. **10**

2. (a) Discuss applicability of the Rolle's theorem for the function $f(x) = x^2$ over (-1, 1). **10**

(b) For implicit function $x^y = y^x$, find $\frac{dy}{dx}$. **10**

OR

3. (a) State Leibnitz's Theorem. If $y = (\cos^{-1} x)^2$, then by applying Leibnitz's theorem show that $(1 - x^2)y_{n+2} - (2n + 1)xy_{n+1} - n^2y_n = 0$ **10**

(b) If $y = \sin(\sin x)$, then show that $y_2 + y_1 \tan x + y \cos^2 x = 0$ **10**

4. (a) State Taylor's Theorem in infinite form in the power of (x-a). Then expand $\ln x$ in power of $(x - 4)$. **12**

(b) Expand the function $\cos x$ in power of x. **8**

University of Asia Pacific

Department of Civil Engineering

Mid-Semester Examination, Fall - 2019

Program: B.Sc. in Civil Engineering

Year 1st **Semester: 1st**

Course Code: HSS101 Course Title: English Language I (Oral and Written English) Credit: 3.00

Time: 1.00 Hour Full Marks: 20

Instructions:

***Marks are indicated in the right margin.**
***Answer all the questions**

1. Complete the following passage by inserting the missing *a, an, the* or *X* (for no article) where necessary: **4x1 = 4**

Compacted granular columns are one of **(A)** _____ soft ground improvement techniques that are more commonly and successfully used to reduce settlement and to speed up consolidation of soft soils. The reduction of settlement and acceleration of the consolidation are due to the higher stiffness of **(B)** _____ granular material (Aboshi et al. 1979; Priebe 1995) and shortened drainage paths induced by radial consolidation of the columns, respectively (Han and Ye 2002; Tan et al. 2008; Castro and Sagaseta 2013). **(C)** _____ important requirement for the granular columns to drive sufficient load-carrying capacity is the lateral confinement provided by the surrounding soft soil. A single granular column installed in very soft clay (Su< 15 kPa) may fail through excessive bulging that occurs near the top; however general shear failure is a more probable failure mechanism for a shorter granular column (Greenwood 1970). The failure consequently results in a lower load-carrying capacity irrespective of the stiffness and strength of constituent materials. The main advantage of geosynthetic-encased granular columns **(D)** _____ over traditional granular columns is the higher stiffness resulting from the hoop stresses in the geosynthetic encasement, which increases the load capacity.

2. Fill in the gaps using the correct homophone. **3X1 = 3**

a) Electronics is _____ (*one, won*) of his hobbies.
b) He saw a car colliding with a _____ (*stationary, stationery*) vehicle a few minutes ago.
c) We walked down the _____ (*aisle, isle*) between the rows of seats.

3. Fill in the following gaps using the right forms of verbs according to the tense. **2X1 = 2**

a) At first it was strange, but now they are used to _____ (eat) tuna steak.
b) Neither the plates nor the serving bowl _____ (go) on that shelf.

4. Fill in the blanks using appropriate preposition from the box below. **6X1 = 6**

beside	in	from	with
of	for	down	to

One **(a)** _____ the most important responsibilities of environmental engineering is **(b)** ____ prevent the release of harmful chemical and biological contaminants into the air, water and soil, the BLS says. This requires extensive knowledge of the chemistry and biology of the potential contaminants as well as the industrial or agricultural processes that might lead to their release. **(c)** _____ this knowledge, new processes can be designed, or existing processes can be modified, to reduce or eliminate the release of pollutants. Another important function performed by environmental engineers is detecting the presence of pollutants and tracking them back to their source, the BLS says. In some cases, this can present a significant challenge. **(d)** _____ instance, the source of contamination in a lake could be anywhere within several thousands of acres of land surrounding the lake and its tributaries. Contamination of oceans can present even greater challenges in identifying the source. Once the environmental engineer identifies a source of contamination, it must be stopped or significantly reduced. Simply shutting **(e)** _____ a business is not always a viable option, because of the potential for severe economic consequences. Environmental engineers often work with businesses to determine ways to avoid or reduce the production of pollutants or to separate them so they can be disposed of **(f)** _____a safe manner.

5. Writing Formal Letter **5**

Suppose you are an Executive Engineer at Innovate Engineering & Development (Address: 3rd Floor, House-2/21, Block- C, Tajmahal Road, Mohammadpur, Dhaka - 1207). Five days ago, you ordered 300 S.S Square Pipe Grade-304 (diameter – 1 ¼ X 1 ¼ in inch, 1.2 mm thick) from Winner Stainless Steel Mills Ltd (169 Nawabpur Road - 3rd Floor, Dhaka - 1100). However, after receiving the products you found that 60 pipes were damaged and 40 pipes had stress corrosion cracking. You called the company to report the problem but you have not received any help yet.

Now, write a <u>complaint letter</u> to the Manager of Winner Stainless Steel Mills Ltd explaining the problems you faced and state what action you would like from the organization.

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

Course Title: Engineering Mechanics I | Credit Hours: 3.0 | Course Code: CE 101
Time: 1 hour | Full Marks: 40 (= 4 × 10)

ANSWER ALL THE QUESTIONS

1. What force P will cause the wheel (as shown in ***Fig.1***) to be on the point of moving over the block A if the wheel weighs 2000 lb and $\theta = 30^0$. Also calculate the angle θ that required minimum force P to pull the wheel over block A. **10**

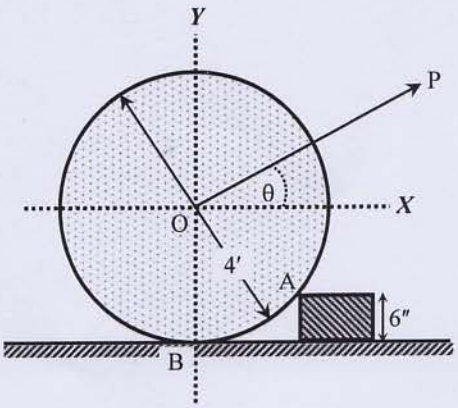


Fig.1

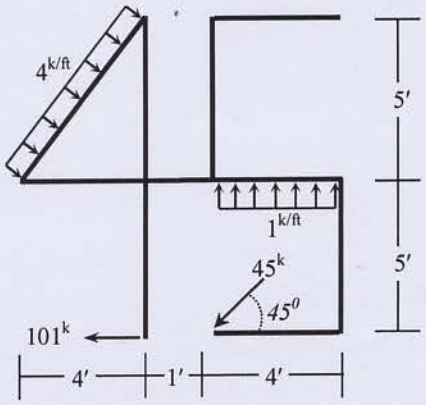


Fig.2

2. ***Fig.2*** shows a system of forces acting on a structure (shown by bold lines). Calculate the magnitude, direction and location of resultant of the forces. **4+4+2**

3. In the truss loaded as shown in ***Fig.3*** (i) Identify zero force member(s), (ii) Calculate reactions at supports ***A*** and ***I*** and (iii) Calculate forces in member ***CD*** and ***LK***. **2+4+4**

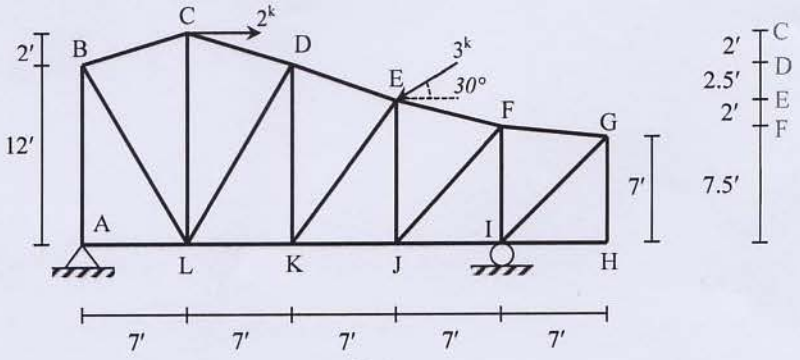


Fig.3

4. In the beam loaded as shown in ***Fig.4***, reaction of roller support at B is 7.75 kip. Calculate the (i) reactions at ***F*** (ii) uniformly distributed load ***w*** and (iii) Shear Force (***V***) and Bending Moment (***BM***) at point **C**. **2+2+6**