

University of Asia Pacific

Final Examination Spring – 2016

Department of Civil Engineering

Course Code: HSS 101

Year/semester: 1st year 1st sem.

Time: 3 hours

Course Title: English Language I

*Marks are distributed on the right side

Full Marks: 50

Section – A (Reading Comprehension)

(Read the passage carefully and answer the corresponding questions)

Many great inventions are initially greeted with ridicule and disbelief. The invention of the airplane was no exception. Although many people who heard about the first powered flight on December 17, 1903 were excited and impressed, others reacted with peals of laughter. The idea of flying an aircraft was repulsive to some people. Such people called Wilbur and Orville Wright, the inventors of the first flying machine, impulsive fools. Negative reactions, however, did not stop the Wrights. Impelled by their desire to succeed, they continued their experiments in aviation.

Orville and Wilbur Wright had always had a compelling interest in aeronautics and mechanics. As young boys they earned money by making and selling kites and mechanical toys. Later, they designed a newspaper-folding machine, built a printing press, and operated a bicycle-repair shop. In 1896, when they read about the death of Otto Lilienthal, the brothers' interest in flight grew into a compulsion.

Lilienthal, a pioneer in hang-gliding, had controlled his gliders by shifting his body in the desired direction. This idea was repellent to the Wright brothers, however, and they searched for more efficient methods to control the balance of airborne vehicles. In 1900 and 1901, the Wrights tested numerous gliders and developed control techniques. The brothers' inability to obtain enough lift power for the gliders almost led them to abandon their efforts.

After further study, the Wright brothers concluded that the published tables of air pressure on curved surfaces must be wrong. They set up a wind tunnel and began a series of experiments with model wings. Because of their efforts, the old tables were repealed in time and replaced by the first reliable figures for air pressure on curved surfaces. This work, in turn, made it possible for the brothers to design a machine that would fly. In 1903 the Wrights built their first airplane, which cost less than \$1,000. They even designed and built their own source of propulsion—a lightweight gasoline engine. When they started the engine on December 17, the airplane pulsed wildly before taking off. The plane managed to stay aloft for 12 seconds, however, and it flew 120 feet.

By 1905, the Wrights had perfected the first airplane that could turn, circle, and remain airborne for half an hour at a time. Others had flown in balloons and hang gliders, but the Wright brothers were the first to build a full-size machine that could fly under its own power. As the contributors of one of the most outstanding engineering achievements in history, the Wright brothers are accurately called the fathers of aviation.

1. Choose the best answers from the multiple options.

(5)

A. People thought that the Wright brothers had _____.

I. acted without thinking

- II. been negatively influenced
- III. been too cautious
- IV. been mistaken
- V. acted in a negative way

B. The Wrights' interest in flight grew into a _____.

- I. financial empire
- II. plan
- III. need to act
- IV. foolish thought
- V. Answer not available

C. Lilienthal's idea about controlling airborne vehicles was _____ the Wrights.

- I. proven wrong by
- II. opposite to the ideas of
- III. disliked by
- IV. accepted by
- V. improved by

D. The old tables were _____ and replaced by the first reliable figures for air pressure on curved surfaces.

- I. destroyed
- II. invalidated
- III. multiplied
- IV. approved
- V. not used

E. The Wrights designed and built their own source of _____.

- I. force for moving forward
- II. force for turning around
- III. turning
- IV. force for going backward
- V. None of the above

2. Give a title of the passage given above and write a summary of it. (5)

Section - B (grammar)

3. Find out and correct the errors in capitalization and punctuation in the following passages: (5)

sammy and ralph were snowmen sammy was ralphs cousin sammy was a very proper little snowman and ralph was a rebel ralph always wanted to do things differently while sammy always wanted to do what he was supposed to do because ralph wanted to be different he wore sunglasses a yellow flowered tourist hat and a bright blue shirt he also carried a briefcase sammy wore a blue top hat a striped scarf and carried a shovel ralph did have one traditional snowman characteristic that was the same as sammys however like all snowmen he had handsome orange carrot nose one day ralph decided to pack his suitcase full of snowballs

his cousin sammy told him not to he told ralph that all the snowballs would melt and ruin his suitcase ralph didnt listen he packed his suitcase full of snowballs and they all melted water started to leak out of his suitcase ralph figured out a way to solve his problem he put his suitcase in the freezer and the water turned to ice

4. Use the following prefixes and suffixes and make words with them. With the newly made words, make sentences. (any 6) (6)

Suffix/ Prefix: de-, homo-, tri-, co-, -ist, -ity, -ship, -tion

Given words: Angle, Worker, Hard, Equate, Creative, active, fine, phone

5. Make individual sentences using any four pairs of homophones given bellow – (8)

Be Die Made

Bee Dye Maid

Buy Fair Pray

By Fare Prey

6. Fill in the gaps using appropriate parts of speech. (5)

- I. I am not to anyone. (bias)
- II. He is a, I know it from my experience. (hypocrisy)
- III. Stop your behavior. (child)
- IV. Why is he in the sun? (run)
- V. Akbar was the Mughal emperor. (great)
- VI. He beat the poor boy (violence)
- VII. Rafsan got A+ in HSC. (gold)
- VIII. We want a man for this position. (depend)
- IX. the passage. (summary)
- X. Do not a liar. (glory)

Section c (writing)

7. Write a paragraph (200-250 words) on any of the following topics – (8)

- I. Effects of Social Networking Sites.
- II. An event that changed my life.

8. Suppose, you ordered for 10 new Dell laptops for your own cyber café - a business that you run, from TechVillage computers, Multiplan Computer center, Science Lab Dhaka. But, without any prior information they sent you 5 DEL computers and 5 hp computers. Write a **claim letter** to the MD of Tech Village computers asking him either to change those 5 hp computers or to refund the money. (8)

OR

Write an inquiry letter asking information about private student aid funds for admission to a Masters program in Civil Engineering at a foreign university.

University of Asia Pacific
Department of Basic Sciences and Humanities
Final Examination Spring – 2016
Program: B. Sc Engineering (Civil)

Course Title: Physics
Time: 3.00 Hours

Course Code: PHY-101

Credit: 3.00
Full Mark: 150

N.B- There are **Eight** Questions. Answer any **Six**. All questions are of equal value. Figures in the right margin indicate marks.

1. (a) Write short notes: (i) Brewster's law, (ii) Quarter wave plate, (iii) Half wave plate. [15]
- (b) Calculate the thickness of a half wave plate of quartz for a wavelength of 5000 Å. Here $\mu_E = 1.553$ and $\mu_O = 1.544$. [10]

2. (a) If E and A are the total energy and amplitude of a simple harmonic oscillator, then how can you prove that total energy of the simple harmonic oscillator is [15]

$$E = \frac{1}{2}kA^2$$

- (b) A simple harmonic motion is represented by $y = 10\sin\left(10t - \frac{\pi}{6}\right)$, where y is measured in metres, t in seconds and phase angle in radians. Calculate displacement, velocity and acceleration at time, $t = 0$ and $t = 1$ sec. [10]
3. (a) What do you understand by Lissajous' figure? Deriving the following equation, find out different types of Lissajous' figures. [15]

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} - \frac{2xy}{ab} \cos\delta = \sin^2\delta$$

Where δ is the phase difference between the two waves.

- (b) Two tuning forks A and B are of nearly equal frequencies. Frequency of A is 256. When the two tuning forks are used to obtain Lissajous' figures, two complete cycle of changes takes place in 20 seconds. When the tuning fork B is loaded with a little wax, the time taken is 40 seconds. Calculate the frequency of B before loading. [10]

[Turn over

4. (a) Derive the expressions for the apparent pitch due to Doppler effect when the observer moves towards and away from a stationary source and when observer is at rest and source is in motion. [15]

(b) A motor car sounding a horn at a frequency of 100 hertz moves away from a stationary observer towards a rigid flat wall with a velocity of 36 km/hr. How many beats per second will be heard by the observer? [Velocity of sound = 350 m/s] [10]

5. (a) State and explain the laws: Zeroth law of thermodynamics, First law of thermodynamics, Second law of thermodynamics. [15]

(b) Prove that the slope of an adiabatic curve is γ times steeper than that of an isothermal curve. [10]

6. (a) Show that the work done for expanding the gas during an adiabatic process can be expressed by the equation $W = \frac{1}{1-\gamma}[RT_2 - RT_1]$, where the symbols have their usual meaning. [15]

(b) A motor car tyre has a pressure of 2 atmospheres at room temperature of 30°C. If the tyre suddenly bursts, find the resulting temperature. [10]

7. (a) Show that the work done for expanding the gas during an isothermal process can be expressed by the equation $W = RT \times 2.3026 \times \log_{10} \frac{P_1}{P_2}$, where the symbols have their usual meaning. [15]

(b) A quantity of air at 30°C and normal atmospheric pressure is suddenly compressed to half its original volume. Find the final pressure and temperature. [10]

8. (a) Prove that the efficiency of the Carnot's heat engine in terms of temperature is given by the relation [15]

$$\eta = 1 - \frac{T_2}{T_1}$$

Where T_1 and T_2 are the temperatures of source and sink respectively.

(b) A Carnot's engine whose temperature of the source is 200 K takes 100 calories of heat at this temperature and rejects 50 calories of heat to the sink. What is the temperature of the sink? Also calculate the efficiency of the engine. [10]

University of Asia Pacific
Department of Civil Engineering
Final Examination Spring 2016
Program: B.Sc. Engineering (Civil)

Course Title: Engineering Mechanics I
 Time: 3 hours

Course Code: CE 101(A)
 Full Marks: 100

Use separate script for Part A and B

PART A

There are 6 questions. Answer any 5 questions.

(5x10=50 marks)

1. For the beam shown in Figure 1, calculate the following:
 (i) Reactions at supports A and E, (ii) Shear force at section 1-1.

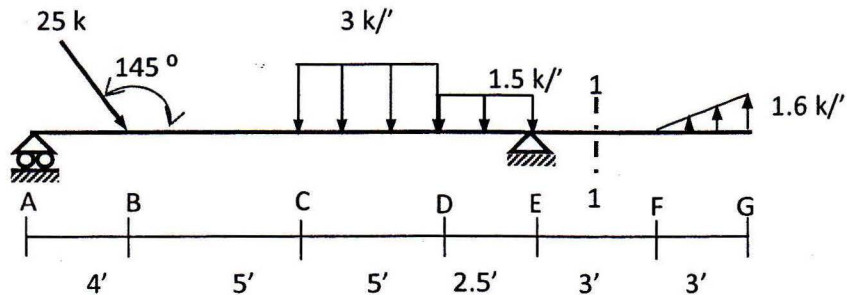


Figure 1

2. A pipe is supported by a hanger rod AE, as shown in Figure 2. The hanger is hinged at pin A. If the pipe section weighs 1000 lb, compute the reactions at A, B, C and D. Assume all the surfaces to be smooth and also neglect weight of the hanger. Diameter of the pipe = 12".

7

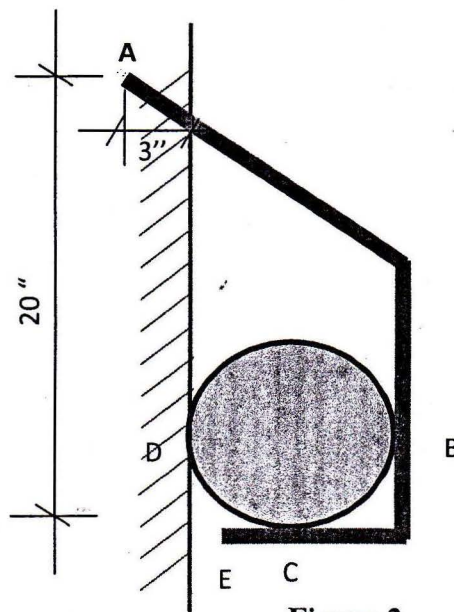


Figure 2

3. For the frame shown in Figure 3, Calculate (i) the reactions at the supports, (ii) the force in the member DC, (iii) the pin reaction at E. Neglect the self-weight of the members.

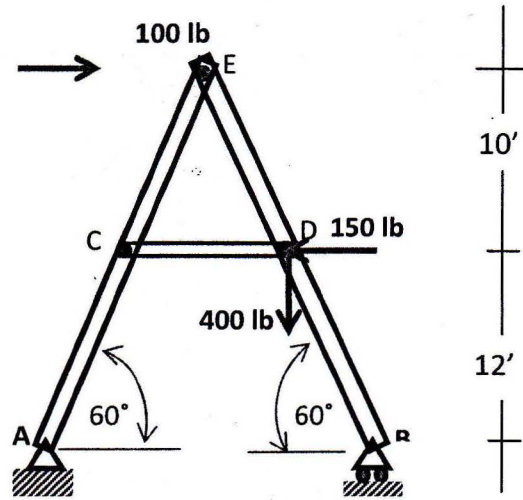


Figure 3

4. For the truss shown in Figure 4, (i) determine the support reactions, (ii) identify the zero force members and (iii) calculate the forces in the members a, b and c.

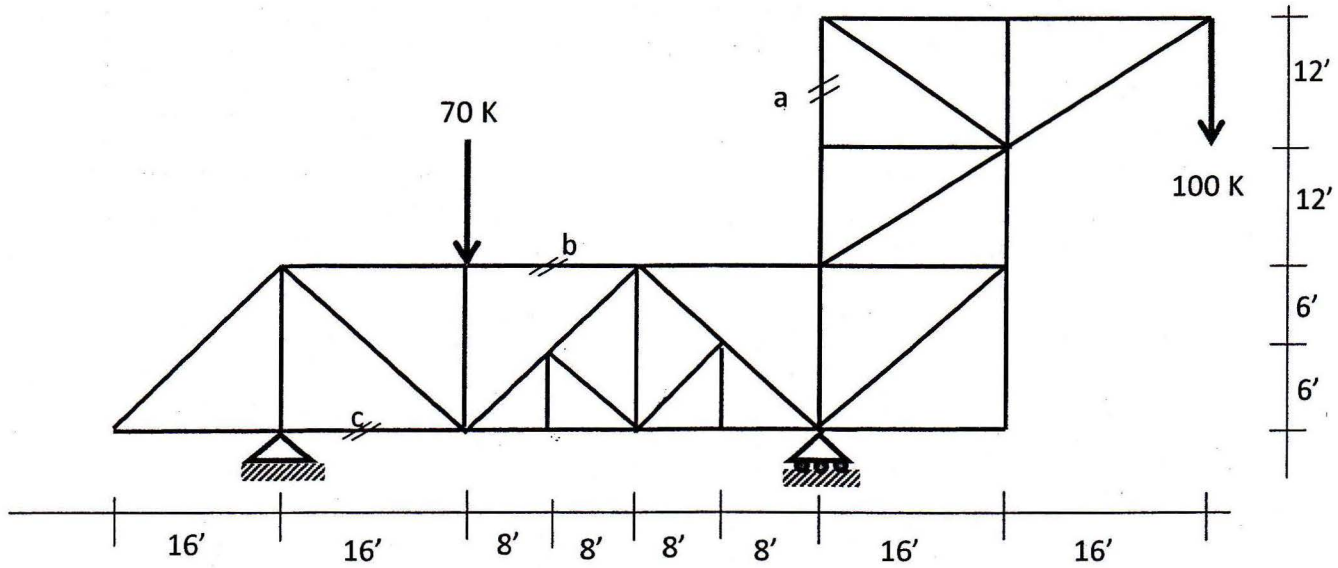


Figure 4

5. For Figure 5, $\Sigma F_x = -137.95 \text{ N}$, $\Sigma F_y = -281 \text{ N}$, calculate the following
- Resultant (magnitude, line of action and direction)
 - Force F_1
 - Angle α
- Also determine the magnitude of the resultant (R), if $F_1 = 0$

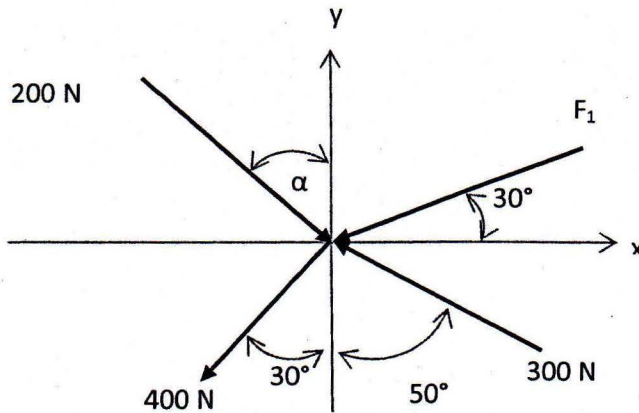


Figure 5

6. The weight of object A is 400 lb. The pulley and all the surfaces are smooth. Determine the weight of object B and the slope (α) of the plane on which the object B is resting (as shown in Figure 6).

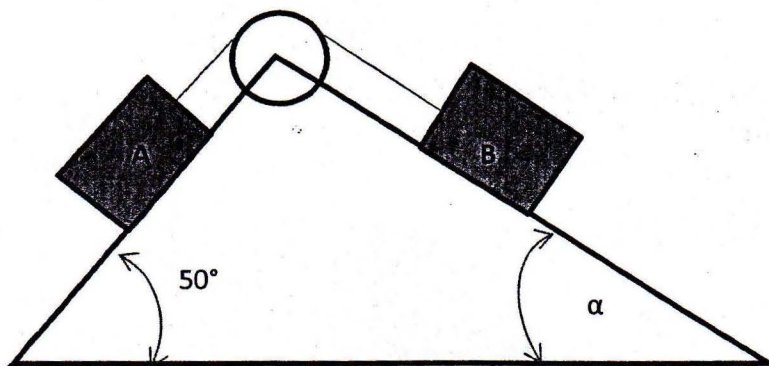


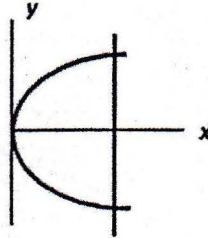
Figure 6

PART B

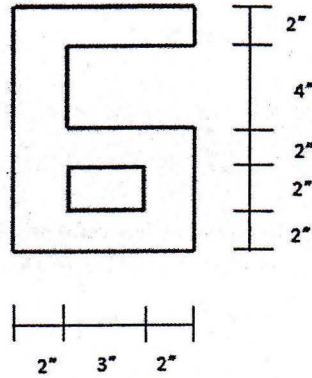
There are 6 questions. Answer any 5 questions.

(5x10=50 marks)

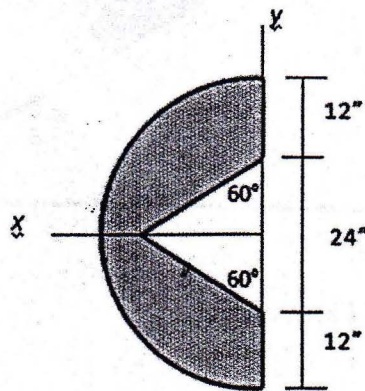
1. An area is bounded by the parabola $y^2 = 8x$ and the straight line $x = 5$ in. Determine the centroid of this area by integration.



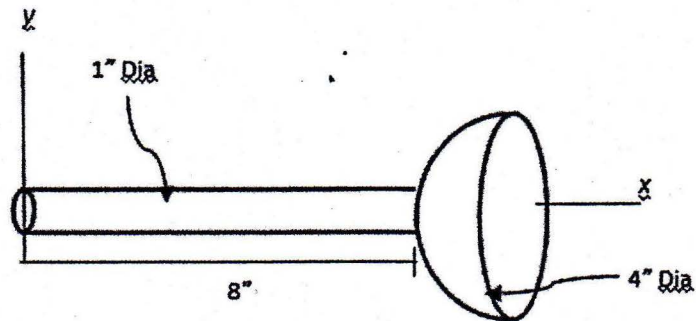
2. Determine the centroid of the following composite area.



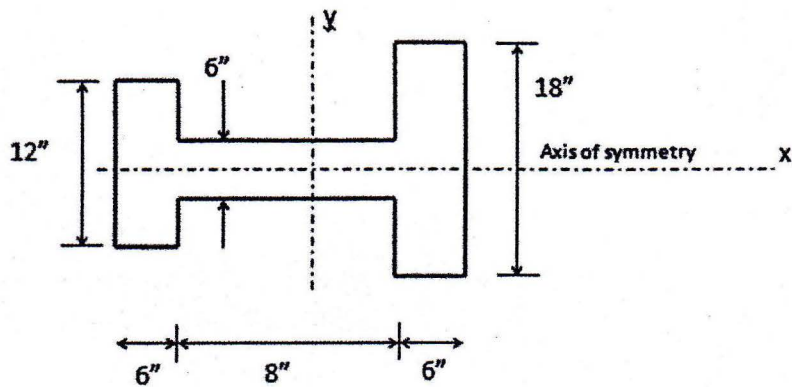
3. Determine \bar{x} for the shaded area shown below.



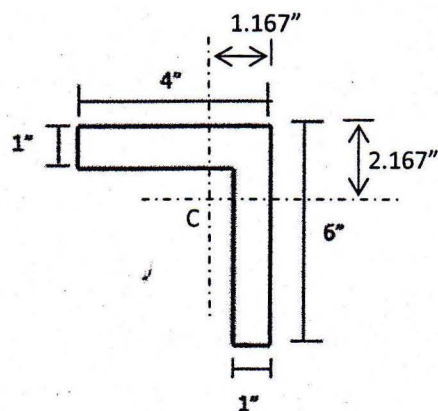
4. A homogeneous rod and a hemispherical part of the same material are welded together as shown below. Determine the location of center of gravity of this composite body.



5. Find the moment of inertia of a T-section shown below about its centroidal y axis.



6. For angle section shown in figure below has $\bar{I}_x = 30.8 \text{ in}^4$ and $\bar{I}_y = 10.8 \text{ in}^4$ and $\bar{P}_{xy} = -10 \text{ in}^4$. Determine the minimum radius of gyration. C is the centroid.



University of Asia Pacific
Department of Civil Engineering
Final Examination Spring 2016
Program: B.Sc. Engineering (Civil)

Course Title: Engineering Mechanics I
 Time: 3 hours

Course Code: CE 101(B)
 Full Marks: 100

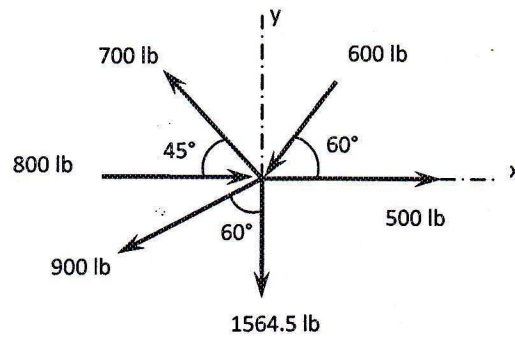
Use separate script for Part A and B

PART A

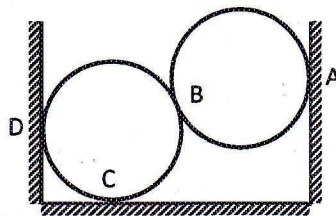
There are 6 questions. Answer any 5 questions.

(5x10=50 marks)

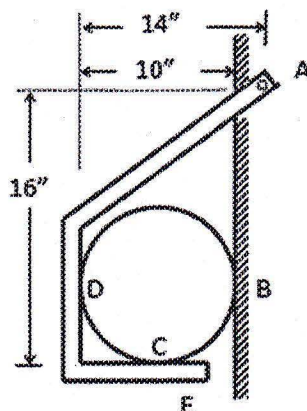
1. Find the resultant of the force system shown below.



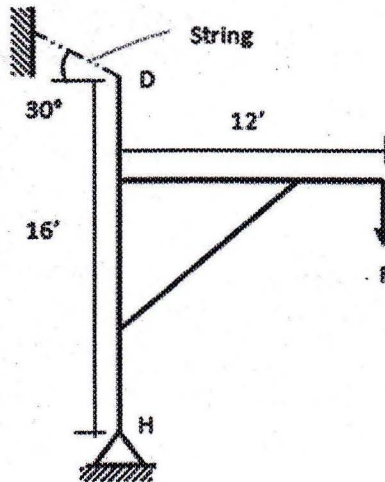
2. Two smooth spheres, each of radius 100 mm and weighing 100 N, rest in a horizontal channel having vertical walls, the distance between which is 360 mm. Find the reactions at the points of contact of A, B, C & D.



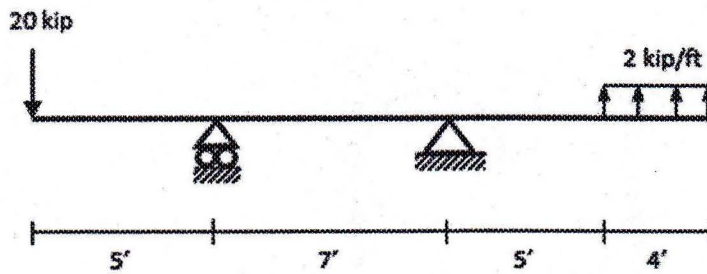
3. A pipe section is supported by hanger rods AE as shown below. The hanger is pivoted at A. The pipe section weighs 800 lb. Compute the reactions at A, B, C and D. Neglect the weight of the hanger.



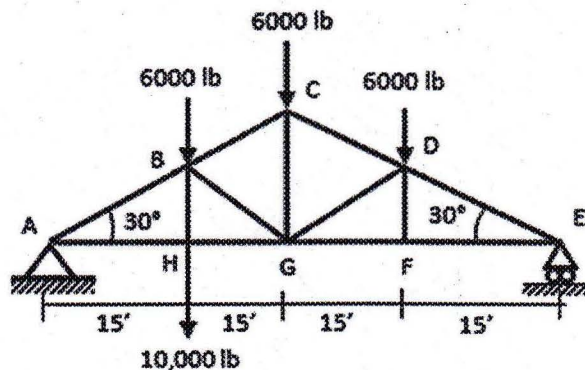
4. The framework of a crane is shown below. It is supporting a load of $F = 5000$ lb. What are the reactions at H (components) and D if the weights of the members are neglected?



5. Calculate the support reactions in the beam shown below.



6. For the truss shown below, determine the external reactions and forces in member CD , DG and GH .



Part-B

There are 6 questions. Answer any 5 questions.

(5x10=50 marks)

1. Find \bar{x} of both the areas: (i) bounded by y axis, $y = 8''$ and $y^2 = 9x$; (ii) bounded by y axis, $x = 8''$ and $y^2 = 9x$.
2. (i) By applying the theorem of Pappus and Guldins, determine the area generated by revolving the area generated by revolving a semi-circular arc of radius R about its diameter through an angle 180° .

(ii) Calculate the tension at each support for the flexible cord. Also calculate the slope of cable at the support. The wire weighs 1 lb per ft.
Distance between two supports = 380 ft
Sag (measured from lower support) = 6 ft

3. Locate the centroid of the shaded area (Figure 1).

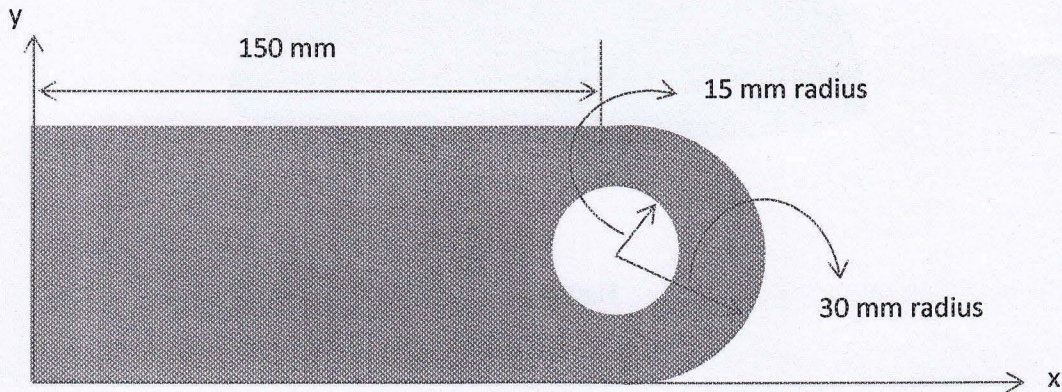


Figure 1

4. For the area shown in Figure 2, determine the following with respect to axes passing through the centroid, (i) \bar{I}_x and \bar{I}_y , (ii) \bar{P}_{xy}

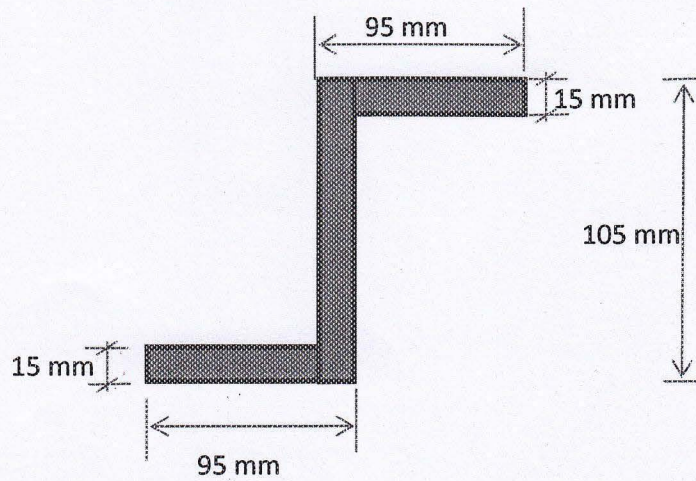


Figure 2

5. Derive the following expression:

$$\tan 2\theta = \frac{2P_{xy}}{I_y - I_x}$$

6. Locate the centroid of a hemispherical volume (Figure 3). Assume that the base of the volume is on the xz plane. 'R' is the radius of the sphere.

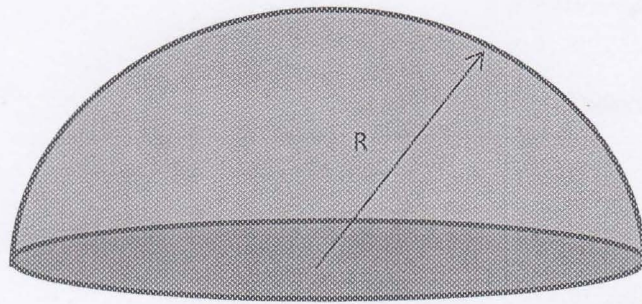


Figure 3

University of Asia Pacific
Department of Civil Engineering
Final Examination Spring 2016
Program: B. Sc. Engineering (Civil)

Course Title: Introduction to Civil and Environmental Engineering
 Time- 2 hours

Course Code: CE 107
 Full marks: 100

PART I

There are **THREE** questions. Answer any **TWO** (2*25=50)

1. (a) Define the term *Environmental Pollution*. [5]
 (b) Mention some controls measures for i) Industrial pollution ii) Air pollution. [10]
 (c) Define biodiversity. Why it is needed to protect? Mention the causes that threat biodiversity. [10]
2. (a) Point out some recent global environmental issues. [5]
 (b) Write short notes on ii) Primary and Secondary air pollutant ii) Natural and Cultural Eutrophication. [10]
 (c) What do you mean by Environmental Ethics? What is the importance of Environmental Ethics? [10]
3. (a) "*Water pollution is all about quantities*"—justify the statement. [5]
 (b) Mention the impacts of i) Global warming ii) Ozone layer depletion. [10]
 (c) Define biotic component and abiotic component of environment. State the relationship between these two. [10]

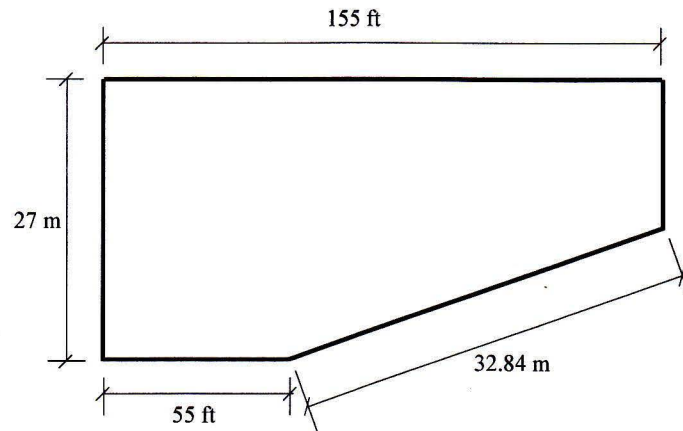
PART II

There are **4** questions. Question **4** is mandatory. In addition, answer any **2** among questions **5** through **7**. (20+15 x 2 = 50)

4. A two-storied residential building is to be constructed. Estimate the construction cost of foundation, superstructure and boundary wall as per the following particulars and specifications of the building. Use PWD schedule and other relevant information provided in the attached appendix. 20

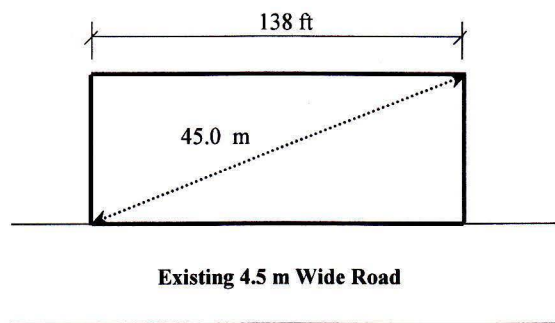
SI No	Particulars	Specification
01	Land Size	Determine from plot layout as shown below
02	Building type	Residential (Superior)
03	Allowable Bearing Capacity (q_a)	3.5 ksf
04	Floor Level	Two
05	Plinth Area	58.5 % of Land Size
06	Construction Material	20 MPa, RCC Structure 1:1.5:3 (Brick Chips)
07	Ground Floor	Car Parking
08	Roof top RCC water tank including beams and supports etc	1000 Gallons
09	Structure type	RCC Frame Structure

SI No	Particulars	Specification
10	Underground water reservoir, distribution line, water pump, pump house, WASA charge	3000 gallons
11	Boundary wall	RCC frame
12	Incidental Cost	Consider 6% for this building



PLOT LAYOUT

5. (a) Mention two simple points (each) related to the understanding of science, engineering and technology. 6
 (b) Define civil engineering according to ASCE. 3
 (c) Giving examples categorize building/construction materials based on specific property of material. What are the major factors for choice of materials? What are the major foci of any civil engineering project? 3+1+2=6
6. (a) Classify building according to type of occupancy. 3
 (b) Give the names in details of the following codes with their related fields. 2
 (i) ASTM (ii) AREA
 (c) Define plane and geodetic surveying. 3
 (d) Classify surveying based on instruments used. 3
 (e) Showing detail convert the unit weight of water from lb/ft^3 to kN/m^3 . 4
7. (a) Mention (names only) few types of loads to be considered in design. 4
 (b) For the following plot, find the total floor area and the number of stories that can be built for a residential building. 11



PLOT LAYOUT