University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination Fall 2015
Program: B.Sc. Engineering (Civil)

Course Title : Engineering Mechanics II
Time : 1 hour

Course Code: CE 103
Full Marks: 20X3=60

1. Determine the minimum load W that can be supported by the system shown in Figure 1.

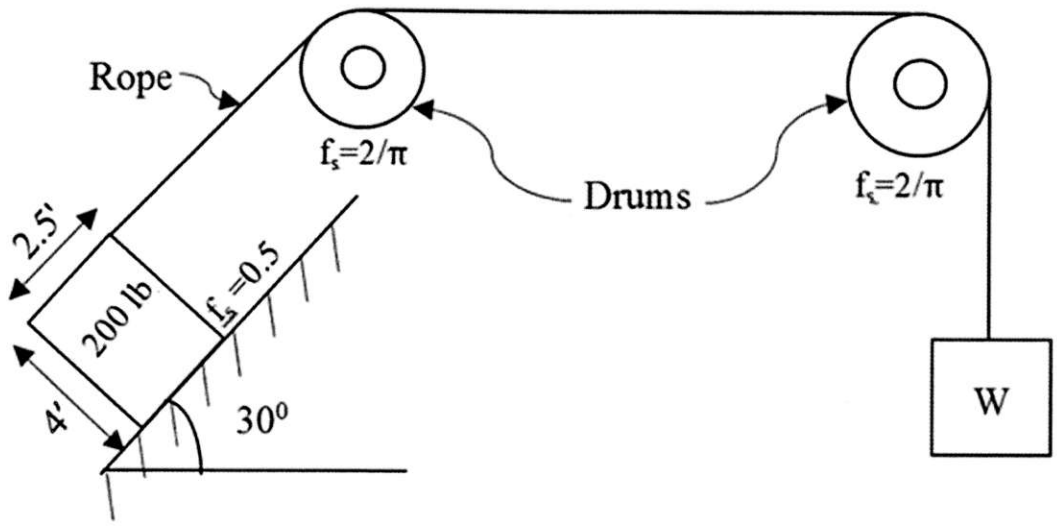

Figure 1

2. A slender brass rod of uniform cross section has been welded at the centre of the base of a cast-iron cone as shown in Figure 2. Weight of the rod and unit weight of cast-iron are 20 lb and 490 lb/ft^3, respectively. Calculate the radius of gyration of this composite mass with respect to Y axis.

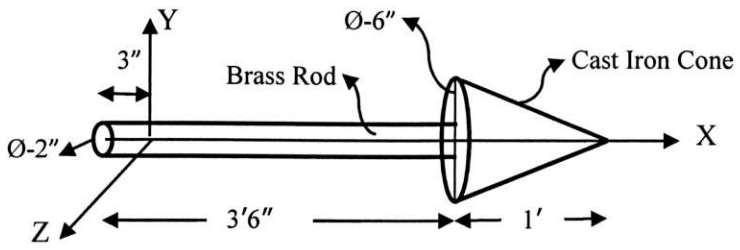

Figure 2

3. Three Cables are used to tether a balloon as shown in Figure 3. Determine the vertical force **P** exerted by the balloon at **A** knowing that the tension in cable **AB** is **259N.**

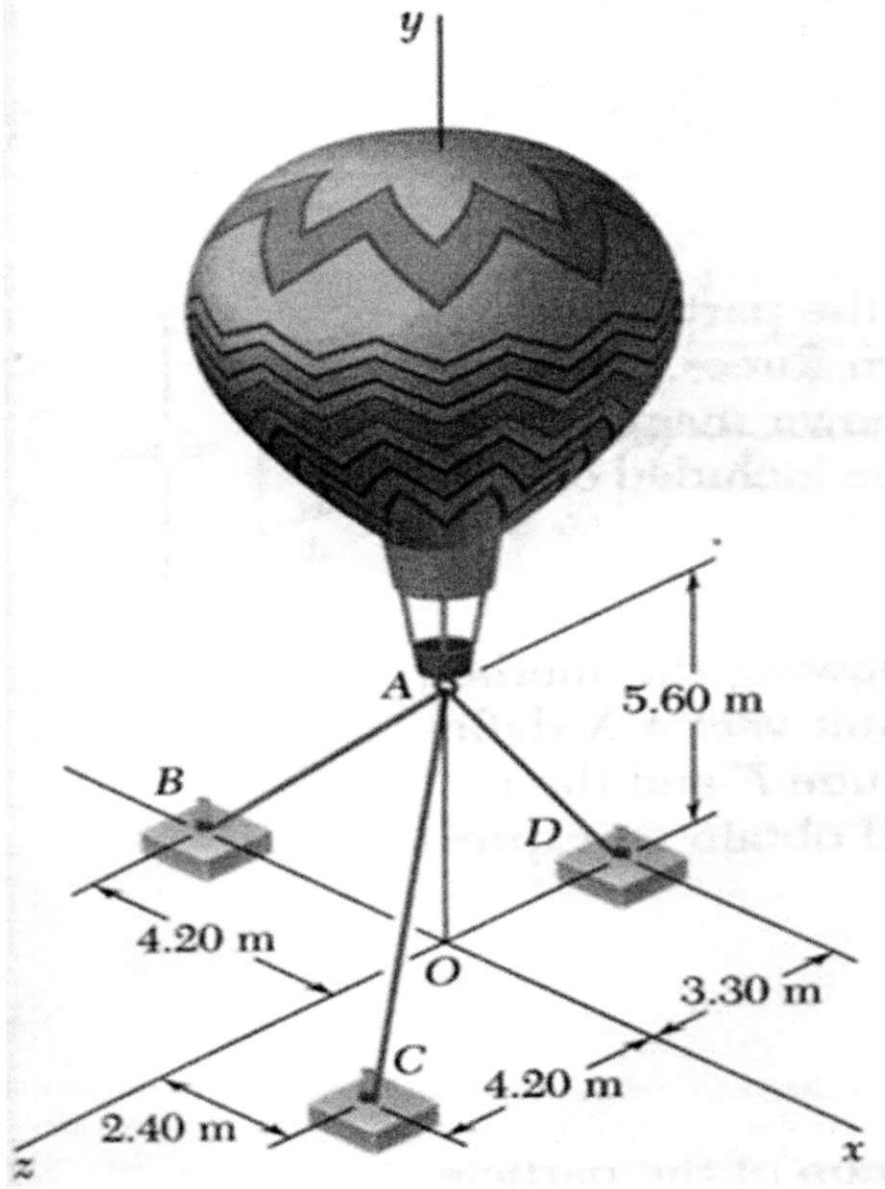

Figure 3

University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination ~~Spring~~ Fall 2015
Program: B.Sc. Engineering (Civil)

Course Title: Surveying **Course Code:** CE 105
Time: 1 Hour **Full Marks:** 60

There are **Four** questions. Answer any **Three**

1. (i) Write short note on following (3x3=9)
   a) Field Book
   b) 3-4-5 Method
   c) Run a parallel to chain line through a given point

   (ii) Calculate the sag corrections for a 60 m steel under a pull of 80 N in six equal spans of 10 m each. Weigh of one cubic cm of steel = 0.078 N. Area of cross sections of tape= 0.09 sq.cm (5)

   (iii) In an old map, a line EF was drawn to a magnetic bearing of 4° 24' the magnetic declination at the time being 2° *West*. To what magnetic bearing should the line be set now if the present magnetic declination is at 10° 55' *West*. (6)

2. (i) The following consecutive staff readings were taken with a dumpy level: 6.21, 4.92, 6.12, 8.42, 9.81, 6.63, 7.91, 8.26, 9.71, 10.21
   The level position was moved after 4^{th}, 6^{th}, 9^{th} readings. The reduced level at first point was 120 ft. Use *Rise and Fall* method, find out the final elevation. Also, apply check at the end. (15)

   (ii) Find out the combined correction for curvature and refraction for distance of (a) 2200 meters and (b) 2000 ft (*Hint:* 1km= 3280.84 ft) (5)

3. (i) What is contour? Describe the characteristics of contour. (7)
   (ii) Draw contour diagram of following: (3)
   a) Hill
   b) Pond
   c) Ridge Line

   (iii) The following bearings were taken in running a compass traverse (10)

Line	F.B.	B.B.	Line	F.B.	B.B.
AB	38°30'	219° 15'	CD	25° 45'	207° 15'
BC	100° 45'	278° 30'	DE	325° 15'	145° 15'

   Mention which stations were affected by local attraction and determine the corrected bearings.

4. (i) Calculate the volume of earth work by prismoidal formula in a road embankment with the following data:

Chainage along the center line	0	100	200	300	400
Ground Levels	201.70	202.90	202.40	204.70	206.90

Formation level at chainage 0 is 202.30, top width is 2 ft, side slopes are 2:1. The longitudinal gradient of the embankment is 1 in 100 rising. The ground is assumed to be level across the longitudinal section. (14)

(ii) Define (3x2=6)

a) Datum
b) Bench Mark
c) Fore Sight

University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination Fall 2015
Program: B.Sc. Engineering (Civil)

Course Title: Surveying
Time: 1 Hour

Course Code: CE 105
Full Marks: 30

There are **Four** questions. Answer any **Three**

1. (a) Show in sketch the working principle of an optical square. Hint: prove how it shows an image of 90°. (02)

   (b) A base line measured with a steel tape was 1650 m. The steel tape used was 30m long, standardized at 50 degree F with a pull of 15 kg. Find the true length of the base line, if the temperature at the time of measurement was 90°F and pull exerted was 26 kg. Weight of 1 cm^3 of steel is 7.86 gm. Weight of tape is 0.6 kg and given that E= 2.109×10^6 kg/cm^2, coefficient of expansion of tape per 1°F = 6.2×10^{-6}. (06)

   (c) Show in sketch the Intersection method of plane table surveying. (02)

2. (a) The following figures were extracted from a level field book, some of the entries being illegible owing to exposure to rain. Insert the missing figures and check your results. Rebook all the figures by the rise and fall method. (07)

Station	B. S.	I. S.	F. S.	Rise	Fall	R. L.	Remarks
1	2.285					232.46	B.M. 1
2	1.65		?	0.02			
3		2.105			?		
4	?		1.96	?			
5	2.05		1.925		0.3		
6		?		?		232.255	B.M. 2
7	1.69		?	0.34			
8	2.865		2.1		?		
9			?	?		233.425	B.M. 3

   (b) Write down the characteristics of Contour. (03)

3. (a) Define: (04)
   1) Back Bearing
   2) Fore Bearing
   3) Closing Error
   4) Local Attraction

   (b) The table below gives the lengths and bearings of the lines of a traverse ABCDE. Calculate the length of line DE and line EA. (06)

Line	Length (m)	Whole circle bearing (W.C.B.)
AB	204	87°30′
BC	226	20°20′
CD	187	280°0′
DE	?	210°3′
EA	?	180°28′

4. (a) Find out the volume of earthwork in a road cutting 120 meters long from the following data: (06)

The formation width 10 meters; side slopes 1 to 1; average depth of cutting along the center line 5 meters; slopes of ground in cross-section 10 to 1.

Hint: calculate h_1, h_2, w_1 and w_2 and calculate area by two-level section.

(b) The following perpendicular offsets were taken from a chain line to a hedge: (04)

Chainage (m)	0	15	30	45	60	70	80	90
Offsets (m)	8.5	7.0	6.2	5.0	6.5	4.0	5.0	6.4

Calculate the area between the survey line, the hedge and the end offsets by

(i) Trapezoidal rule

(ii) Simpson's rule

University of Asia Pacific
Department of Civil Engineering
Midterm Examination Fall 2015
Program: B.Sc. Engineering (Civil)

Course Title: Chemistry | Course Code: CHEM 111
Time: 1 hour | Full Marks: 60

There are ***four*** questions. Answer ***any three*** questions.

1. (a) What is lattice energy for ionic solids? Draw the Born-Haber cycle for determining the lattice energy of NaCl. [2+3]

   (b) What is meant by ionic radius? Which one of the following pairs is larger in size? Why? [2+3]

   i) Na^+ and Na, ii) S^{2-} and S

   (c) Predict the geometry of CO_2, NH_3, PCl_5, XeF_4 and SF_6 molecules by VSEPR model. You must show your work to get full credit on this question. [10]

2. (a) What is dipole moment? Explain why NH_3 has such a large dipole moment compared to NF_3? [5]

   (b) Define bonding and anti-bonding molecular orbital. [5]

   (c) Draw the molecular orbital diagram of O_2 molecule. Is this molecule diamagnetic or paramagnetic? What is the bond order of O_2? [6+2+2]

3. (a) What is wave function, Ψ? What are the physical significances of Ψ^2? [5]

   (b) Write down all the possible quantum numbers for n = 3. Sketch the general shape and orientations of the 2p orbitals. [4+3]

   (c) Define ionization energy and electron affinity. How do they change in the periodic table? [5+3]

4. (a) What are the postulates of Bohr's atomic model? [6]

   (b) What is the wavelength of light emitted when the electron in a hydrogen atom undergoes a transition from energy level $n = 4$ to level $n = 2$? [6]

   (c) Applying VBT explain the bonding of H_2O and XeF_4 molecules. [8]

University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination Fall-2015
Program: BA (Honours) in Civil Engineering
Year: 2015 Semester: Fall 2015

Course Code: HSS 103 Course Title: English Language II
Time: 1 hour Full Marks: 20

1. Rewrite the following sentences correctly: **.5x6=3**

a. The wave raised very high.
b. He took to smoke while in school.
c. He was quite amusing when he heard what had happened.
d. The bird flapped it's wings.
e. Hassan, together with some of his friends, are going to the cinema.
f. His choice of words are excellent.

2. Join the following sentences: **.5x6=3**

a. Jahan cannot play the guitar. Jahan cannot sing well.
b. My aunt is nearly 100. She lives in Germany.
c. I know. He is a brave boy.
d. I saw him fall. I ran towards him.
e. We were walking to the other side of the island. We found a small stream.
f. I did not go to the show. I had already seen it.

3. Make sentences with the following pairs of words: (any three) **1x3 =3**

a.	Between	Ancient	Illiterate	Empty
	Among	Old	Ignorant	Vacant

4. Complete the following sentences by using correct conditional structures: **.5x6=3**

a. I read, if there _____ (be) nothing on TV.
b. Maria _____ (get) the job and moved to Japan if she had studied Japanese in school instead of French.
c. If they worked harder, the _____ (earn) more money.
d. If you _____ (study) hard, you would have passed the test.
e. Jenny is going to Australia, if she _____ (get) her visa.
f. I the curtains _____ (be) open, the sun would shine in.

5. **Provide both synonyms and antonyms to the following words and make sentences out of them: (any three)** **1x3=3**

   Careless, Humorous, Flexible, Benevolent, Conceal

6. **Note Taking:**
   Read the text below and carry out the following instructions:

Cox's Bazar is a district in the Chittagong Division of Bangladesh. Cox's Bazar It is located 150 kilometres (93 mi) south of Chittagong. Cox's Bazar is also known by the name *Panowa* ("yellow flower"). The modern Cox's Bazar derives its name from Captain Cox (died 1798), an army officer who served in British India. It is one of the fishing ports of Bangladesh. The annual average temperature in Cox's Bazar is 34.8 °C and a minimum of 16.1 °C. The climate remains hot and humid with some seasons of temperate weather. The average amount of rainfall is 4285 nm.

The major livelihood of Cox's Bazar district is tourism. Millions of foreign and Bangladeshi natives visit this coastal city every year. A number of hotels, guest houses, and motels have been built in the city and coastal region and the hospitality industry is a major employer in the area.

A number of people are involved in the fishing and collection of seafood and sea products. Oysters, snails, pearls and jewelry made from shells are popular with the tourists in the seaside and city stores. A number of people are also involved in the transportation business for tourists. Many people of the district are farmers.

Today, Cox's Bazar is one of the most-visited tourist destinations in Bangladesh. It has yet to become a major international tourist destination, and has no international hotel chains, due to lack of publicity and transportation. In 2013, the Bangladesh Government formed the Tourist Police unit to better protect local and foreign tourists, as well as to look after the nature and wildlife in the tourist spots of Cox's Bazar.

a. **Take notes by following any one of the following methods:** **1x5=5**

i) Charting Method
ii) Mapping Method

University of Asia Pacific
Department of Basic Sciences & Humanities
Mid Semester Examination, Fall-2015
Program: B.Sc. Engineering (Civil)
1st Year / 2nd Semester

Course Title: Mathematics II | Course Code: MTH 103 | Course credit: 3.00
Time: 1 hr | Full Marks: 60
Answer any **three** of the followings | 3×20 = 60

1. (a) Transform the equation $11x^2 + 4y^2 - 24xy - 20x - 40y - 5 = 0$ if the axes are being rotated at an angle $\theta = \tan^{-1}\frac{4}{3}$. **8**

(b) Define direction cosines. If l, m, n be the direction cosines of any line then prove that $l^2 + m^2 + n^2 = 1$. Using this find the direction cosines of the line which is equally inclined to the axes. **2+6+4**

2. (a) Find the equation of the plane which passes through the intersection of planes $7x - 4y + 7z + 16 = 0$ and $4x + 3y - 2z + 3 = 0$ and is parallel to the plane $3x - 7y + 9z + 5 = 0$. **10**

(b) Find the equation of the plane parallel to the plane $3x - 4y + 7z = 0$ and passing through the point $(2, 3, -1)$. Also find the angle between this plane and the plane $8x + 3y - z = 2$. **10**

3. (a) Find the point of intersection of the straight line joining points $(2, -3, 1)$ *and* $(3, -4, -5)$ and the plane $3x + 4y + 5z = 5$. **10**

(b) Show that the straight lines $x - 2y + 2 = 0 = 2y + z + 4$ and **10**

$7x + 4y - 15 = 0 = y + 14z + 40$ are perpendicular.

4. (a) Show that the equation $12x^2 + 3y^2 + 4z^2 - 12x - 16y + 4z - 4 = 0$ represents an ellipsoid. Also find its centre and lengths of the semi-axes. **10**

(b) Given the equation of plane $x + 2y + 2z + 1 = 0$ and the equation of sphere $7x^2 + 7y^2 + 7z^2 - 14x + 21y + 7z + 6 = 0$. Does the plane cut the sphere? **10**