University of Asia Pacific
Department of Civil Engineering
Final Examination, Fall 2019
Program: B.Sc. in Civil Engineering
Year: 1st, Semester: 2nd

Course Title: English ll: Language Composition Skill   Course Code: HSS 103   Credit: 3.00

Time: 3.00 Hours   Full Marks: 50

Instructions:

*Marks are indicated in the right margin.

*Answer all the questions

1. Choose the correct word from the given options.   (10x0.5=5)

   a) I will advice/advise you to take medicine.

   b) He wanted to alter/altar the length of his pants.

   c) Our party candidate will canvas/canvass the constituency next month.

   d) Don't flaunt/flout your possession.

   e) This is a course/coarse woolen cloth.

   f) The special effect/affect they used to create the monster in the movie was laughable.

   g) The Principle/Principal will accept/except the proposal.

   h) His speech was not all together/ altogether bad.

   i) This video contains dual/duel audio.

2. Underline the mistakes and rewrite the passage in correct form.   (5+5=10)

   Who do not want to prosper in life? Proper education is needed to rises in the world. Nobody can not prosper in life without education. For this diligence and sincerity are needed. Diligence is the key to success. One succeed after another makes a man great. We hope that all of you will honest and diligent.

3.   Fill   in   the   gaps   by   completing   the   idioms   and   phrases:
   (5x1=5)

   a) He came to the university at the _____ hour.

   b) They earn a _____ of money.

c) By the _____, how are you?

d) He succeeded by_____ of hard labor.

e) His performance did not come _____ expectation.

4. Make sentences by joining the clauses with coordinating and subordinating conjunctions: (5x1=5)

a) She went to work. She did not want to go.

b) The scientists trained him well. They helped him find a job when his training was through.

c) Polar bears are fierce, territorial animals. Grizzly bears are the same.

d) They made plans to go. They ended up not being able to make it.

e) Some say that dogs are friendlier than cats. Cats can also be extremely loving.

5. Write an essay on any one of the following. (15x1=15)

a) Student Politics should be Banned from the Universities

b) Causes of Road Accidents.

6. Prepare your CV in order to apply for the following circular. (10x1=10)

ABC Construction Company Limited
House 28, Road 12, Dhanmondi R/A, Dhaka- 1207
Email: hracc@gmail.com, Phone: 930946303

Vacancy Announcement

Post: Assistant Civil Engineer
Vacancy: 02

ABC Construction Company Limited, a renowned construction company, is inviting applications from qualified candidates for the post of Assistant civil Engineer.

Educational Requirements:
  • B. Sc. In Civil Engineering from any recognized university
Experience Requirements:
  • 3 years work experience in the related field

Application Procedure:
Please send your detailed CV along with a cover letter, 02 copies of pp size photo and attested copies of experience certificate, all academic certificates and transcripts to Human Resource executive, ABC Construction Company Limited, House 28, Road 12, Dhanmondi R/A, Dhaka-1207.

Application Deadline: March 12, 2020

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

Course Title: Engineering Mechanics II	Credit Hours: 3.0	Course Code: CE 103
Time: 3.0 hours		Full Marks: 100 (10 × 10)

1. An object weighing W lb is resting on a rough plane as shown in **Figure 1**.The plane is inclined at an angle θ with the horizontal. Force Q acts at one corner of the object at an angle α with the inclined plane.

    If the body is at impending state of sliding up the plane,

    Prove that: $Q = \dfrac{W(\sin\theta + f\cos\theta)}{(\cos\alpha + f\sin\alpha)}$, where f is the coefficient of static friction.
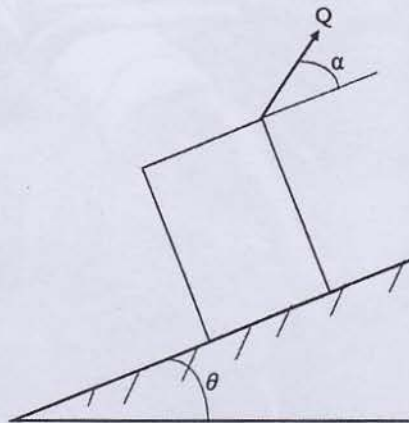

Figure 1

2. A hand-fan is shown in **Figure 2**.

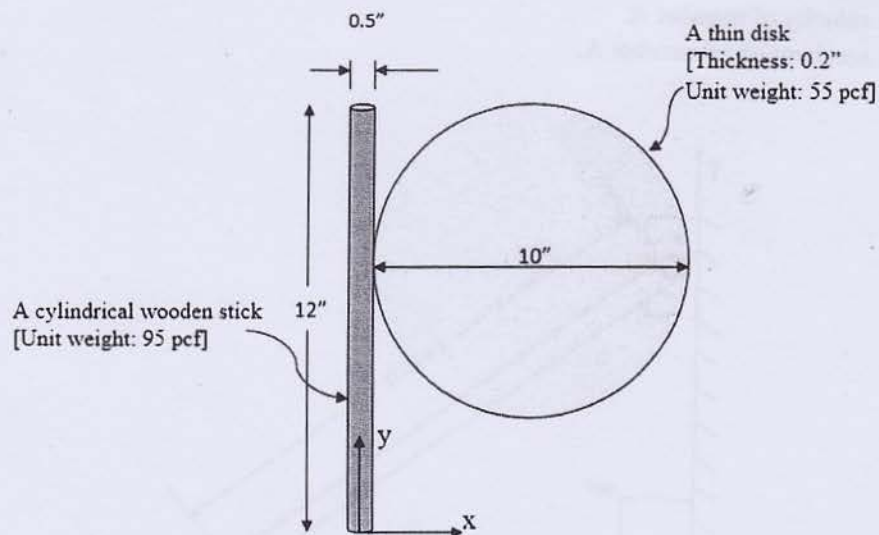   Calculate: The "Radius of Gyration" of the hand-fan with respect to the y-axis.

Figure 2

3. A Tree-Climber (weighing 120 lb) is climbing a 'perfectly vertical' palm tree as shown in *Figure 3*. Weight of the hanging palms is 20 lb.

   If at any instant of climbing, the person is at downward impending state of motion,

   Determine the Normal Reaction (N) and Friction Force (F) at the foot of the Tree-Climber.

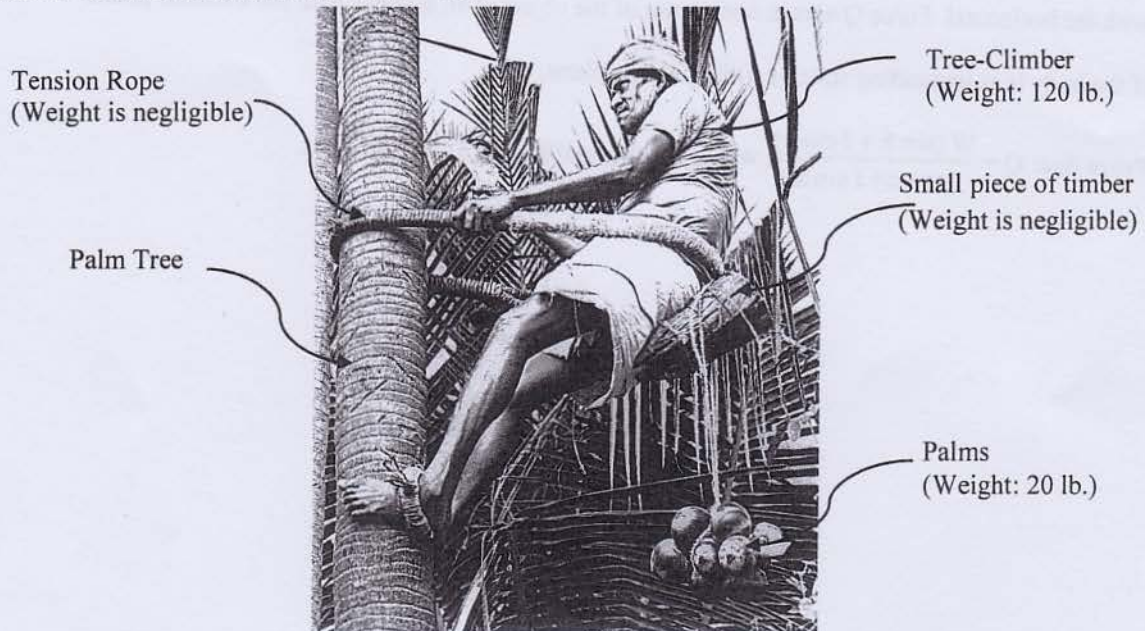   Consider: Coefficient of static friction, $f = 0.98$

Tension Rope
(Weight is negligible)

Palm Tree

Tree-Climber
(Weight: 120 lb.)

Small piece of timber
(Weight is negligible)

Palms
(Weight: 20 lb.)

Figure 3

4. A system is shown in *Figure 4* where two sliding members A and B are connected by a bar (Length, L =10 ft). At any instant when x = 8 ft, the velocity of B is 22 fps towards right and the acceleration of B is -17 fps² towards left.
   At the same instant, determine:
   a. The velocity of member A.
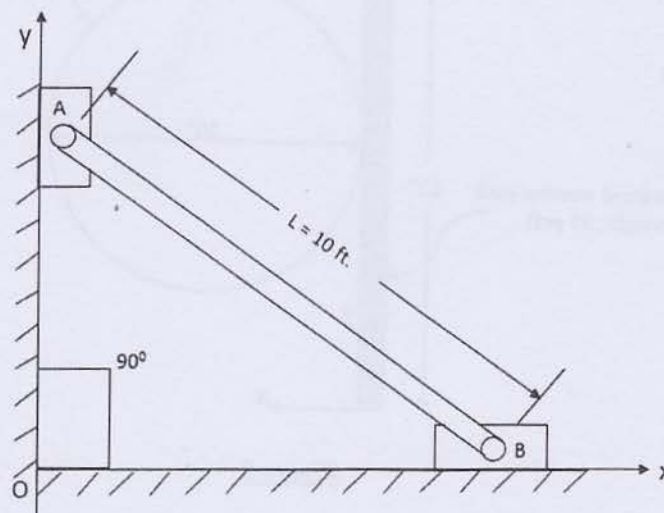   b. The acceleration of member A.

Figure 4

5. A 500 lb body 'A' falls on a spring (whose scale is 5000 lb/in) as shown in **Figure 5**, and compresses it by 6 in (The free length of the spring is 12 in).

Use the Work-Energy Principle to calculate:
   a. the velocity of the body 'A' when the spring regains its full length
   b. the maximum vertical height attained by the body 'A'
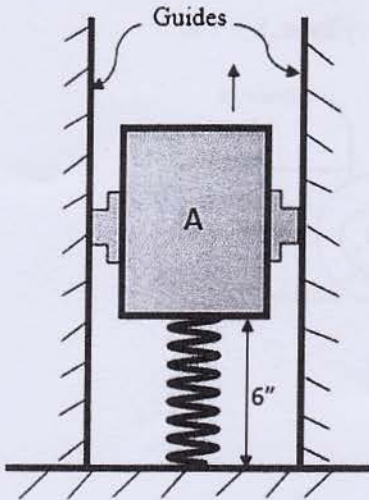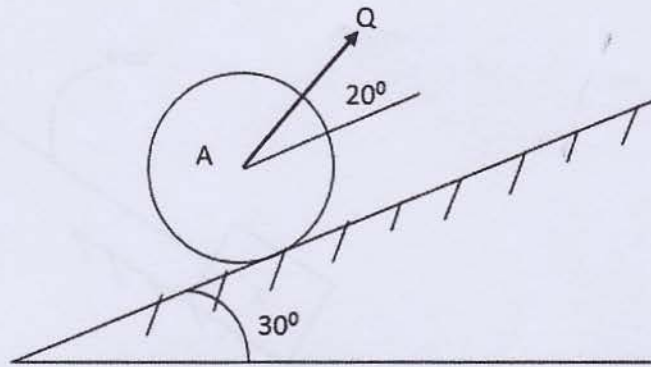Given: The total friction force in the guides is 100 lb.

Figure 5

Figure 6

6. A solid cylinder (Weight = 200 lb, Diameter = 1 ft) is being rolled up an inclined plane ($\theta = 30°$) by a constant force, Q = 200 lb as shown in **Figure 6**. The force Q acts at angle angle of 20° with the inclined plane. Determine the:
   a. Velocity of center of gravity of the cylinder after moving 20 ft from rest.
   b. Frictional force between the plane and the cylinder.
   c. Coefficient of friction necessary for rolling.

7. A fast-moving sphere (weighing 1 lb) hits a surface at V_i = 40 fps and changes its velocity and direction as shown in **Figure 7 (a)**. This collision is presented in a Force-Time graph as shown in **Figure 7(b)**.

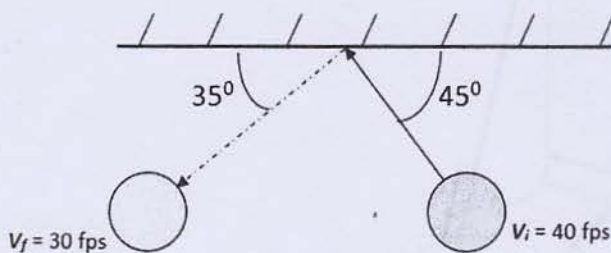Calculate: The Magnitude and Direction of the Impact force, R [Using Impulse-Momentum Principle].
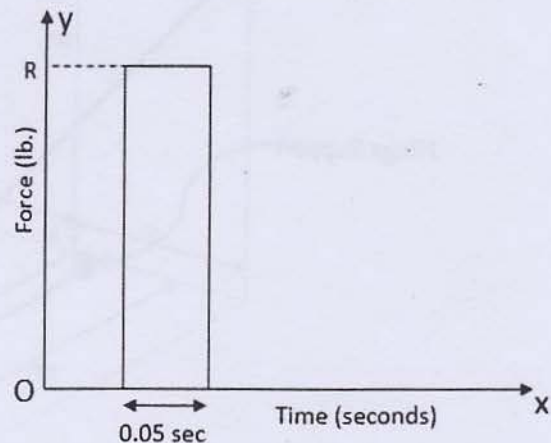

Figure 7 (a)

Figure 7 (b)

8. A system is shown in **Figure 8** where a cord wraps around cylinder B (Weight = 966 lb, Diameter = 4 ft.) and the cord is also connected to A (Weight = 64.4 lb.). The cylinder B wraps up the cord due to a shaft-torque, M = 120 lb-ft. Initially the system was at rest.

   Calculate:
   a. The velocity of A after 5 seconds from the rest.
   b. Tension in the cord

   Given: Coefficient of kinetic friction, f_k = 0.2 and radius of gyration of the cylinder, k = 1 ft.
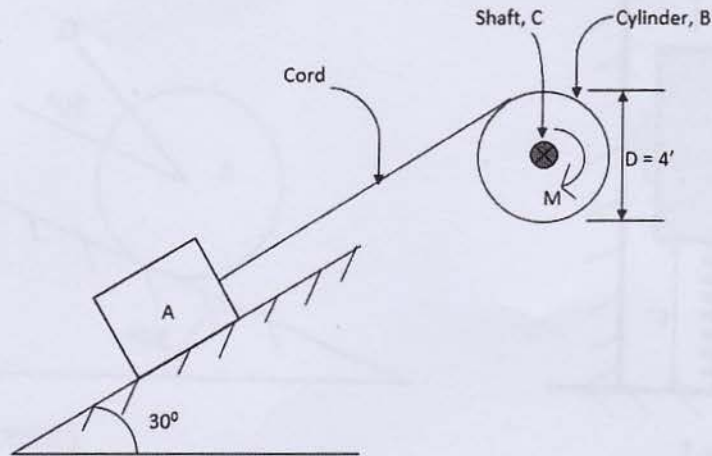

Figure 8

9. Load W = 300 lb is acting at point B of a bar AB.
   Cable BC and Cable BD are connected to point B to support the vertical load.

   Determine:
   a. Tension in cable BC and cable BD.
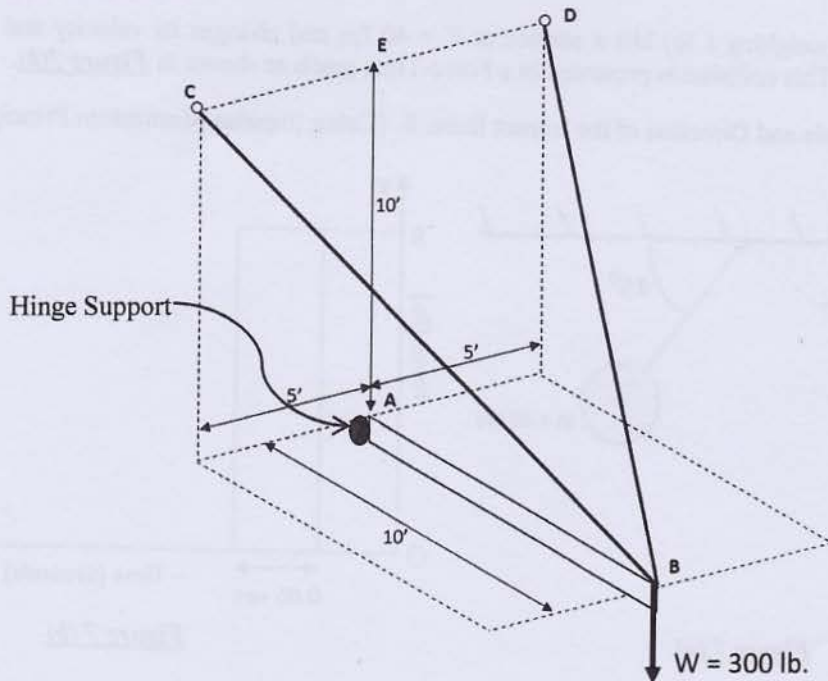   b. Force in the bar AB.

Figure 9

10. A balloon is held by three mooring cables (Cable AD, Cable BD, Cable CD).
The uplift force on the balloon is 800 lb.

Determine: The force in each cable.
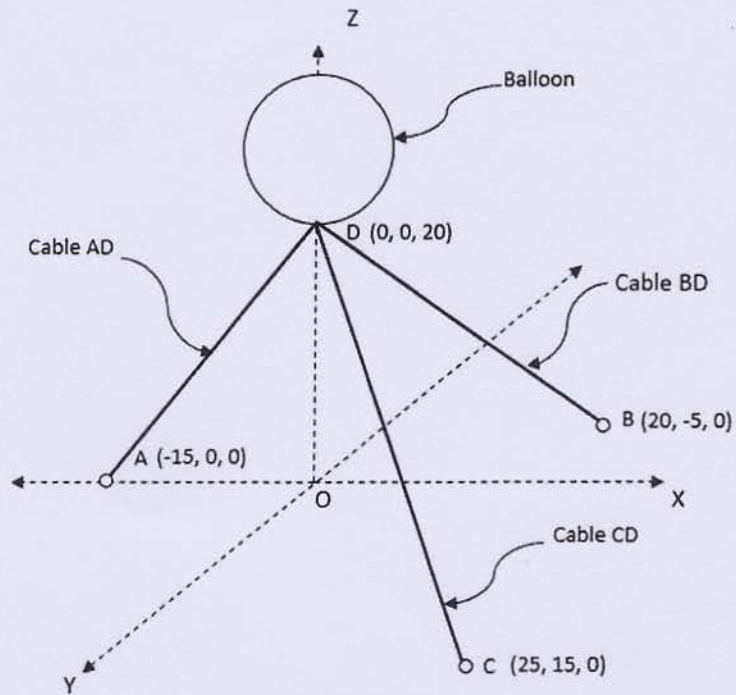Assume that the co-ordinates are expressed in ft.

Figure 10

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

Course Title: Surveying
Time: 3 hours   Credit Hour: 4.00

Course Code: CE 105
Full Marks: 200

[Assume Reasonable Values for Any Missing Data]

Part A

1. What are the differences of Plane and Geodetic survey? What do you understand by reconnaissance? Why do civil engineers need it? — 15

Or

2.(a) A survey line ABC cuts the banks of a river at B and C, and to determine the distance BC, a line BE 60 m long was set out roughly parallel to the river. A point D was then found in CE produced and middle point F of DB determined. EF was then produced to G, making FG equal to EF, and DG produced to cut the survey line in H. GH and HB were found to be 40 and 80 metres long respectively. Find the distance from B to C. — 7.5

(b) A 20 m chain was found to be 5 cm too long after chaining a distance of 2000 m. It was found to be 20 cm too long at the end of day's work after chaining a total distance of 3500 m. Find the true distance if the chain was correct before the commencement of the work. — 7.5

3. A closed traverse was conducted round an obstacle and the following observations were made. Work out the missing quantities. — 10

Side	Length (m)	Azimuth
AB	500	$98^0 30'$
BC	620	$30^0 20'$
CD	468	$298^0 30'$
DE	?	$230^0 0'$
EA	?	$150^0 10'$

4. What is contour? Write 5 characteristics of contours. — 5+10 =15

5. With a neat diagram explain the procedure of Intersection method of Plane Table Surveying. — 15

6. A railway embankment 400 m long is 12m wide at the formation level and has side slope 2 to 1. The ground level at every 100m along the centre line are as under: — 15

Distance	0	100	200	300	400
R.L.	204.8	206.2	207.5	207.2	208.3

7. Two tangents intersect at chainage 59+60, the deflection angle being   15
   $50^0 30$'. Calculate the necessary data for setting out a curve of 15 chains
   radius to connect the two tangents if it is intended to set out the curve by
   offsets from chords. Take peg interval equal to 20 metres (100 links).

8. The following bearings were observed with a compass. Calculate the   15
   interior angles.

Line	Fore Bearing
AB	$60^0 30$'
BC	$122^0 0$'
CD	$46^0 0$'
DE	$205^0 30$'
EA	$300^0 0$'

Part B

9. Write down the main principle of GIS. Differentiate between GIS and   8+7=15
   remote sensing.

10. A land is 1800'x1500' approximately and towards the end of the   15
    longitudinal side, there is a steep slope. At a distance of 1150' from the
    left corner of the land, there is a pond. If you are the surveyor and you
    need to survey the entire land and also overcome the obstacle, what
    method or methods would you undertake and why? Justify your answer.

11. Fill up the following table from an old surveying book and point out any   20
    error if found.

Point	B.S	I.S	F.S	Rise	Fall	R.L	Remarks
1	4.125					X	B.M
2	X		X	1.325		125.005	T.P
3		2.320			0.055		
4		X				125.350	
5	X		2.655				T.P
6	1.620		3.205		2.165		T.P
7		3.625					
8			X			122.590	T.B.M

12. The following give the values of offset taken from a chain line to an   15
    irregular boundary:

    Distance (m) 0   50   100   150   200   250   300   350   400
    Offset (ft) 10.6 15.4 20.2   18.7   16.4   20.8   22.4   19.3   17.6

    Calculate the area in appropriate unit according to Simpson's Rule.

13. A tacheometer was set up at a station M and the following readings were 10 obtained on a staff vertically held.

Inst. Station	Staff Station	Vertical Angle	Hair Readings (m)	Remarks
M	BM	-5°20'	1.12,1.7,2.43	RL of BM = 750.50 m
M	D	+8°12'	0.75,1.4,2.27	

14. What is local attraction and how to eliminate it? The magnetic bearing of 10 a line PQ is S28°30'E. Calculate the true bearing if the declination is 7°30'West.

15. What is photogrammetry? Describe its advantage and limitations. 5

16. Photographs of a certain area were taken from P and Q, two camera 10 stations, 100 m apart. The focal length of the camera is 150 mm. The axis of the camera makes an angle of 70° and 40° with the base line at stations P and Q respectively. The image of a point A appears 20.2 mm to the right and 16.4 mm above the hair lines on the photograph taken at P and 35.2 mm to the left on the photograph taken at Q. Calculate the distance Pa and QA and elevation of point A, if the elevation of the instrument axis at P is 158.56m.

Course Title: Chemistry

Course Code: CHEM 111

Time: 3 Hours

Full Marks: 150

Write your answers neatly and cleanly. Good Luck!

Section: A

There are *FOUR* questions in this section.
Answer any *THREE* questions including *Q-1* and *Q-2*.

1. (a) What is meant by the term "internal energy"? How are internal energies of chemical compounds being changed during a chemical reaction system? [10]
   (b) Why is enthalpy considered as a state function? Explain the effect of temperature on reaction enthalpies using the Kirchhoff's law. [9]
   (c) State and explain the third law of thermodynamics. [6]

2. (a) A chemical equilibrium is dynamic in nature, not static. Explain. [10]
   (b) Illustrate the Law of Mass Action from kinetic considerations and apply it to the equilibrium, $N_2 + 3H_2 \rightleftarrows 2NH_3$. [10]
   (c) How is the above equilibrium affected by temperature and pressure changes? [5]

3. (a) Explain each of the following terms:
   (i) Instantaneous reaction rate   (ii) Molecularity [6]
   (b) Derive the integrated rate law equation of a first order reaction. How is half-life related to the first order reaction kinetics? [10]
   (c) What is meant by a reaction mechanism? How would you determine the rate of a complex reaction? [9]

OR

4. (a) Define the following terms:
   (i) Heterogeneous catalysis   (ii) Turnover number   (iii) Activation energy [9]
   (b) Name the methods that are being utilized to determine the order of a chemical reaction. Describe one of those methods in detail. [11]
   (c) A first order reaction, $X \rightarrow$ products, has a rate of reaction of 0.00250 M s^{-1} when [X] = 0.484 M.   (i) What is the rate constant, k, for this reaction?
   (ii) Does $t_{3/4}$ depend on the initial concentration? [5]

There are *FOUR* questions in this section.
Answer any *THREE* questions including Q-5 and Q-6.

5. (a) Name the properties of water that allow it to creep up or flow in tubes.
    Explain each of those properties. [9]
   (b) Describe the type of bonding in H_2O according to the valence bond theory.
    Assume that the molecular geometry is the same as given by the VSEPR model. [10]
   (c) Which ion from each of the following pairs would you expect to be more
    heavily hydrated?   (i) K^+, Ca^{2+} (ii) Cu^{2+}, Cu^+ [6]

6. (a) What is meant by environmental degradation? Predict and identify the pollutants
    that are adversely affecting the environmental quality (air, water, soil, and food)
    in and around Dhaka city. [13]
   (b) Describe two major global environmental problems that are affecting us
    more or less in recent years. [12]

7. (a) How is a true solution differed from a colloidal solution ? [6]
   (b) Describe the processes that are being involved in the formation of solution of
    an ionic compound. [14]
   (c) Assuming the CO_2 partial pressure in air above a lake at sea level is
    4.0×10^{-4} atm, what is the equilibrium concentration of CO_2 in the lake at $25^{\circ}C$?
    (Henry's law constant is 32 L. atm / mole) [5]

OR

8. (a) What are the colligative properties? Why are they so called? [6]
   (b) What is meant by reverse osmosis? State the law of osmotic pressure.
    How can this law be employed to determine the molecular weight of an
    unknown substance? Explain. [11]
   (c) A solution is prepared by mixing 1.0 gram of benzene (C_6H_6) in 100 g of water to
    create a solution total volume of 100 mL. Calculate the molarity, mass percent,
    mole fraction, and molality of benzene in the solution. [8]

1. An object weighing W lb is resting on a rough plane as shown in ***Figure 1***.The plane is inclined at an angle θ with the horizontal. Force Q acts at one corner of the object at an angle α with the inclined plane.

    If the body is at impending state of sliding up the plane,

    Prove that: $Q = \dfrac{W(\sin\theta + f\cos\theta)}{(\cos\alpha + f\sin\alpha)}$, where f is the coefficient of static friction.
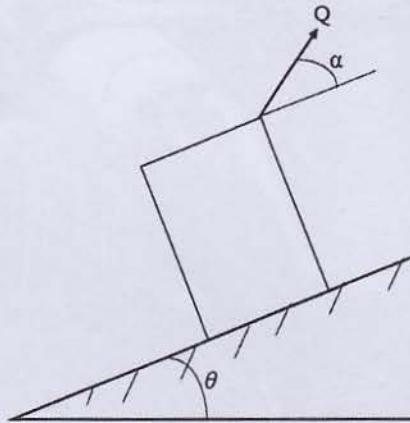

Figure 1

2. A hand-fan is shown in ***Figure 2***.

    Calculate: The "Radius of Gyration" of the hand-fan with respect to the y-axis.

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3. A Tree-Climber (weighing 120 lb) is climbing a 'perfectly vertical' palm tree as shown in *Figure 3*. Weight of the hanging palms is 20 lb.

If at any instant of climbing, the person is at downward impending state of motion,

Determine the Normal Reaction (N) and Friction Force (F) at the foot of the Tree-Climber.

Consider: Coefficient of static friction, f = 0.98

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(Weight is negligible)

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(Weight: 120 lb.)

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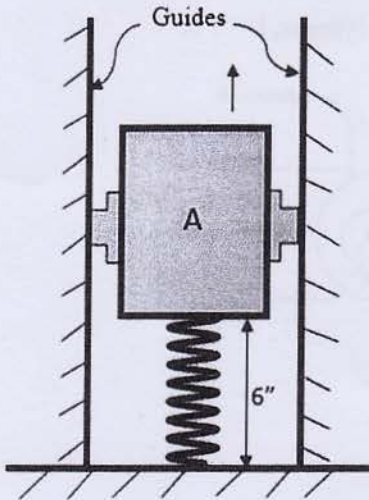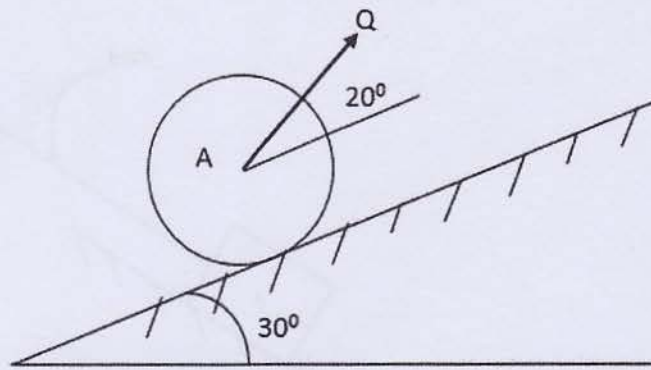Given: The total friction force in the guides is 100 lb.

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a. Velocity of center of gravity of the cylinder after moving 20 ft from rest.
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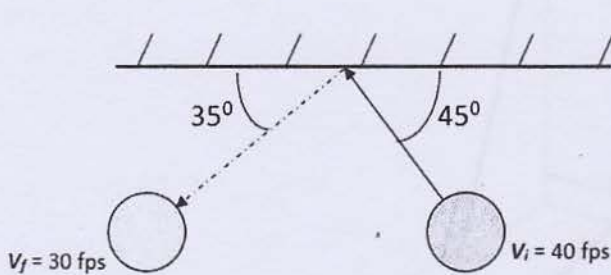Calculate: The Magnitude and Direction of the Impact force, R [Using Impulse-Momentum Principle].
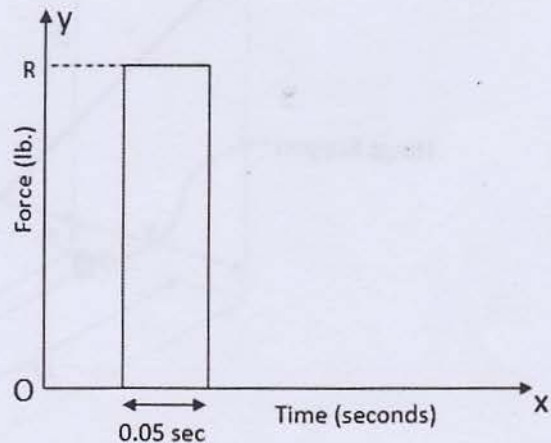

Figure 7 (a)

Figure 7 (b)

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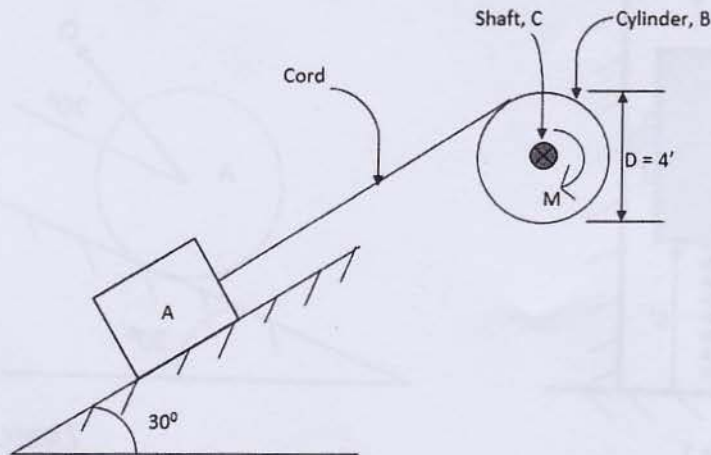

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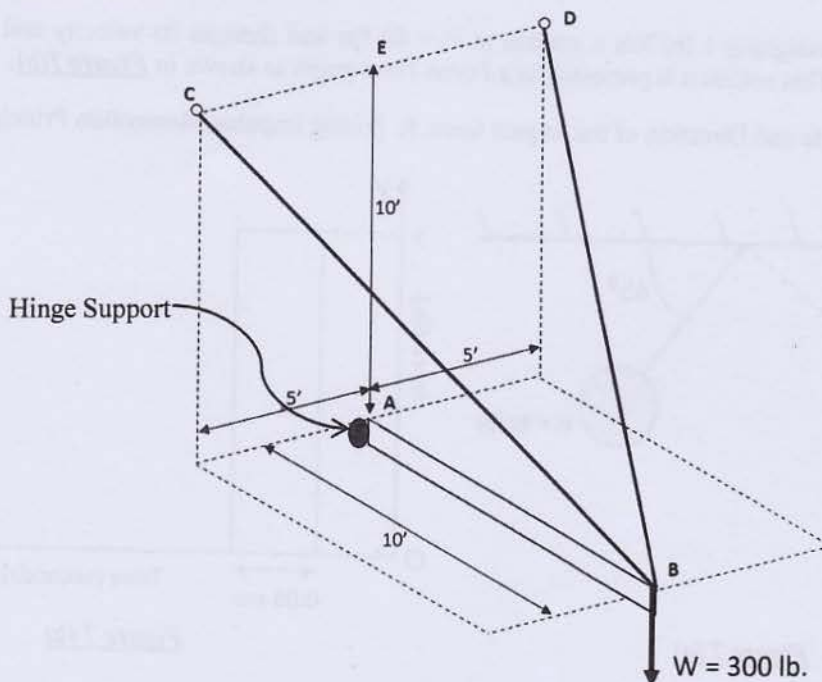   b. Force in the bar AB.

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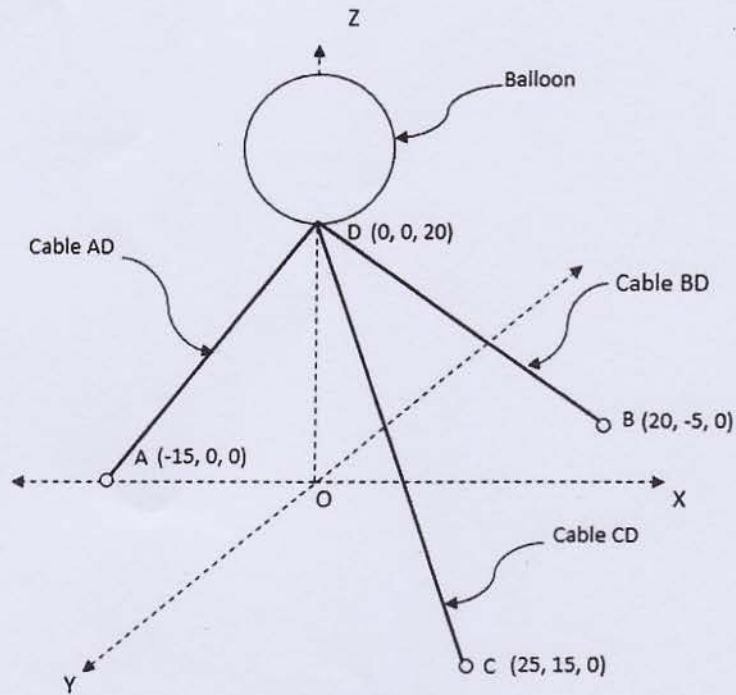Assume that the co-ordinates are expressed in ft.

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