1-2

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

Course Title: English Language II | Credit: 3 .00
Time: 3.00 Hours | Full Mark: 50

---

1. Read the passage carefully and answer the following questions:

Years ago, a cigarette commercial asked if you were smoking more, but enjoying it less. That describes the way many of us live today. We are doing more, but enjoying it less. And when that doesn't work, we compound the problem. In our frantic search for satisfaction, we try stuffing still more into our days, never realizing that we are taking the wrong approach.

The truth is simple; so simple it is hard to believe. Satisfaction lies with less, not with more. Yet we pursue the myth that this thing, or that activity, will somehow provide the satisfaction we so desperately seek.

Arthur Lindman, in his devastating book, "The Harried Leisure Class," describes the futility of pursuing more. His research focused on what people did with their leisure time. He found that as income rose, people bought more things to occupy their leisure time. But ironically, the more things they bought, the less they valued any one of them. Carried to an extreme, he predicted massive boredom in the midst of tremendous variety. That was more than twenty years ago, and his prediction seems more accurate every year.

Lindman of course, is not the first to discover this. The writer of Ecclesiastes expressed the same thought thousands of years ago. It is better, he wrote, to have less, but enjoy it more. If you would like to enjoy life more, I challenge you to experiment with me. How could you simplify your life? What could you drop? What could you do without? What could you stop pursuing? What few things could you concentrate on? The more I learn the more I realize that fullness of life does not depend on things. The more I give up, the more I seem to gain. But words will never convince you. You must try it for yourself.

A. Choose the correct answer. 3x1=3

a. Lindman wrote his book
i) ten years ago
ii) twenty years ago
iii) more than twenty years ago

b. We can make our life happier if we

i) get rid of useless things

ii) buy more things

iii) sell things we do not need

c. Arthur Lindman wrote

i) a novel

ii) The Harried Leisure Class

iii) Ecclesistes

B. Answer the following questions using your own words: 2x1=2

a. When do people normally start buying more things?

b. How can we lead a simple life?

2. Fill in the blanks with appropriate modal verbs. 8x1=8

i) _____ we (leave) now?

ii) I _____ (not /hear) the sound of my cell phone as I was away.

iii) You _____ (not/fill) in the form today.

iv) I don't believe it. It _____ (not/ be) true.

v) Sarah _____ (get) to work by 8:00.

vi) She _____ (not/leave) electric cables hanging down.

vii) He is old enough, so he _____ (go) to work.

viii) _____ you (pass) me the butter please?

3. UAP has decided to organize an Inter Departmental Debate Competition at the end of the final exams. Write a memorandum to this effect. 1x5=5

4. Write a review on a movie that you have watched/enjoyed recently. (120 words) 1x7=7

5. Write a story based on the prompt given. (100-150 words) 1x7=7

A man was watching TV in the living room of his house. Suddenly he got a phone call…

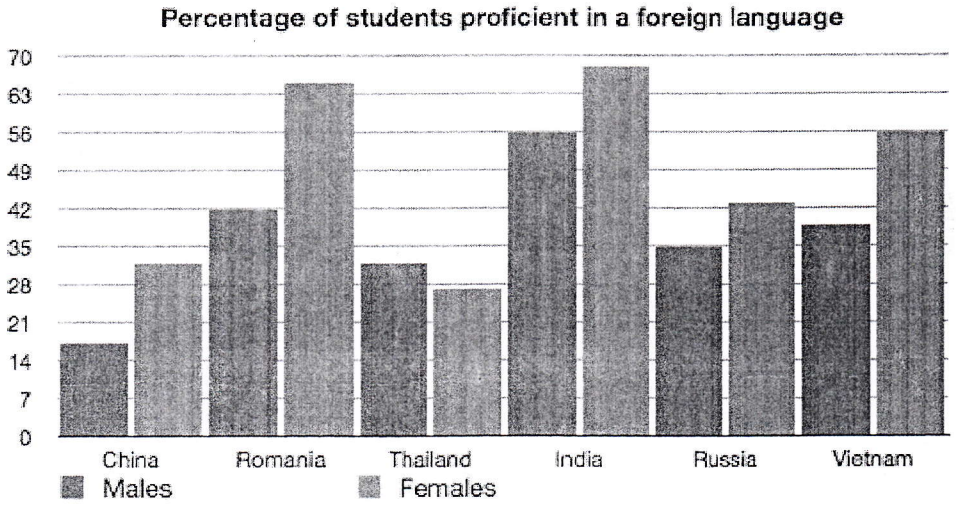
6. Write an essay on any **one (1)** of the following topics (word limit 200-250) 1x8=8

i) Your Dream House

ii) Population Problem in Bangladesh: causes and effects

7. Describe the following picture. 1x5=5

8. The bar chart below shows the percentage of students' proficiency in a foreign language. Summarize the information by selecting and reporting the main features, and make comparisons where relevant. 1x5=5



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

Course Title: Chemistry | Course Code: CHEM 111
Time: 3.00 Hours | Full Marks: 150

There are **SEVEN** questions in this manuscript. Answer any **FIVE.**

1. (a) State *Le Châtelier's principle.* What happens to equilibrium when a reactant or product is added or removed? 8
(b) Define reaction quotient and describe the significance of reaction quotient. 6
(c) Write equilibrium constant expressions for *Kc* and for *KP*, if applicable, for these processes 6
(i) $2NaHCO_3(s) \rightleftharpoons Na_2CO_3(s) + CO_2(g) + H_2O(g)$
(ii) $2CaSO_4 \rightleftharpoons 2CaO(s) + 2SO_2(g) + O_2(g)$
(iii) $2NO_2(g) + 7H_2(g) \rightleftharpoons 2NH_3(g) + 4H_2O(l)$
(iv) $2ZnS(s) + 3O_2 \rightleftharpoons 2ZnO(s) + 2SO_2(g)$
(v) $C(s) + CO_2(g) \rightleftharpoons 2CO(g)$
(vi) $C_6H_5COOH(aq) \rightleftharpoons C_6H_5COO^-(aq) + H^+(aq)$
(d) The Reaction $CO(g) + H_2O(g) \rightleftharpoons CO_2(g) + H_2(g)$ is used to increase the ratio of hydrogen in synthesis gas (mixtures of CO and H_2). Suppose you start with 1.00 mol each of carbon monoxide and water in a 50.0-L vessel. How many moles of each substance are in equilibrium mixture at 1000°C? The equilibrium constant *Kc* at this temperature is 0.58. 10

2. (a) Describe and construct a Fuel Cell. 10
(b) How pH of a solution can be measured by using cell potential? 10
(c) What is the cell potential of the following voltaic cell at 25°C?
$Zn(s)|\ Zn^{2+}(1.00 \times 10^{-5}\ M)\ ||\ Cu^{2+}(0.100\ M)\ |Cu(s)$, the standard cell potential of this cell is 1.1 V. 10

3. (a) Explain the rate of a chemical reaction. 4
(b) Consider the reaction $4NO_2(g) + O_2(g) \longrightarrow 2N_2O_5(g)$. Suppose that, at a particular moment during the reaction, molecular oxygen is reacting at the rate of 0.037 M/s. (i) At what rate is $2N_2O_5$ being formed? (ii) At what rate is NO_2 reacting. 8
(c) What do you mean by rate law and order of the reaction? 6
(d) Iodide ion is oxidized in acidic solution to triiodide ion, I_3^-, by hydrogen peroxide.
$H_2O_2(aq) + 3I^-(aq) + 2H^+(aq) \longrightarrow I_3^-(aq) + 2H_2O(l)$
A series of four experiments was run at different concentrations, and the initial rates of,I_3^- formation were determined (see below). (i) From these data, obtain the reaction orders with respect to H_2O_2, I^-, and H^+. (ii)Then find the rate constant. 12

	Initial Concentrations (mol/L)			Initial Rate
	H_2O_2	I-	H+	[mol/ (L.s)]
Exp. 1	0.010	0.010	0.00050	1.15×10^{-6}
Exp. 2	0.020	0.010	0.00050	2.30×10^{-6}
Exp. 3	0.010	0.020	0.00050	2.30×10^{-6}
Exp. 4	0.010	0.010	0.00100	1.15×10^{-6}

4. (a) Derive the second order rate law equation and draw the linear form of that equation with labeling. 10
(b) Show that half life of a zero order reaction is proportional to the initial concentration of the reactant. 8
(c) Iodine atoms combine to form molecular iodine in the gas phase:

$$I(g) + I(g) \longrightarrow I_2(g)$$ 12

This reaction follows second-order kinetics and has the high rate constant 7.0 3 109/*M*/s at 23°C. (i) If the initial concentration of I was 0.068 *M*, calculate the concentration after 3.5 min. (ii) Calculate the half-life of the reaction if the initial concentration of I is 0.53 *M* and if it is 0.39 *M*.

5. (a) Explain enthalpy of a reaction with graphical representation. 6
(b) Explain thermochemical Equation with example. 6
(c) When 2 mol H_2 (g) and 1 mol O_2 (g) react to give liquid water, 572 kJ of heat evolves.

$$2H_2 (g) + O_2 (g) \longrightarrow 2H_2O (l); \Delta H = -572 \text{ kJ}$$

Write this equation for 1 mol of liquid water. Give the reverse equation, in which 1 mol of liquid water dissociates into hydrogen and oxygen. 6
(d)What is the enthalpy of reaction, ΔH, for the formation of tungsten carbide, WC, from the elements? (Tungsten carbide is very hard and is used to make cutting tools and rock drills.)

$$W(s) + C \text{ (graphite)} \longrightarrow WC(s)$$

The enthalpy change for this reaction is difficult to measure directly, because the reaction occurs at 1400°C. However, the heats of combustion of the elements and of tungsten carbide can be measured easily:

$2W(s) + 3O_2(g) \longrightarrow 2WO_3(s)$; $\Delta H = -1685.8$ kJ ------- (i)
C (graphite) + $O_2(g) \longrightarrow CO_2(g)$; $\Delta H = -393.5$ kJ--------- (ii)
$2WC(s) + 5O_2(g) \longrightarrow 2WO_3(s) + 2CO_2(g)$; $\Delta H = -2391.8$ kJ------- (iii) 12

6. (a) Define and classify solution. 6
(b) State and explain the Henry's law. 6
(c) What are Colligative properties? Explain boiling point elevation properties. 6
(d) Camphor is a white solid that melts at 179.5"C. It has been used to determine the molecular masses of organic compounds because of its unusually large freezing-point-depression constant (40"C/*m*), which allows ordinary thermometers to be used. The organic substance is dissolved in melted camphor, and then the melting point of the solution is determined. (i) 1.07-mg sample of a compound was dissolved in 78.1 mg of camphor. The solution melted at 176.0"C. What is the molecular mass of the compound? (ii). If the empirical formula of the compound is CH, what is the molecular formula? 12

7. (a) The formula for low-molecular-mass starch is $(C_6H_{10}O_5)_n$, where *n* averages 200. When 0.798 g of starch is dissolved in 100.0 mL of water solution, what is the osmotic pressure, in mmHg, at 25 °C? 10
(b) State and explain Hess's law of heat summation. 10
(c) Calculate the standard cell potential of the following voltaic cell at 25°C using standard electrode potential and write the cell reaction.

$$Al(s)|Al^{3+} || Fe^{2+}(aq)| Fe(s).$$

Given that, $Al^{3+}(aq) + 3e \longrightarrow Al(s)$; $E^0_{Al} = -1.66$ V

$Fe^{2+}(aq) + 2e \longrightarrow Fe(s)$; $E^0_{Fe} = -0.41$ 10

University of Asia Pacific
Department of Basic Sciences & Humanities
Final Examination Fall-2015
Program: B.Sc. Engineering (Civil)

Course Title: Mathematics II | Course Code: MTH 103 | Course credit: 3.00
Time: 3.00 Hours. | Full Marks: 150

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

1. **(a)** Find the equation of the line through $(1, -1, 2)$ at right angles to **13**

$$\frac{x}{1} = \frac{y}{1} = \frac{z}{2} \text{ and } \frac{x+7}{2} = \frac{y-8}{-1} = \frac{z-3}{1}$$

(b) Remove the first degree term from the equation **12**

$$3x^2 - 4y^2 + 6x + 24y - 135 = 0$$

2. **(a)** Find the symmetric form of the straight line **13**

$$4x + 4y - 5z - 12 = 0 = 8x + 12y - 13z - 32$$

(b) Show that the plane $2x - 2y + z + 16 = 0$ touches the sphere **12**

$$x^2 + y^2 + z^2 + 2x - 4y + 2z - 3 = 0$$

3. **(a)** If the position vectors of the points A, B & C are the vectors $4\hat{\imath} + 5\hat{\jmath} + \hat{k}$, $2\hat{\imath} + 4\hat{\jmath} - \hat{k}$ *and* $3\hat{\imath} + 6\hat{\jmath} - 3\hat{k}$, prove that the triangle ABC is an isosceles right angle triangle. Also find the area of the triangle. **13**

(b) Find the sine of the angle between the vectors $2\hat{\imath} + \hat{\jmath} + \hat{k}$ *and* $\hat{\imath} - \hat{\jmath} + 2\hat{k}$. Also find the unit vector perpendicular to each of the vectors. **12**

4. **(a)** Find the perpendicular distance of the point $(7, 6, 7)$ from the line **15**

$$\frac{x-2}{2} = \frac{y-1}{3} = \frac{z-3}{6}$$

(b) Define scalar product and triple product. Find the volume of the parallelepiped whose edges are represented by $5\hat{\imath} + 7\hat{\jmath} + \hat{k}$, $\hat{\imath} - 3\hat{\jmath} - \hat{k}$ *and* $\hat{\imath} - 2\hat{\jmath} - 9\hat{k}$. **10**

5. **(a)** Find the unit tangent vector to any point on the curve $x = t^2 + 1, y = 4t - 3, t = 2t^2 - 6t$ at the point where $t = 2$. **10**

(b) If $\varphi(x, y, z) = xy^2z$ and $\vec{A} = xz\hat{\imath} - xy^2\hat{\jmath} + yz^2\hat{k}$, find $\frac{\partial^3}{\partial^2 x \partial z}(\varphi\vec{A})$ at the point $(2, -1, 1)$. **10**

(c) If $\vec{A} = t^2\hat{\imath} - t\hat{\jmath} + (2t + 1)\hat{k}$ *and* $\vec{B} = (2t - 3)\hat{\imath} - \hat{\jmath} - t\hat{k}$, find $\frac{d}{dt}|\vec{A} + \vec{B}|$ at $t = 1$. **5**

6. **(a)** Given $\varphi = 2x^3y^2z^4$. Find $\vec{\nabla}.(\vec{\nabla}\varphi)$ at the point $(1, -1, -1)$ **10**

(b) Find gradient of φ, where $\varphi = \frac{1}{|\vec{r}|}$ and $\vec{r} = x\hat{\imath} + y\hat{\jmath} + z\hat{k}$. **10**

(c) Prove that, $curlgrad\varphi = 0$, where φ is any scalar function. **5**

7. **(a)** Evaluate $\iint_S \vec{A} \cdot \hat{n}\, ds$, where $\vec{A} = z\hat{\imath} + x\hat{\jmath} - 3y^2z\hat{k}$ and S is the surface of the cylinder $x^2 + y^2 = 16$ included in the first octant between $z = 0$ and $z = 5$. **15**

(b) If $\vec{R}(u) = (u - u^2)\hat{\imath} + 2\sin(u)\,\hat{\jmath} - e^{-u}\hat{k}$, find $\int \vec{R}(u)\, du$ from $u = 0$ to $u = 1$. **10**

8. **(a)** Using Divergence theorem evaluate $\oiint_S \vec{F} \cdot \hat{n}\, ds$ where $\vec{F} = 4xz\hat{\imath} - y^2\hat{\jmath} + yz\hat{k}$ and S is the surface of the cube bounded by $x = 0$, $x = 1$; $y = 0, y = 1$ *and* $z = 0$, $z = 1$. **13**

(b) If $\vec{A} = 3xy\hat{\imath} - y^2\hat{\jmath}$, evaluate $\int_C \vec{A} \cdot d\vec{r}$, where C is the curve in the *xy plane* $y = 2x^2$ from $(-1, 3)$ to $(2, 2)$. **12**

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

Course Title: Engineering Mechanics II
Time: 3 hours

Course Code: CE 103(A)
Full Marks: 100 (= 10 × 10)

Answer **any 4** from the **6** questions of **Part A** and **any 6** from the **8** questions of **Part B.**
Assume reasonable values for missing data only, if any.

Part A

1. Determine the mass moment of inertia of the cylinder about its centroidal axis **(Figure 1)** and express the result in terms of total mass 'm' of the cylinder. The material has a constant density ρ.

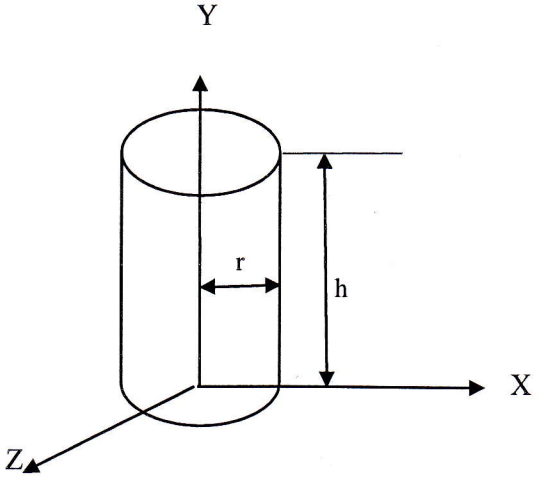


Figure 1

2. A steel link has a 3 inch diameter hole. Allowing for the hole, compute the mass moment of inertia and radius of gyration of the link about axis A-A as shown in **Figure 2.**

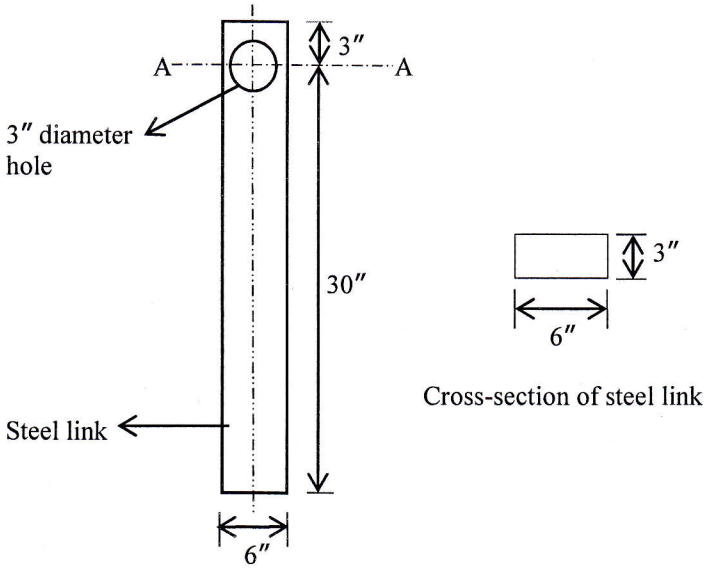


Figure 2

3. Determine the magnitude and direction of actual friction force acting on the 1200 N block as shown in **Figure 3**, if (i) P=800 N and (ii) P=300 N. The coefficients of static and kinetic friction are 0.25 and 0.20 respectively. The force P makes an angle of 50° with the horizontal as shown in Fig. 3.

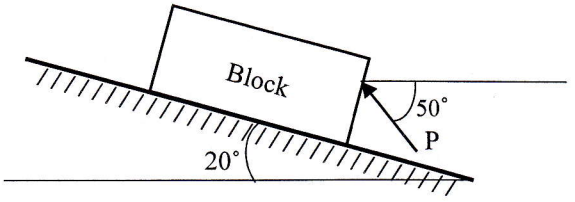


Figure 3

4. Determine the smallest horizontal force P **(Figure 4)** required to lift the 200 lb crate. Coefficient of friction at all contacting surfaces = 0.2. Neglect the weight of the wedge.

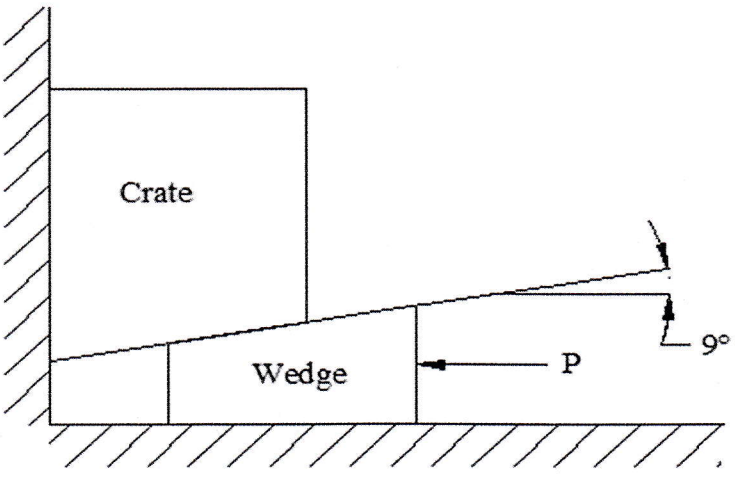


Figure 4

5. Determine the minimum load W in the system that can be lifted by an upward force of 100 N.

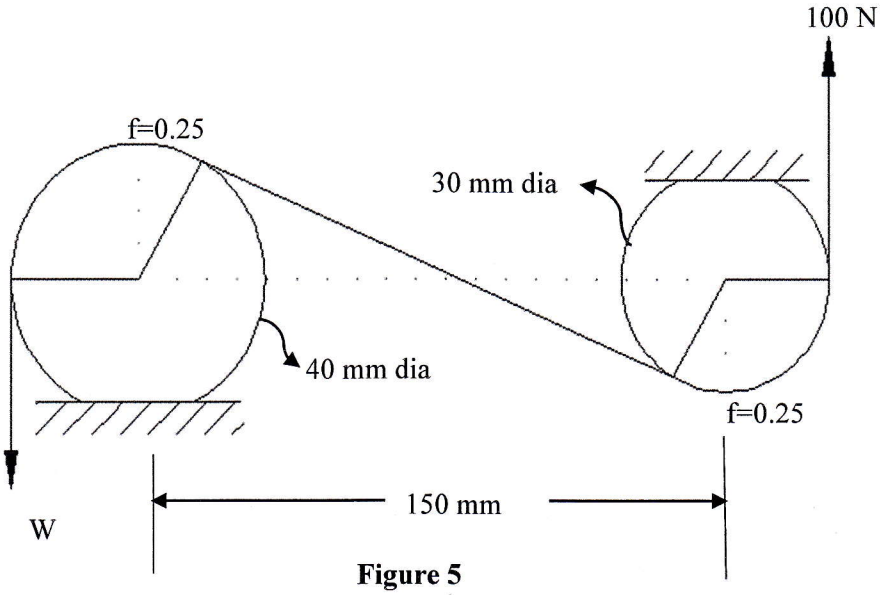


Figure 5

6. Two cables AC and BC terminate on a pole and exert forces in a horizontal plane x′y′ at C as shown in **Figure 6**. The tension in the cable AC and BC are 6000 lb and 5000 lb respectively. The guy cable makes an angle of 50° with the pole. Calculate the tension in the cable CD and force in the pole CE.

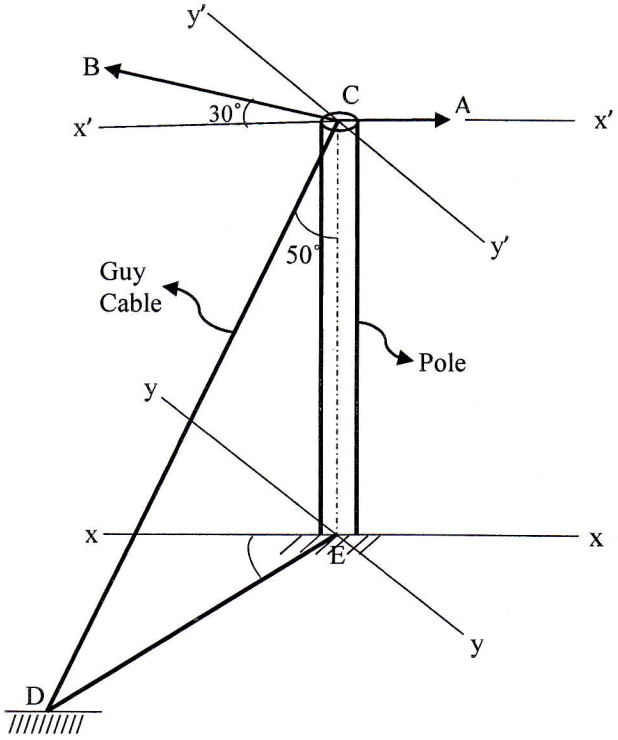


Figure 6

Part B

7. The dragster starts from rest and has an acceleration described by the graph. Determine the time t′ for it to stop. Also, what is its maximum speed? Construct v-t and s-t graphs for the time interval $0 \leq t \leq t'$.

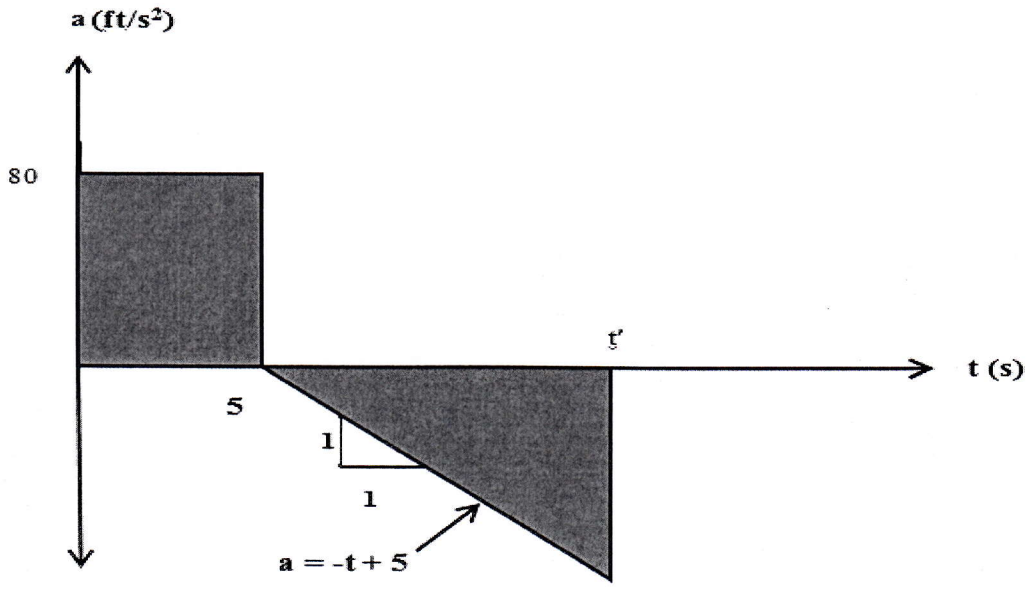


Figure 7

8. When a rocket reaches an altitude of 40m it begins to travel along the parabolic path $(y-40)^2 = 160x$, where the coordinates are measured in meters. If the component of velocity in the vertical direction is constant at $v_y = 180$ m/s, determine the magnitudes of the rocket's velocity and acceleration when it reaches an altitude of 80m.

9. At the instant shown, cars A and B are travelling at speeds of 55 mi/hr and 40 mi/hr respectively. If B is increasing its speed by 1200 mi/hr^2, while A maintains a constant speed, determine the velocity and acceleration of B with respect to A. Car B moves along a curve having a radius of curvature of 0.5 mi.

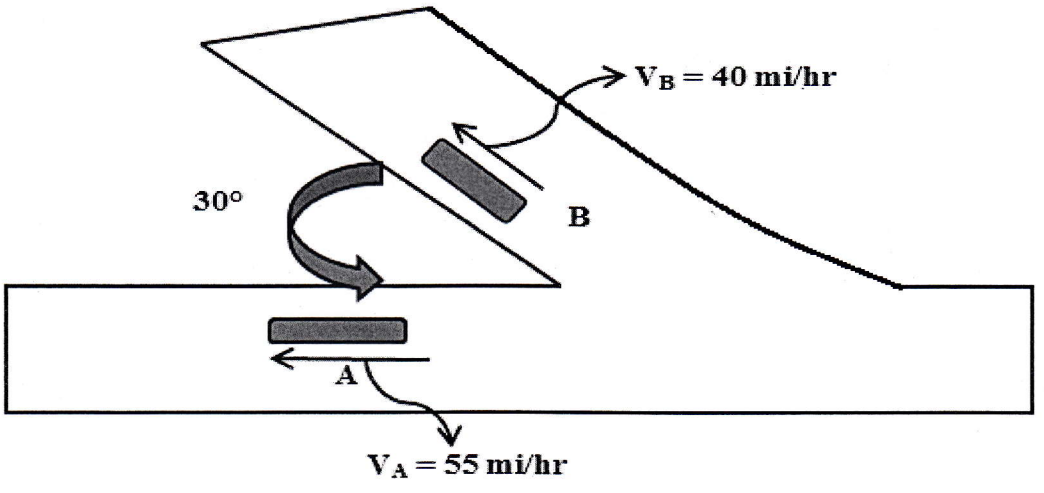


Figure 8

10. The spring in the toy gun has an unstretched length of 100 mm. It is compressed and locked in the position shown in the **Figure 9**. When the trigger is pulled, the spring unstretches 12.5 mm and the 20 gm ball moves along the barrel. Determine the speed of the ball when it leaves the gun. Neglect friction.

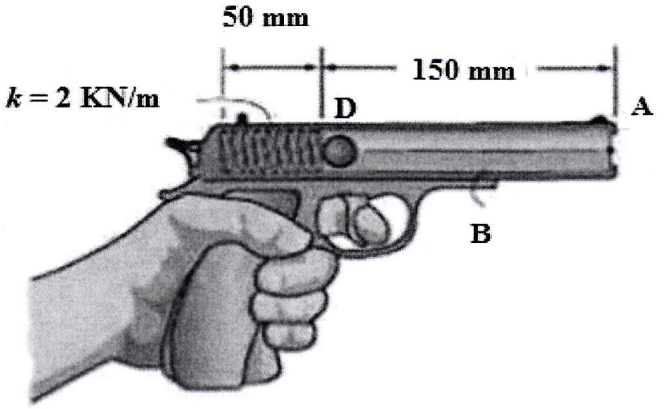


Figure 9

11. If the 10-lb block, shown in **Figure 10**, passes point A on the smooth track with a speed of v_a= 10 ft/s determine the normal reaction of the block when it reaches point B.

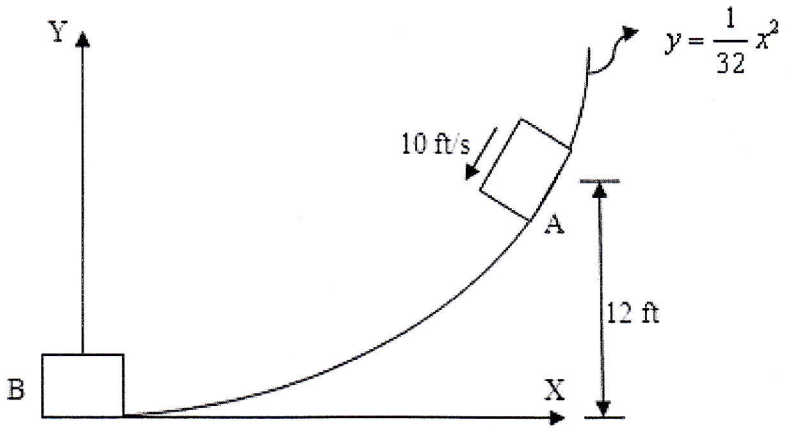


Figure 10

12. The ram shown in **Figure 11** has a mass of 120 kg and is released from rest 0.75m from the top of a spring, A, that has a stiffness k_A = 12 kN/m. If a second spring B, having a stiffness k_B = 15 kN/m, is "nested" in, determine the maximum displacement of A needed to stop the downward motion of ram. The unstretched length of each spring is indicated in the figure. Neglect mass of the springs.

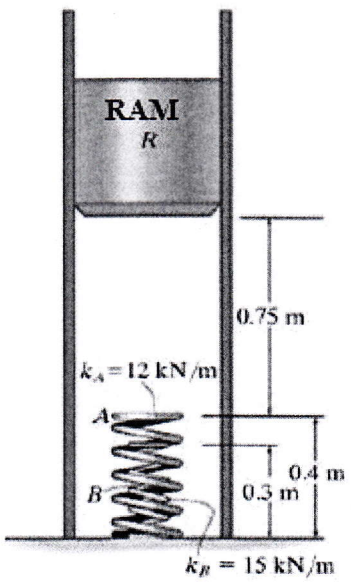


Figure 11

13. The bag A, having a weight of 8 lb, is released from rest at the position $\theta=0°$, as shown in the figure. After falling to $\theta = 90°$, it strikes an 18 lb box B. If the coefficient of restitution between the bag and box is $e = 0.5$, determine the velocities of the bag and box just after the impact.

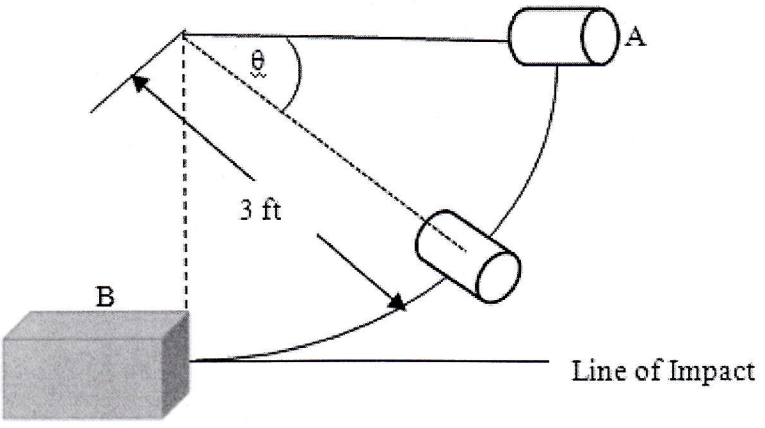


Figure 12

14. Two smooth disks A and B, having a mass of 1 kg and 2 kg, respectively, collide with each other with the velocities shown in **Figure 13**. If the coefficient of restitution for the disks is $e = 0.75$ then, determine the x and y components of the final velocities of both disks just after the collision.

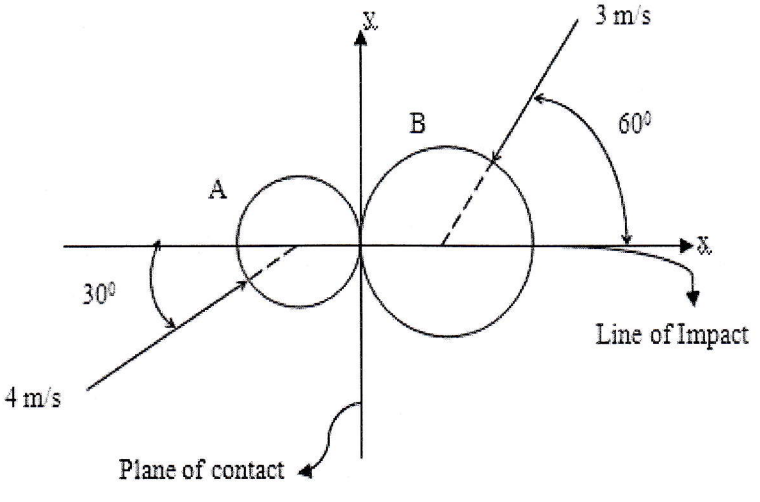


Figure 13

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

Course Title: Engineering Mechanics II | Course Code: CE 103(B)
Time: 3 hours | Full Marks: 100 (= 10 × 10)

Answer **any 4** from the **6** questions of **Part A** and **any 6** from the **8** questions of **Part B.**
Assume reasonable values for missing data only, if any.

Part A

1. Determine the force in each cable to support the 100 lb crate as shown in **Figure 1**.

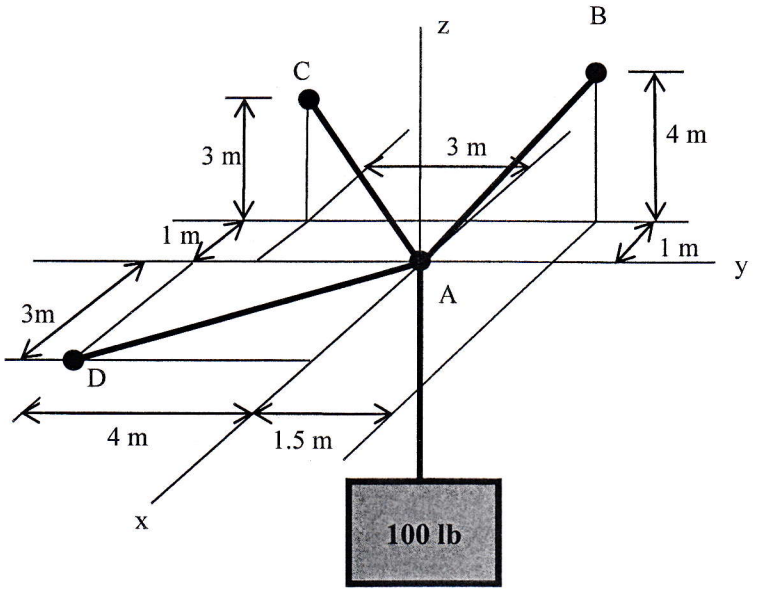


Figure 1

2. Derive the expression for the mass moment of inertia of the cone about Y axis shown in **Figure 2**.

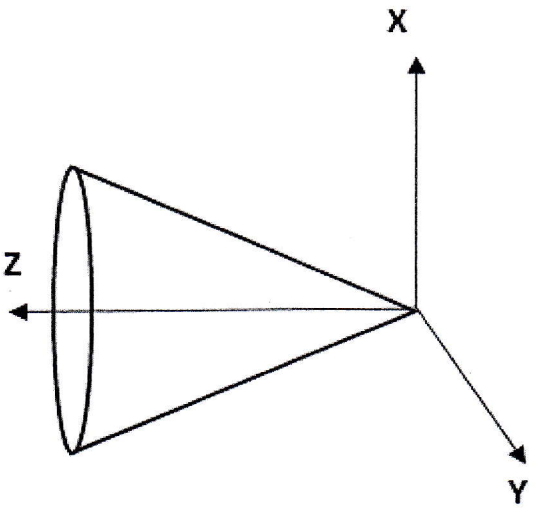
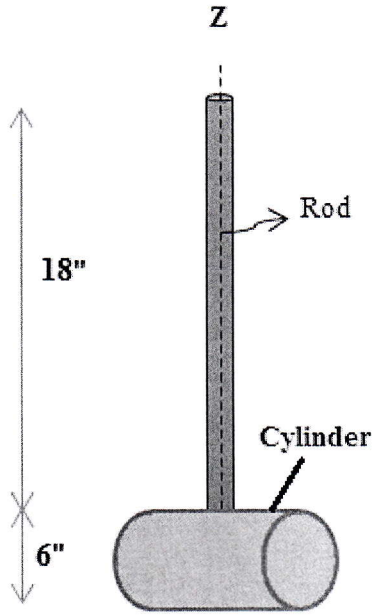


Figure 2

3. Determine the mass moment of inertia of the following **Figure 3** about the vertical axis Z.



Unit weight of Rod = 490 lb/ft^3
Unit weight of Cylinder = 490 lb/ft^3
Rod Dia = 2"

s

Figure 3

4. If wedge A in **Figure 4** is weightless, what load W_B may be raised by a force 3000 lb? Coefficient of friction for all slipping surface = 0.25.

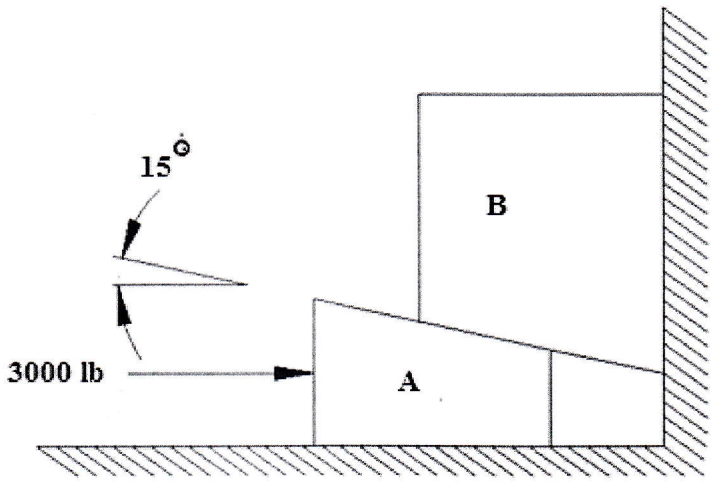


Figure 4

5. Block A weighing 300 lb rests over the block B which weighs 900 lb. Coefficient of friction for all contact surfaces is 0.3. What is the value of the force P that will cause the block B to have impending motion towards right?

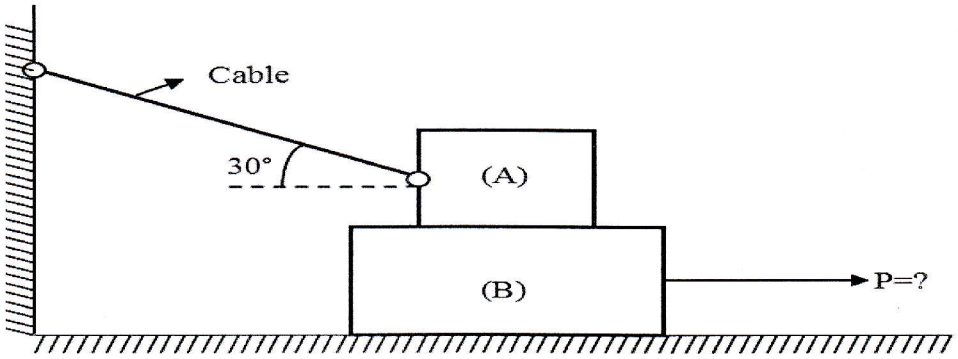


Figure 5

6. The maximum tension that can be developed in the cord shown in **Figure 6** is 1000 N. If the pulley at A is free to rotate and the coefficient of static friction at the fixed drums B and C is $\mu_s = 0.3$, determine the largest mass of the cylinder that can be lifted by the card.

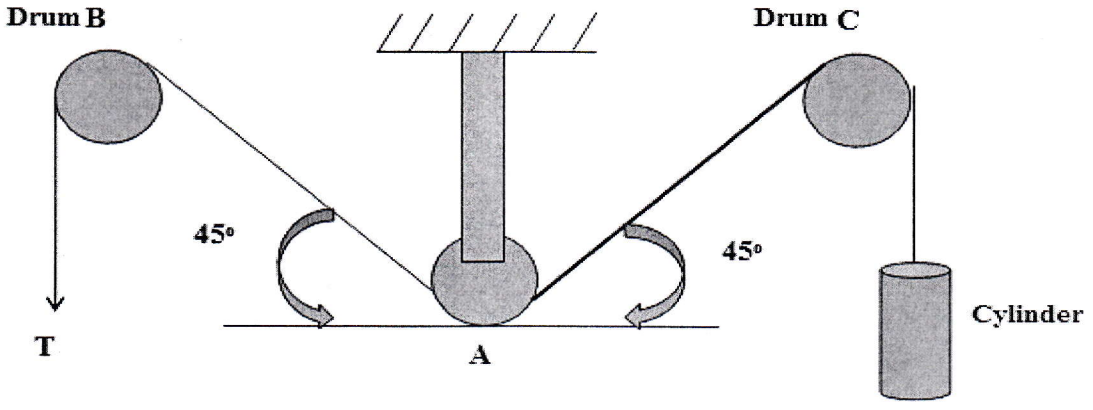


Figure 6

Part B

7. A skier in Fig. 7 leaves the ramp A at an angle $\Theta_A = 25°$ with the horizontal. If he strikes the ground at B, determine the initial speed v_A and the speed v_B at which he strikes the ground.

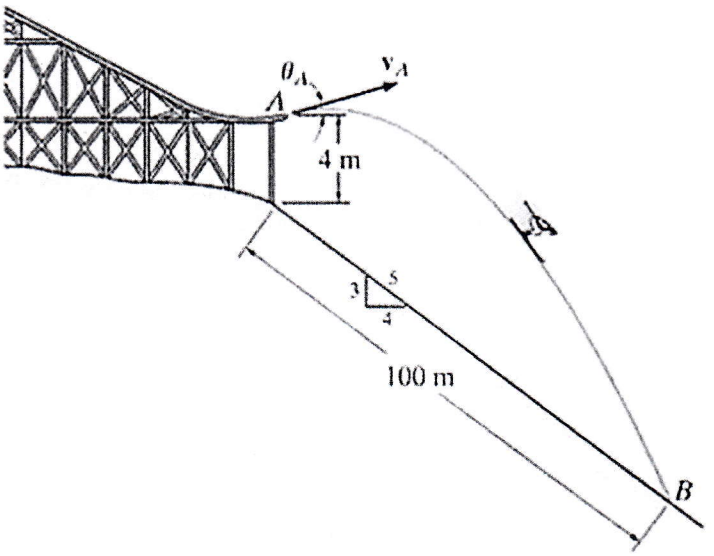


Figure 7

8. A smooth collar weighing 2 lb, as shown in Fig. 8, is attached to a spring that has an unstretched length of 2 ft and a stiffness of K=100 lb/ft. If the collar is given an initial velocity of 20 ft/s when it is at Position 1, calculate its velocity when it moves to Position 2.

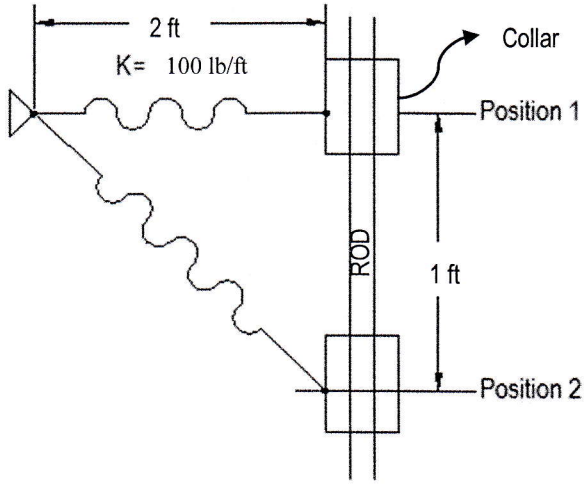


Figure 8

9. At the instant shown in Fig. 9 cars A and B are traveling with speeds of 19 m/s and 10 m/s, respectively. Also, at this instant, both A & B have deceleration of $1 m/s^2$ and $2 m/s^2$ respectively. Determine the velocity and acceleration of B with respect to A.

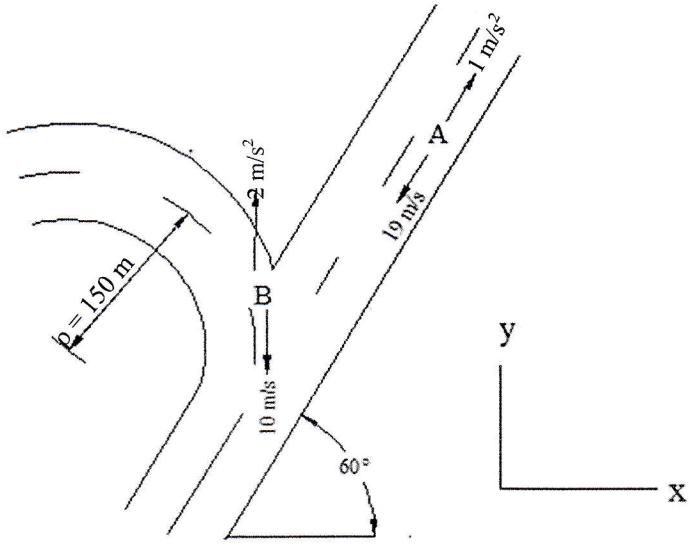


Figure 9

10. The v-s graph for a go-cart travelling on a straight road is shown in Fig. 10. Draw the a-s graph and determine the acceleration of go-cart at s=50 m and s=150 m.

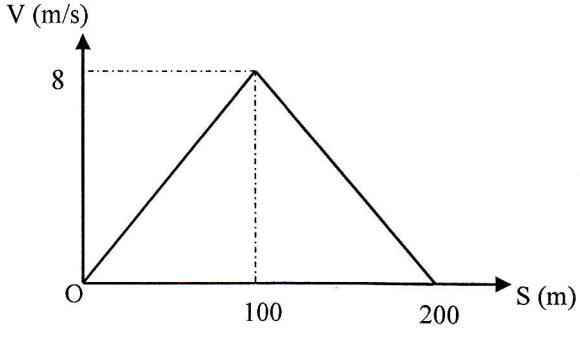


Figure 10

11. A 10 lb block is suspended by a long cord. The block is at rest when a 0.05 lb bullet travelling horizontally to the left strikes the block and is embedded in it. The impact causes the block to swing upward 0.50 ft measured vertically from its lowest position. Determine:
    (i) velocity of bullet just before it strikes the block, and
    (ii) loss of kinetic energy of system during the impact.

12. Two identical balls 'B' and 'C' (Fig. 11) are at rest when ball 'B' is struck by a ball 'A' of the same mass moving with a velocity of 6 m/s. This causes a series of collisions between various balls. Knowing e=0.50, determine the velocity of each ball just after the collisions have taken place.

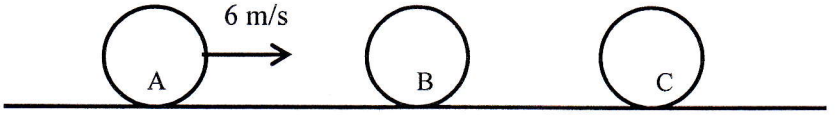


Figure 11

13. A 100 N block is released from rest on an inclined plane (Fig. 12) which is making an angle 30° to the horizontal. The block starts from A, slides down a distance of 1.5 m and strikes a spring with stiffness of 10 KN/m. The coefficient of friction between the inclined plane and the block is 0.2. Determine:
    (i) maximum deformation of the spring in bringing the block to the rest position.
    (ii) distance the block will rebound up the plane from the compressed position.

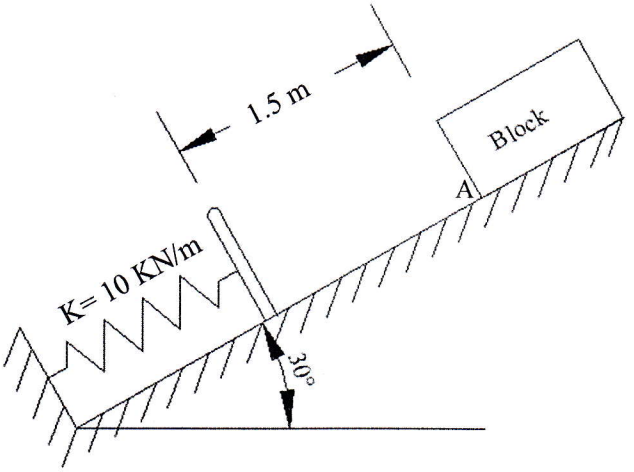
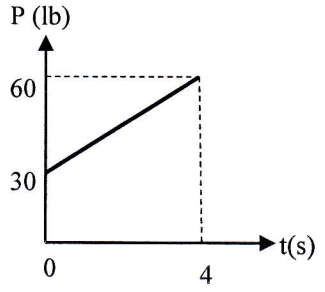


Figure 12

14. The 50 lb crate shown in Fig. 13 is acted upon by a force P described in the graph below. Determine the crate's velocity 4 s after P has been applied. The initial velocity is 6 ft/s down the plane and the coefficient of kinetic friction between the crate and the plane is f_k=0.3.



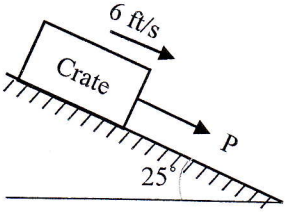


Figure 13.

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

Course Title: Surveying | Course Code: CE 105 (A)
Time: 3 Hours | Full Marks: 120

Section- A: Answer any 3 (Three) out of 4 (Four) Questions (3x20=60)

1. (a) Define:
i) Zenith and Nadir, ii) Latitude, iii) Longitude, iv) Altitude v) Solastices (05)

(b) What are the 'Zones of Earth'? Write down the properties of a spherical triangle. (05)

(c) Calculate the shortest distance between Dhaka and Hong Kong, given that the latitude of Dhaka and Hong Kong are 23°7′ and 22°27′ and their longitudes are 90°3′ and 114°17′. (08)

(d) What is *equation of time*? What are the different systems used for measuring time? (02)

2. (a) Find the G.M.T corresponding to the following L.M.T. (08)
i) $10^h\ 25^m\ 22^s$ A.M. at a place in longitude 65°30′ E
ii) $8^h\ 27^m\ 38^s$ P.M. at a place in longitude 30°30′ W

(b) Define *degree of curvature*. Write down the names of linear methods of setting out a curve. (04)

(c) Determine the offsets to be set out at 1 chain interval along the tangents to locate a curve by using i) radial offsets, ii) perpendicular offsets, and iii) approximation method. R = 20 chain. (1 *chain* = 30 m) (Hint: calculate up to 5 intervals) (08)

3. (a) Define *photogrammetry*. Classify photogrammetry. (02)

(b) Define '*Crab*' and '*Drift*'. What are the data required to compute a flight plan? (05)

(c) The scale of an aerial photograph is 1 cm= 1000 m. The photograph size is 25 cm x 25 cm. Longitudinal lap is 60% and the side lap is 20%. Determine the number of photographs required to cover an area of (10)
i) 400 sq. km.
ii) 30 km x 30 km

(d) A camera having *f= 25 cm* is used to take a vertical photograph of an area having elevation of 1600 m. What is the height from *m.s.l.* at which an air-craft must fly to get a scale of 1: 6000? (03)

4. (a) What are different methods used for measuring distances between two given points? (02)

(b) Explain different properties of electromagnetic wave with figure. (04)

(c) What is *remote sensing*? Classify remote sensing based on energy and observation (04)

platform.

(d) What are the different stages of remote sensing system? (07)

(e) Define *GIS*? Write down about applications of GIS. (03)

Section- B: Answer all the questions

1. (a) The length of a survey line was measured with a 20 m chain and was found to be 1200 m. As a check, the length was again measured with a 30 m chain and was found to be 1212 m. If the 20 m chain was found to be 1 decimeter too long, find the actual length of the 30 m chain. (07)

(b) The volume of an excavation was computed from the measurements taken by a 20 m chain and found to be 58,75,000 m^3. On the close of the work, it was detected that chain used was 5 cm too long, whereas it was correct at the commencement of the work. Calculate the correct volume of the excavation. (03)

(c) The following staff readings were taken successively using a dumpy level, the instrument having been moved after third, sixth and eighth readings: (10)

2.228, 1.606, 0.988, 2.090, 2.864, 1.262, 0.602, 1.982, 1.044, 2.684

Enter the above readings in a page of a level book and calculate the R.L. of the points if the first reading was taken with a staff held on a bench mark of 432.384 m. Use the line of collimation method and apply necessary checks.

2. (a) A coastal embankment at a constant reduced level of 10 m is to be constructed. The width of the formation level is 6 m and the side slope of the embankment is 2 horizontal to 1 vertical. The transverse ground is leveled. The following are the levels of the ground surface (G.S.) along the alignment at 50 m interval: (20)

Chainage (m):	0	50	100	150	200	250	300	350
G.S. (m):	5.8	5.6	5.4	5.0	4.8	5.2	5.7	5.8

Calculate the amount of earthwork necessary to construct the embankment using both Trapezoidal Rule and Prismoidal Rule.

3. (a) The following offsets in meters were taken from a chain line to a curved boundary line at an interval of 15 m: (10)

0, 2.65, 3.80, 3.70, 4.65, 3.60, 4.95, 5.85

Compute the area enclosed between the chain line, the curved boundary line and the end offsets, by:
(a) Average Ordinate rule
(b) Trapezoidal rule
(c) Simpson's rule.

(b) For the following traverse, compute the length CD so that A, D and E may be in one straight line. (10)

Line	Length in meters	Bearing
AB	110	83°12′
BC	165	30°42′
CD	-	346°6′
DE	212	16°18′