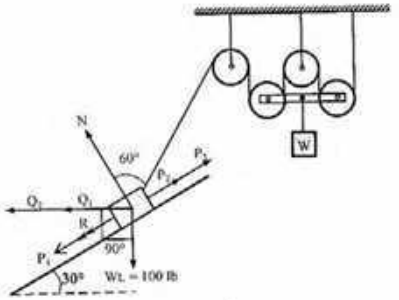
Section A

The University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination Spring 2011

Course No: CE 101 | Course Title: Engineering Mechanics I
Full Marks: 30 | Time: 1 hr

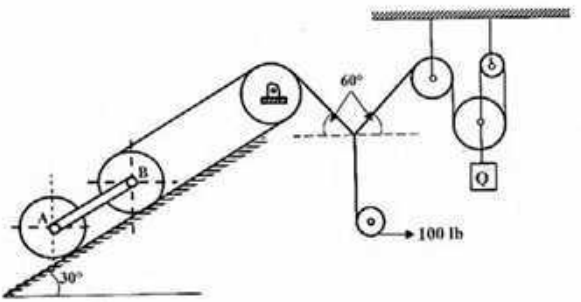
There are FOUR questions. Answer any **THREE**.
Each question carries equal number.

1. In the following concurrent force system, the resultant of all the forces is acting parallel to the plane in upward direction. Calculate the value of W and P_1.

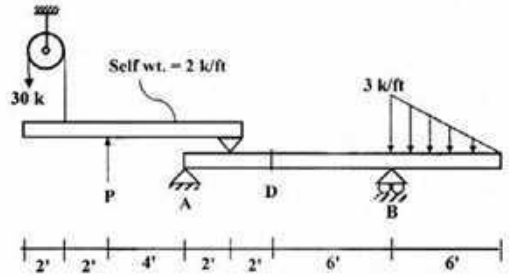


$P_2 = 25$ lb
$P_1 = 30$ lb
$Q_1 = 45$ lb
$Q_2 = 30$ lb
$R = 40$ lb
$N = 36.6$ lb

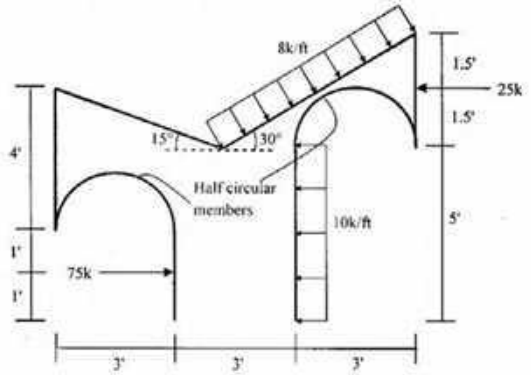
2. In the following system, Weight of sphere A and B are 100 lb and 150 lb. Calculate the magnitude of Q.



3. In the beam system shown below, calculate the force **P** and reactions at supports **A, B** to keep the system in equilibrium. Also calculate the axial force, shear force and bending moment at **D**.



4. For the force system shown below calculate the magnitude, direction and location of resultant R.



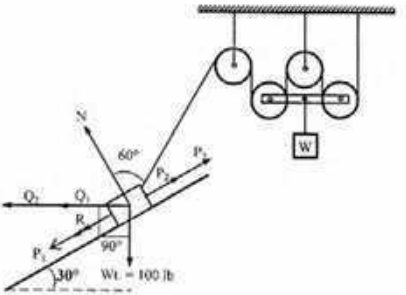
Section B

The University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination Spring 2011

Course No: CE 101 | Course Title: Engineering Mechanics I
Full Marks: 30 | Time: 1 hr

There are FOUR questions. Answer any **THREE**.
Each question carries equal number.

1. In the following concurrent force system, the resultant of all the forces is acting parallel to the plane in upward direction. Calculate the value of W and P_1.



$P_2 = 25$ lb
$P_3 = 30$ lb
$Q_1 = 45$ lb
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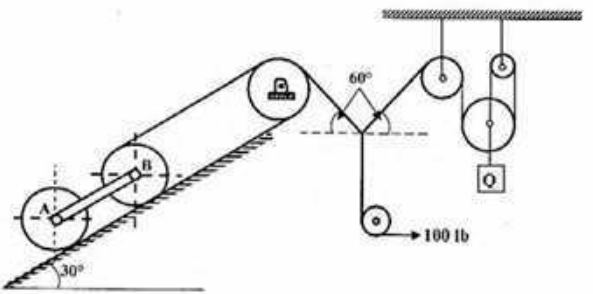
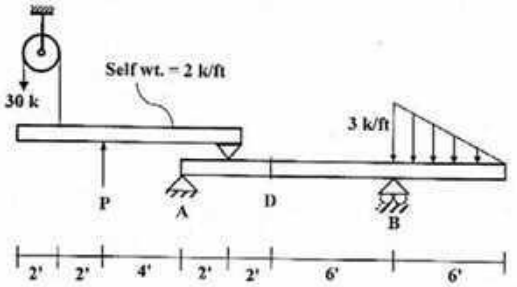
$N = 36.6$ lb

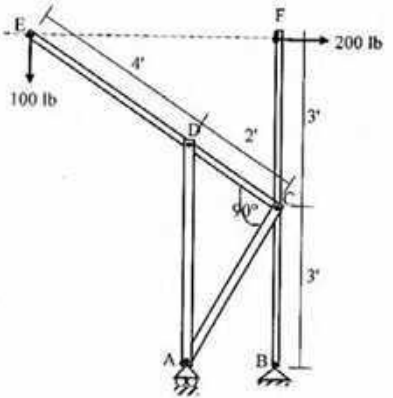
2. In the following system, Weight of sphere A and B are 100 lb and 150 lb. Calculate the magnitude of Q.



3. In the beam system shown below, calculate the force **P** and reactions at supports **A, B** to keep the system in equilibrium. Also calculate the axial force, shear force and bending moment at **D**.



4. Calculate reaction at support A & B, force in member AD and pin reaction at C.



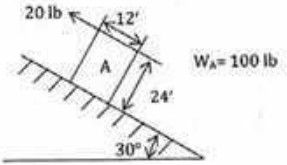
The University of Asia Pacific
Department of Civil Engineering
Mid Term Examination, Spring 2011
Program: B.Sc. Engineering (Civil)

Course Title: Engineering Mechanics II Credit: 3.00 Course Code: CE 103
Time:1.0 hours Full Marks: 40 (=4x10)

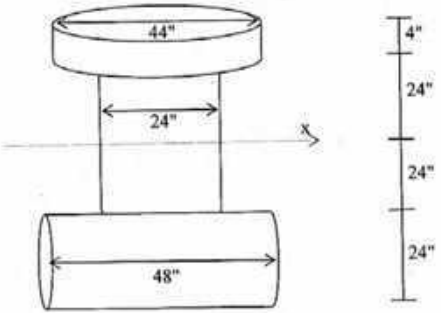
[Answer **any 4 (four)** of the following **5 (five)** Questions.]

1. Derive an expression for mass moment of inertia of a right circular homogeneous cone about an axis through its apex. Also determine the radius of gyration about a parallel gravity axis. **(10)**

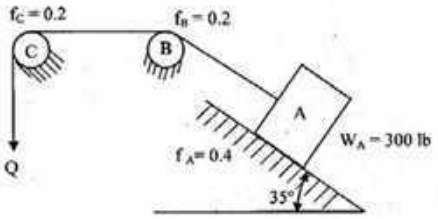
2. In the following figure, the force **20 lb** acting parallel to the plane. Determine the range of coefficient of friction when motion will impend? **(10)**



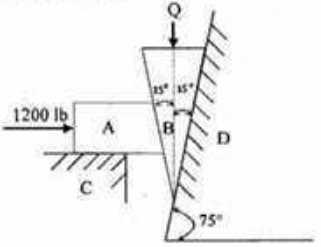
3. Three homogeneous cylindrical objects are arranged like the figure below. Determine the mass moment of inertia about x-axis when density of the material is 480 #/ft^3. **(10)**



4. For the figure shown below, what is the value of Q, when the block A will impend to slide upward? **(10)**



5. As shown in the figure below, a resistance of 1200 lb is exerted on the block A, which in turn presses against the wedge B. Neglect the weight of blocks A and B and assume that f = ¼ for all surfaces. What force Q will cause the wedge B to be in impending motion downward? **(10)**



The University of Asia Pacific
Department of Civil Engineering
Mid-Term Examination Spring' 2011

Course No: CE 105 — Course Title: Surveying
Full Marks: 60 — Time: 1 hour

Answer any 3 out of 4 questions:

1. The TBM of a location in the site is 58.5m AOD. A leveling job was conducted by placing the tilting level in 4 locations. (20)
The readings taken for different setups are:
Setup 1: 1.5, 2.2, 4.3, 2.2; Setup 2: 2.8, 5.5, 6.1, 1.5; Setup 3: 6.8, 3.0
Determine the TBM at the last point of the location using HPC method.

2. A base line was measured in catenary in four lengths giving 28.26, 25.973, 31.066 and 23.536 m. The differences of level were respectively 0.33, 0.58, 0.38 and 0.47 m. The temperature during observation was 7° C and the tension applied 18 kgf. The tape was standardized as 30 m, at 20° C, on the flat with a tension of 5 kg. The coefficient of expansion was 0.000 011 per ° C, the weight of the tape 1 kg, the cross-sectional area 3 mm^2 , E = 210 × 103 N/mm^2, gravitational acceleration g = 9.81 m/s^2 . Calculate the length of the base. (20)

3. Using the preliminary azimuths and lengths from Table 1 compute departures and latitudes, linear misclosure, and relative precision. Balance the departures and latitudes using the compass rule. (20)
Table 1:

Station	Preliminary Azimuths (deg-min-sec)	Length (ft)
A		
	126-55-17	647.25
B		
	178-18-58	203.03
C		
	015-31-54	720.35
D		
	284-35-20	610.24
E		
	206-09-42	285.13
A		

4. (a) Station A and station B have elevations of 265.69 ft and 311.48 ft respectively. Their corresponding instrument heights are 5 ft and 5.5 ft. AB = 133.47 ft, A = 40-35-11 (deg-min-sec), B = 31-28-29, v1 = 7-14-21 and v2 = 4-8-12. What is the elevation of the chimney stack? (8)
(b) Coordinates of the corner points of a polygon are A (8.34, 591.78), B (517.44, 202.94), C (523.41, 11.27), D (716.29, 694.02) and E (125.72, 847.71). Calculate the area of the polygon. (12)

Formula:

$$AI_A = \frac{AB\sin(B)}{\sin[180° - (A + B)]} = \frac{AB\sin(B)}{\sin(A + B)}$$

$$I_AP = AI_A\tan(v_1)$$

$$C_t = KL\Delta t$$

$$C_T = L \times \frac{\Delta T}{AE}$$

$$C_s = \frac{W^2L}{24T^2}$$

$$C_h = \frac{h^2}{2L}$$

The University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination Spring 2011
Program: B. Sc. Engineering (Civil)

Course Title : Engineering Materials | Course Code: CE 201
Time: One Hour | Full Marks: 60

Answer any THREE questions (3 x 20 = 60) including Question No. 1.
Question No. 1 is compulsory. The figures in the right margin indicate the marks of the questions.

1. For construction of the new campus of UAP, the required FM of sand is 2.6. For this project, a sand sample was collected and tested in the Concrete Lab of UAP. The sieve analysis data of the sand sample are summarized below: 20

ASTM Sieve	Material Retained (g)
3 inch	0
1.5 inch	0
¾ inch	0
3/8 inch	0
#4	0
#8	50
#12	65
#16	70
#30	10
#40	5
#50	5
#100	5
#200	45
Pan	45

(i) Calculate the FM of the sand sample,
(ii) Draw the grading curve of the sand sample,
(iii) Make a brief discussion on the FM, sieve analysis data, and grading curve,
(iv) What measures are to be taken to improve the grading of the sand sample?
(v) What measures are to be taken to change FM of the sample to 2.6 as required for the project?

Sieve openings: #12 - 1.7 mm, #40 - 0.425 mm, and #200 - 0.075 mm.

2. (a) Draw typical stress-strain curves of steel and concrete and discuss the salient features of the curves. 3
(b) What is efflorescence of bricks? What will happen if the bricks having efflorescence are used in construction of walls of a building? 2

(c) Explain the influence of excess lime in brick earth. 2

(d) "Drying of bricks is necessary before burning" – Why? 2

(e) What is fineness of cement? Compare a fine cement with a coarse cement considering the following points: 5

(i) Heat of Hydration
(ii) Early Strength
(iii) Long-Term Strength
(iv) Microcracking
(v) Durability
(vi) Cost of Production

(f) Compare flash setting and false setting of cement. 2

(g) What is bulking of sand? Explain bulking characteristics of fine, medium, and coarse sand. 2

(h) Compare creep and relaxation. 2

3. (a) Compare setting and hardening of cement. 3

(b) Write a short note on sulfate resistant cement. 3

(c) What is hydration of cement? Write the hydration reactions of silicate and aluminate. 4

(d) Explain the morphology of hydration products of cement. 2

(e) Compare bulk specific gravity and apparent specific gravity. 2

(f) Discuss the functions of each ingredient of concrete including chemical and mineral admixtures. 3

(g) Write short notes on honeycomb, segregation, and laitance of concrete. 3

4. Mixture proportion of mortar is necessary for plastering work of a brick wall of 30 ft long and 10 ft height. The following data are provided: 20

Sand to cement ratio (weight ratio) = 3.0,
W/C=0.5,
Specific gravity of cement = 2.9,
Specific gravity of sand = 2.6,
Air content = 1% ,
Mortar thickness = 1 inch (on both surfaces of the wall).

(i) Calculate the unit contents of sand, cement, and water,
(ii) Calculate the unit weight of mortar,
(iii) Estimate the amount of each ingredient (in weight and volume) of mortar necessary for the plastering work of the both surfaces of the wall. Assume 15% extra volume of material is necessary due to the loss of mortar during application on the wall. Unit weight of cement (with void) = 1450 kg/m^3 and unit weight of sand (with void) = 1350 kg/m^3.
(iv) What adjustment in sand volume is necessary, if bulking of sand is 10%?
(v) What adjustment of mixing water is necessary if the sand is in moist condition (moisture content = 3%, bulking of sand – 10%)?

The University of Asia Pacific
Department of Civil Engineering
Midterm Examination Spring 2011

Course # : CE-203 | Course Title: Engineering Geology & Geomorphology
Full Marks: 60 (4 X 15 = 60) | Time: 1 hour

Answer any **four** (4) questions of your choice out of the following **five** (5)

1a) With a schematic diagram show thicknesses of different parts of Lithosphere. 2

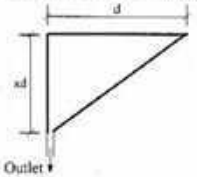
1b) Draw a schematic diagram of the rock cycle and discuss (in brief) sedimentary rock according to the cycle. 8

1c) Classify (mention names only) physical and chemical weathering processes. Discuss, in brief, any one of each processes. 5

2a) With a sketch, show different components of total flow. 3

2b) Distinguish among precipitation, infiltration and percolation. 3

2c) In the following basin, for what value of x, the flow rate (Q) or runoff will be the maximum? Also find the FF and CC of the basin for maximum runoff. 9

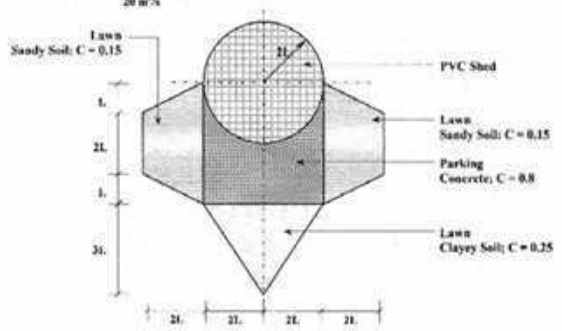


3a) Mention the factors affecting runoff. 3

3b) Write a short note on rational formula. 4

3c) Using the information provided below, calculate L for the catchment area as shown below. 8

Intensity of Rainfall: **1.0 inch/hour**
Q_p: **20 m^3/s**



4a)	What is diastraphism? Draw a neat sketch of a typical fold geometry showing its different components.	4
4b)	Classify folds (mention names only). Draw neat a sketche of any one type of fold.	3
4c)	Define fault and joint. Classify fault (mention names only). Draw a neat sketch of an oblique fault.	8
5a)	Write down the factors affecting drainage pattern. Classify drainage patterns (mention names only).	5
5b)	Draw neat sketches of any four types of drainage pattern. Discuss, in brief, any two of them.	10

The University of Asia Pacific
Department of Civil Engineering
Mid Term Examination Spring 2011
Program: B.Sc. Engineering (Civil)

Course Title: Numerical Analysis & Computer Programming — Course No: CE 205
Time: 1.0 hours — Full Marks: 30

Answer all the questions.

1. (a) Correct and rewrite the program given below; (3)

```
#include<iostram>
using namespace std,

void main(
{
int a,b;c=5;
        Cout>>"This program can multiply<<end;
        cin>>a>>b>>endl;
        C =* (a+b);
        cout<< "c"<<endl;
}
```

(b) Write a program that can calculate the area of a circle and triangle both. (7)

or

(b) (1x7)

i. Describe the two ways to include comments in a C^{++} program.
ii. What is the purpose of the processing directive:
include <iostream>
iii. In each of the following assume that m has the value 5 and n has the value 2 before the statement executes. Tell what the values of m and n will be after each of the following statements executes:
a. m * = n++
b. m * = - - n
iv. Evaluate the following expressions, assuming in each case that m has the value 25 and n has the value 7:
a. m % ++n
v. State whether each of the following is true or false. If false tell why.
a. ! (p | | q) is the same as !p | | !q
b. !!!p is the same as !q

2. Using Newton Raphson method, find the real root of the following equation, (10)

$$e^{-2x} = \cos x$$

up to four decimal places, $\epsilon = 0.0001$

or

Using the iteration method, find the root of the equation (10)

$$\ln x = \frac{x+1}{2x}$$

up to four decimal places, $\epsilon = 0.0001$

3. Solve the following system of equation by Gauss Elimination Method, **(10)**

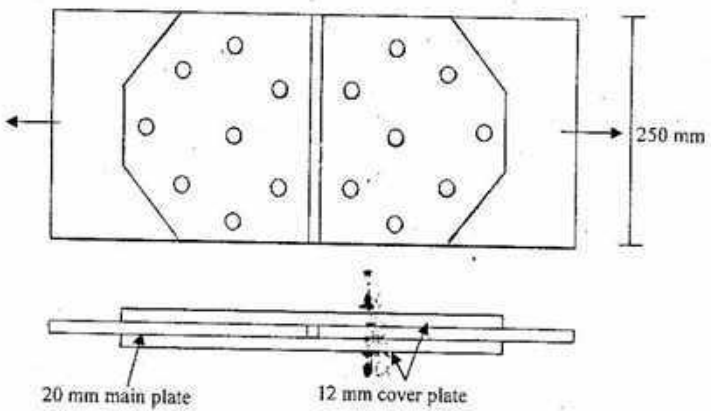
$$a + b + c = 6$$
$$6a + 2b + 3c = 20$$
$$2a + 3b + 6c = 13$$

or

Solve the following system of equation by Gauss Jordan Method, **(10)**

$$5a - 2b - c = 142$$
$$a - 5b - 4c = -30$$
$$2a - b - 3c = 5$$

4. Find the capacity of the multi-riveted structural joint shown in the figure. All the rivets are normally 22 mm in 24 mm diameter holes. Allowable stresses are 150 MPa in tension, 100 MPa in shear and 335 MPa in bearing.



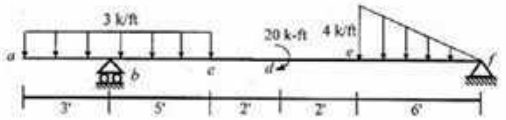
Section A

The University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination Spring 2011

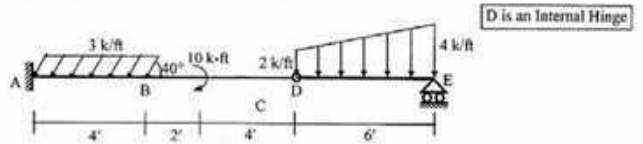
Course No.: CE 211 — Course Title: Mechanics of Solids I
Full Marks: 30 (= 3 × 10) — Time: 1 hour

There are **four** questions in this paper. Answer any **three**.

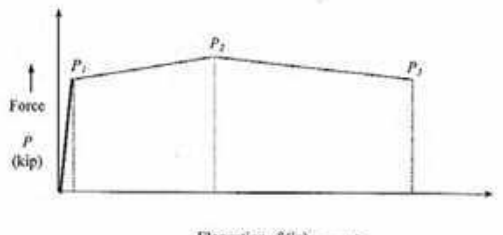
1. For the beam *abcdef* loaded as shown in the figure below
   - Derive the equations for shear force and bending moment using Singularity Functions,
   - Also calculate shear force at point *c* and bending moment at the right of point *d*.



2. Draw the axial force, shear force and bending moment diagram of the following beam.



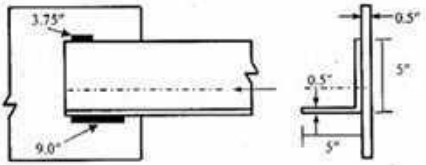
3. The figure below shows the force-elongation diagram of a specimen of 2"-length and 0.5"-diameter. if $P_1 = P_3 = 9$ kips, $P_2 = 12$ kips, $\delta_2 = 0.003$", $\delta_2 = 0.18$", $\delta_3 = 0.40$", Poisson's ratio = 0.25, calculate the (i) Modulus of Elasticity (ii) Ductility (iii) Modulus of Resilience and (iv) Modulus of Toughness of the specimen.



4. The connection shown below is designed by $^3/_8$ inch welds. The lengths on two opposite sides are given. If the connection is to be replaced by bolt connection ,

   Calculate i) numbers of bolts required
   ii) diameter of each bolt
   iii)tearing stresses.

   [Given: Allowable shear stress (for bolt connection) = 17 ksi, bearing stress = 27 ksi
   Allowable shear stress (for weld connection) = 12 ksi].



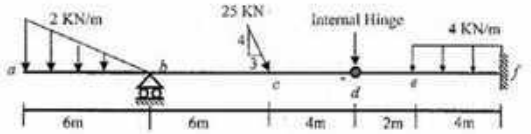
Section B

The University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination Spring 2011

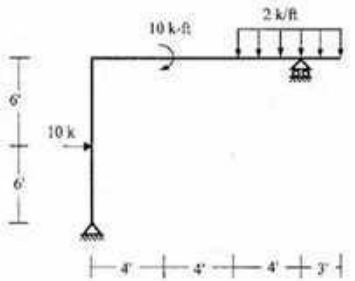
Course No.: CE 211 — Course Title: Mechanics of Solids I
Full Marks: 30 (= 3 × 10) — Time: 1 hour

There are **four** questions in this paper. Answer any **three**.

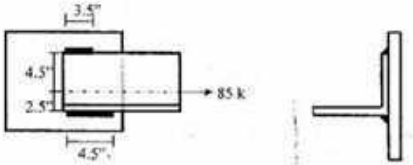
1. Draw axial force, shear force and bending moment diagram for the beam.



2. Draw the axial force, shear force and bending moment diagram of the following frame.



3. Define yield strength, modulus of toughness, actual and apparent σ-ε diagram. Find the adequacy of the 3/8" welded connections where a steel angle is welded to steel plate as shown in the figure. Axial force of 85 kips passes through the centroid of the connection. Allowable shear stress= 20 ksi

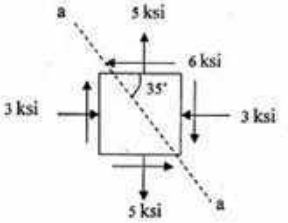


The University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination Spring 2011

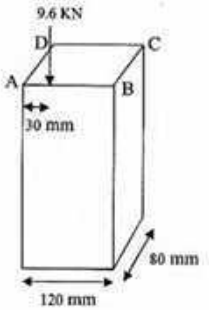
Course No.: CE 213 — Course Title: Mechanics of Solids II
Full Marks: 30 (= 3 × 10) — Time: 1 hour

There are **four** questions in this paper. Answer any **three**.

1. Find the normal and shear stress on the plane a-a using equations for the transformation of stresses. Using Mohr's circle, show the principle stresses and maximum shear stress with associated normal stresses.

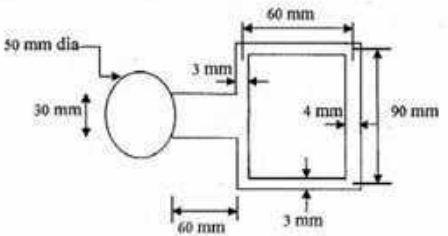


2. Find the stress distribution at section ABCD for the block loaded eccentrically as shown in the figure. Locate the neutral axis. Neglect the weight of the block.

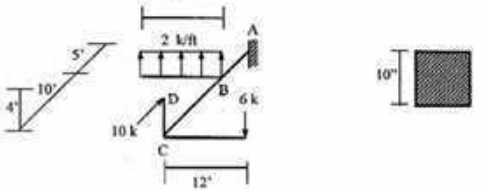


3. A shaft having the cross- section shown in the figure is subjected to 180 N-m torque. Estimate the percentage of torque carried by each of the cross-sectional components and calculate maximum shear

stresses in each part, neglecting stress concentration. Also, find the angle of twist per unit length caused by the applied torque.
Given, G = 84 GPa



4. Describe the maximum distortion-energy and maximum normal strain theory for yield and fracture criteria and show the yield zone. For the structure shown below, draw the torque diagram of member ABC and calculate its maximum torsional shear stress and torsional rotation [Given: G = 1000 ksi and the cross-section is a 10" square] 12'



Formula: 1. Biaxial bending , $\sigma_z(x,y) = -P/A - M_x y/I_x - M_y x/I_y$
2. $\sigma_{xx}' = (\sigma_{xx} + \sigma_{yy})/2 + \{(\sigma_{xx} - \sigma_{yy})/2\} \cos 2\theta + (\tau_{xy}) \sin 2\theta$
3. $\tau_{xy}' = -\{(\sigma_{xx} - \sigma_{yy})/2\} \sin 2\theta + (\tau_{xy}) \cos 2\theta$
4. $R = \sqrt{[\{(\sigma_{xx} - \sigma_{yy})/2\}^2 + (\tau_{xy})^2]}$ $\quad (\sigma_{xx} + \sigma_{yy})/2 = a$
6. $\phi_B - \phi_A = (TL/JG)$
7.

section	stress	J
circular	$\tau_{max} = Tc/J$	$\pi d^4/32$
rectangular	$T/(\alpha bt^2)$	βbt^3
Thin walled	$\tau_{max} = T/(2A_o t)$	$J_{eq} = 4A_o^2/\oint ds/t$

1)

b/t	1.0	1.5	2.0	3.0	6.0	10.0	∞
α	0.208	0.231	0.246	0.267	0.299	0.312	0.333
β	0.141	0.196	0.229	0.263	0.299	0.312	0.333

The University of Asia Pacific
Department of Civil Engineering
Mid-Term Examination Spring 2011
Program: B.Sc. Engineering Civil

Course Title: Fluid Mechanics | Course No : CE 221 | Credit: 3.00

Time : 1.0 hour | Full Marks : 20

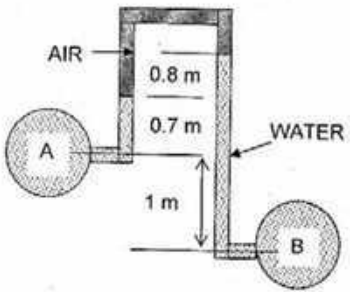
Answer all questions. The figure in the right margin indicates full marks.

1. Differentiate between, (i) Lagrangian Method and Eulerian Method 5
(ii) Uniform and Non-Uniform Flow

Or, Define (i) Surface Tension
(ii) Capillarity

3+2=5

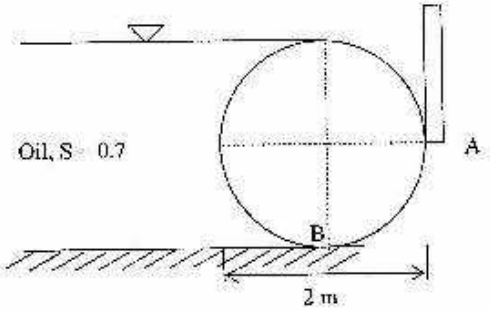
2. a. Find the pressure difference between points A and B



b. By how much does the pressure in a cylindrical jet of water 5 mm in diameter exceed the pressure of the surrounding atmosphere if the surface tension of water is 0.080 N/m.

8

3. The cylinder in Figure is 3 m long and weighs 40 kN. Determine the horizontal reaction at A and the vertical reaction at B.



2

4. A gauge indicates a pressure of 24.53 kN/m^2 vacuum. Compute the corresponding absolute pressure in kN/m^2. The local barometreic pressure is 700 mm of mercury (S = 13.60).

Section - A

The University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination Spring 2011 (Set B)

Course #: CE 311 — Course Title: Structural Engineering I
Full Marks: 40 (= 4 × 10) — Time: 1 hour

1. Determine the degree of statical indeterminacy (dosi) of the frame *abcde* shown in Fig. 1. Also draw its AFD and SFD, assuming a point of inflection at the midspan of column *ab*.

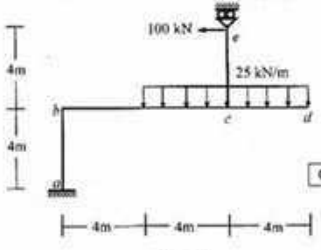


Fig. 1

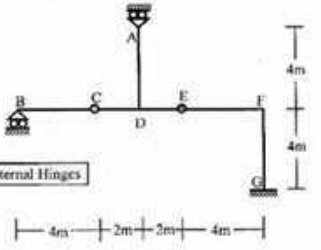


Fig. 2

2. Draw the influence lines of Y_A, Y_D, Y_E and M_G for the frame ABCDEFG shown in Fig. 2, if the unit load moves over (a) beam BF, (b) column AD, (c) column FG.

3. (i) Determine the degree of statical indeterminacy (dosi) of beam *abcdefg* shown in Fig. 3 and draw the influence lines of R_b, $V_{(Right)}$ and M_d.

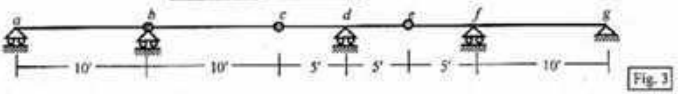


Fig. 3

(ii) Draw the influence lines of R_f and M_c for the plate girder shown in Fig. 4.

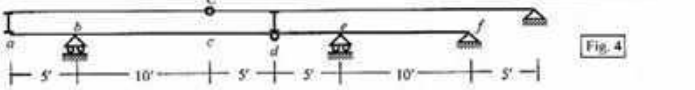


Fig. 4

4. Determine the degree of statical indeterminacy (dosi) of the truss *abcdefg* shown in Fig. 5 and also draw the influence lines for the reaction at support *e* and forces in members *bc*, *bf* and *ef*.

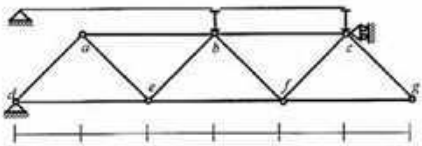


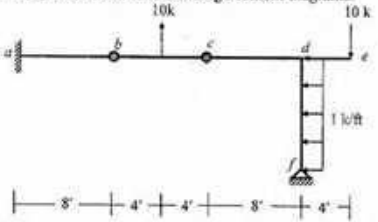
Fig. 5

(Section B)

The University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination Spring 2011 (Set B)
Program: B. Sc. Engineering (Civil)

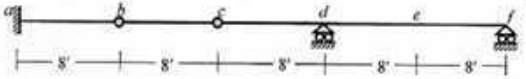
Course #: CE 311 — Course Title: Structural Engineering I
Full Marks: 40 (= 4 × 10) — Time: 1 hour

1. Determine the degree of statical indeterminacy (dosi) of the frame *abcdef* shown below and also draw its Axial Force, Shear Force and Bending Moment diagrams.



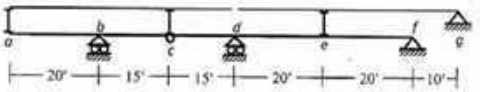
b and c are Internal Hinges

2. Draw the influence lines of (i) R_a, R_e (ii) V_{b+}, $V_{b(left)-}$, V_{b-} (iii) M_e, for the following beam



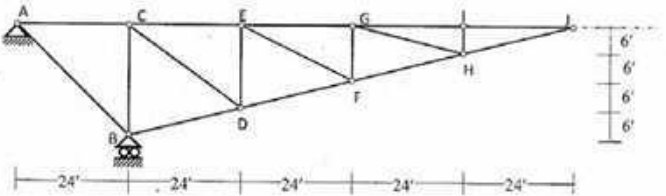
b and c are Internal Hinges

3. For the plate girder shown below, draw the influence lines for (i) R_b, R_f (ii) $V_{c(Right)+}$, $V_{c(Left)-}$ (iii) M_e.



c is an Internal Hinge

4. Show that the truss shown in the following figure is a statically determinate and also draw the influence lines for the forces in members AC, EG, EF and DF. [Note: Stringers are simply supported at floor beams over the top-cords].

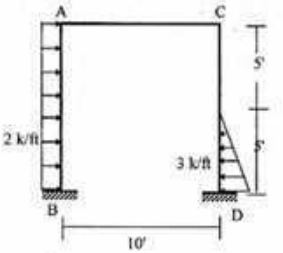


The University of Asia Pacific
Department of Civil Engineering
Mid Term Examination Spring 2011
Program: B. Sc. Engineering (Civil)

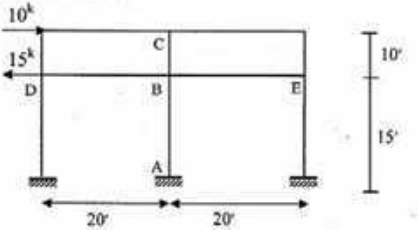
Course Title: Structural Engineering II | Credit Hours: 3.0 | Course Code: CE 313
Time: 1 hour | Full Marks: 40

[Answer **any 4 (Four)** of the following 5 questions]

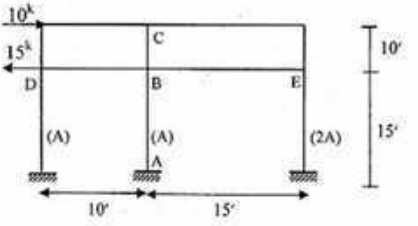
1. Draw the Bending Moment Diagrams for the columns AB and CD using the **Approximate Method.**



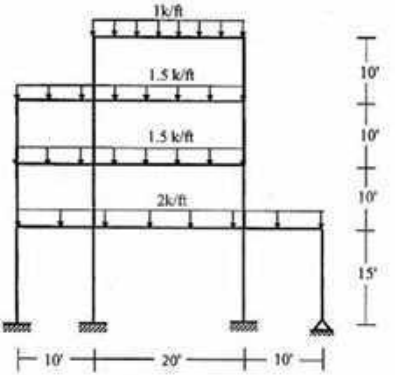
2. For the building frame shown below draw the Bending Moment Diagrams for the column ABC and girder DBE using **Portal Method.**



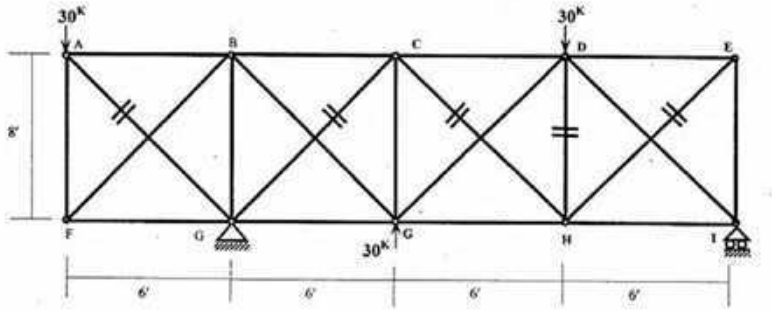
3. For the building frame shown below draw the Bending Moment Diagrams for the column ABC and girder DBE using **Cantilever Method.**



4. Draw the Bending Moment Diagrams for the frame loaded as shown below using **Approximate Method** of analysis by making necessary assumptions.
[Given: EI is constant for all columns].



5. Determine the forces in the marked members of the truss shown in the figure below assuming that all members can carry both tension and compression. Use **Approximate Method** of analysis.



The University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination Spring 2011
Program: B. Sc. Engineering (Civil)

Course Title: Design of Concrete Structures II
Time : 1 Hour

Course Code: CE317
Full Marks: 60

Answer any **THREE** out of FOUR questions

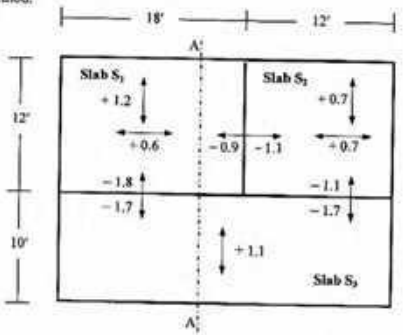
[Given: f'_c = 4.0 ksi, f_s = 24 ksi, f_y = 60 ksi, j = 0.866, R = 0.314 ksi, R_u= .937 ksi for all the problems]

1. (a) Following are the bending moments (k-ft/ft) in the slabs of a floor plan, consisting of 5" thick slabs S_1, S_2 and S_3 (supported on all sides by beams)

i) Calculate all the reinforcements required in the slabs and show them in a plan, including temperature reinforcement and corner reinforcement where necessary. **(12)**

ii) Draw the section along A-A. **(04)**

Use **WSD** method.



1(b) Why is special arrangement of reinforcement needed at the exterior corners of a two way slab system? Discuss the possible special arrangement. **(04)**

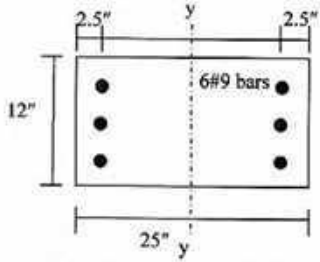
2.(a) A ground floor column of a multistoried building is to be designed for the following load combinations: **(12)**

Gravity load combination: P_u=600 kips, M_u=70 k-ft
Lateral load combination: P_u=550 kips, M_u= 400 k-ft

Architectural consideration require that a rectangular column with b=15 in. and h=25 in. is to be used. Find the required column reinforcement, tie size and spacing and show in sketches. Use reinforcement distributed around the column perimeter.

2.(b) A circular column carries a working DL=700 k and LL=400k. Design the spiral column using a reasonable percentage of main reinforcement. Use either **WSD** or **USD**. Design the spirals also. **(08)**

3. A column section with the main reinforcement is shown in the following figure. Using **WSD**, draw the interaction diagram for the column with at least five points including those corresponding to pure bending, pure axial load and balanced condition.
[Given: S_{st}=2066 in^3, e_s=9.15"] **(20)**



4. An isolated square footing is planned under a column with the following data: **(20)**

Column size = 18 in by 18 in,
Column reinforcements = 8 - #8 bars
DL= 350 kips, LL=275 kips, Allowable soil pressure=4.5ksf. Place bottom of bottom of footing at 5 ft below ground level.

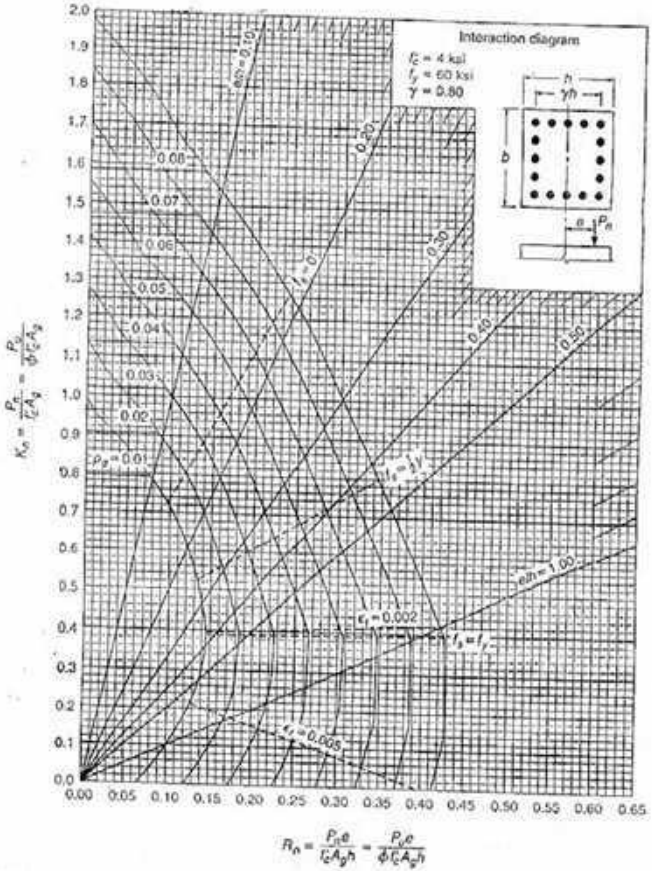
Design the footing by **USD**.

Follow the steps mentioned below:

Follow the steps mentioned below:

(i) Calculation for bearing area (i.e. size of the footing)
(ii) Check for punching shear
(iii) Check for beam shear
(iv) Calculation for design moment and check for footing thickness
(v) Calculation for reinforcements
(vi) Design for dowels
(vii) Neat sketches of reinforcements (plan and sections)

CE 317/CE



GRAPH A.7

Column strength interaction diagram for rectangular section with bars on four faces and $\gamma = 0.80$ (for instructional use only).

The University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination Spring 2011
Program: B.Sc. Engineering (Civil)

Course Title: Environmental Engineering I Course Code: CE 331 Credit: 2.00
Time- 1 hour Full marks: 60

There are **FOUR** questions. Answers any **THREE**. *(3 X 20 = 60)*

1. (a) Differentiate between aquifuge and aquitard with necessary figures. (5)

   (b) The population of a community in 1910, 1920, 1930, 1940 and 1950 was 200,230, 290, 360 and 480 respectively. Estimate the population of the community in the year 1970 and 1980. (5)

   (c) Water is supplied from an impounding reservoir 30 miles away to a service reservoir near the town. A cast iron main is to be designed to supply 425 mgd. Loss of head due to friction in the pipe is estimated to be 300 ft. All other head losses are negligible. What size cast iron pipe would you use? use: (10)
   (1 mgd = 1.547 cfs ; 1 mile = 5280 ft ; f = 0.0075)

2. (a) Write the types of aquifer and defined them also. (5)

   (b) Show that the ground water yield of an unconfined aquifer , can be expressed as , (7)
   $$Q = \{\pi k(D^2 - d^2)\} / \{\log_e (R/r)$$

   (c) A 100 mm diameter tubewell is sunk 35 m below static groundwater level. The depth of water in the tubewell while pumping is 33m. The radius of drawdown is 30 m and the coefficient of permeability of the aquifer is 0.5 l/s/m^2. Calculate the probable discharge of the well. (8)

3. (a) Write down the advantages of use the well screen. (3)

   (b) The population of a town was 180,000 in 1980 and 220,000 in 1990. What will the population be in 2000? (7)

   (c) Design the screen of a well from the following data: (10)

Thickness of the aquifer	= 60 ft
Slot size of the screen	= 20
Discharge	= 334 gpm
Entrance velocity	= 0.1 fps
Well diameter	= 2 inch

4. (a) Defined naturally developed well & gravel-packed well. (5)

(b) What is specific yield and specific retention? (5)

(c) It is required to pump water at the rate of 6750 gpm from a reservoir whose surface is at an elevation of 180 ft. to a tank whose bottom is at an elevation of 375 ft. The pump is placed at an elevation of 195 ft., the diameter of the suction pipe is 30 inch, the length of the pipe from the pump to the tank is 295 ft and the estimated size of this pipe is 24 inch. The sum of the minor losses in the suction and discharge pipe may be taken as 1.5 ft. If the maximum depth of water in the tank is to be 30 ft. what is the required horsepower of a pump for which the overall efficiency is 67%? Neglect all other head losses. (10)

Table : 3·3 Intake areas of screen openings for selected widths of slot openings.

Nominal Screen size (ID) inch	Intake areas in sq inch per linear foot of screen			
	Slot No. 10 (0.01″)	Slot No. 20 (0.02″)	Slot No. 40 (0.04″)	Slot No. 60 (0.06″)
1½—TS	10	16	26	32
1½ PS	13	22	36	45
2—PS	14	25	41	50
3—TS	15	26	42	52
2½ - PS	17	30	48	59
3—PS	20	34	54	68
4—TS	21	35	56	71
4—PS	23	44	68	86

The University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination Spring 2011
Program: B.Sc. Engineering (Civil)

Course Title: Environmental Engineering II Credit: 3.00 Course Code: CE 333
Time: 1.0 hrs Full Marks: 60 (=3x20)

There are **FOUR** questions. Answer **question 1** and any **TWO** from the rest. **QUESTION 1 is COMPULSORY.**

[Assume reasonable value for missing data (if any)]

1.a) A combined area is served by a sanitary trunk sewer shown in figure 1. Residential area A_1 has a total of **50** nos. **5** storied building with **two flats** on each floor. Per capita water demand is **200** liter per day and per capita waste water generation rate is **70%** of water use. Residential area A_2 has high rise apartments and saturation population density is **200** person/ ha. Based on local condition and codes, average waste water flow rate for industrial area is **30** m^3/ha/day and for institutional area **400** m^3/day. (17)
Show the position of discharge in figure 1 and attach the page with your answer script. Also calculate the design waste water flow for P_1, P_2, P_3 using the above information.

b) Define the following terms: (i) Sewerage System, (ii) sewer, (iii) Sewerage. (3)

2.a) Design a two compartment septic tank to serve a household of **twelve** persons having the water consumption rate of **100** lpcd. The tank is to be desludged in every three years. Assume, the design temperature for sludge digestion is **25 °C** and sludge accumulation rate is **0.06** m^3/person/year. (12)

b) Determine the velocity in a **30** cm circular sewer with n= **0.013**, slope S = **0.004** m/m and depth of flow equal to **7.5** cm. (Use enclosed hydraulic elements diagram) (8)

3.a) What are the advantages and disadvantages of a pit latrine? In which condition single pit pour-flush latrine is preferable and when alternating twin-pit pour-flush pit latrine are recommended. (10)

b) Design leach pits for both single and alternate twin off-set pit pour-flush latrines serving a family of **9** members living in a peri-urban area. Consider wastewater flow rate of **8** lpcd and soil infiltration rate of **28** l/m^2-day. (10)

4.a) What do you understand by sanitation? State the Objective of sanitation. (4)
b) What are the general types of sanitation system? Give examples of each system. (4)
c) Discuss different processes that take place in a septic tank. (6)
d) Draw a septic tank and show its different zones. (4)

Formulae:

$V=V_h+V_d+1.4\ V_{st}$
$V_{ac}=0.4\ V_d$
$t_h=1.5-0.3\log(Pq)$
$V_h=10^3\ Pqt_h$
$t_d=30\ (1.035)^{35-T}$
$V_d=0.5x10^{-3}Pt_d$
$V_d=C\ x\ P\ x\ N$
$d_{ac}=0.82-0.26A$
$v_{full}=(R^{2/3}S^{1/2})/n$

Registration No.:

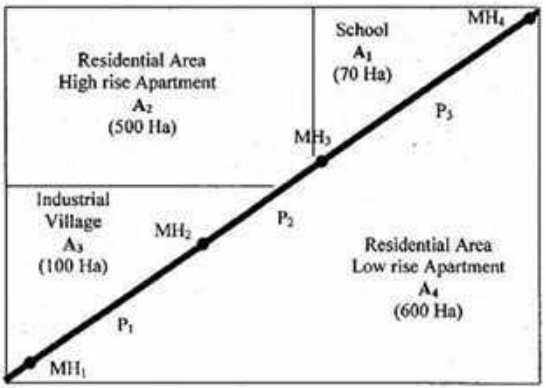
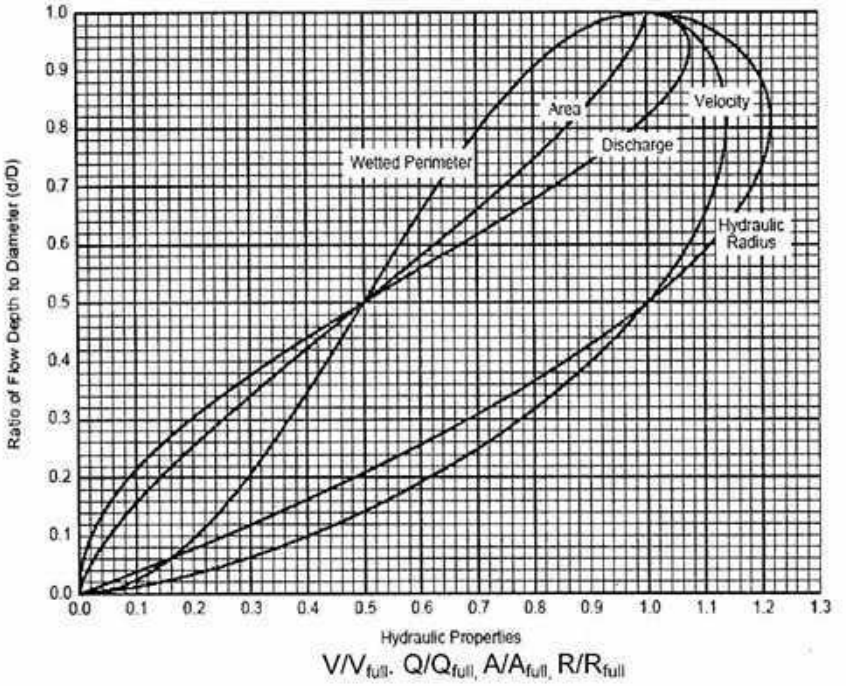


Figure 1: For question 1. a)


Ratio of Flow Depth to Diameter (d/D)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3
Area
Velocity
Discharge
Wetted Perimeter
Hydraulic Radius
Hydraulic Properties
V/V_full, Q/Q_full, A/A_full, R/R_full

The University of Asia Pacific
Department of Civil Engineering
Mid-Term Examination Spring, 2011

Course # 341 — Course Title: Geotechnical Engineering I
Full Marks: 60 (3 x 20 = 60) — Time: 1 hour

Answer any Three (3) questions:-

1a) Classify soils (mention names only) based on mode of transportation agents. Write short note on how transported soils can be formed by combined actions of different mode of transportation. 5

1b) Show sketches of single-grained and coarse-grained skeleton structures of soil and describe any one of them. 7

1c) Write short notes on index properties and engineering properties of cohesive and cohesionless soils. 5

1d) Classify soils (mention names only) showing their size limits. 3

2a) Write a short note on gradation of cohesionless soil. 6

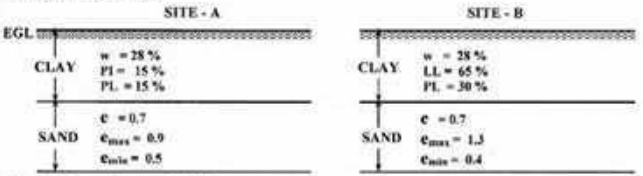
2b) From the following sieve analysis data, determine the gradation of the soil with proper justification. 14

Sieve No./ Opening	Amount Retained (gm)	% Retained	Cumulative % Retained	% Finer
# 4 (4.75 mm)	0.0	0.0	0.0	100.00
# 8 (2.36 mm)	36	6	---	---
# 16 (1.18 mm)	58.5	---	15.75	---
# 30 (0.6 mm)	152.8	---	---	58.78
# 50 (0.3 mm)	164.2	---	68.58	---
# 100 (0.15 mm)	110.2	18.37	86.96	13.04
# 200 (0.075 mm)	52	8.67	---	---
Pan	26.3			

Total = 600 gm — --- To be calculated

3a) With the aid of volume-moisture-content diagram, define liquid limit and plastic limit. 6

3b) For two different sites (site A and site B) following information is given. Compare their shear strength characteristics. 8



Use the information provided below.

Dr (%)	Degree of Denseness
0 - 15	Very Loose
15 – 35	Loose
35 – 65	Medium Dense
65 –85	Dense
85 - 100	Very Dense

I_c (%)	Consistency
<0	Hard
0 - 20	Very Stiff
20 - 40	Stiff
40 - 60	Medium Stiff (Firm)
60 -80	Soft
80 - 100	Very Soft

3e) Derive the following relationship: 6

$$\gamma_{sat} = \gamma_w \left(\frac{e}{w}\right)\left(\frac{1+w}{1+e}\right)$$

4a) 35 bouquets (as shown in Fig. 1) of moist loose sand were required to make a compacted fill-pad (as shown in following Fig. 2a). Using the information given below, determine the following parameters of the compacted fill-pad. 12.5

(i) Void ratio
(ii) Porosity
(iii) Volume occupied by water
(iv) Dry unit weight
(v) Moist unit weight

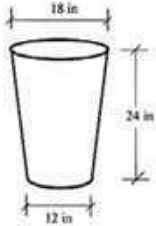


Fig. 1
Bouquet

Volume of Bouquet, $V_b = 2.49\ ft^3$

Specific Gravity (Gs), Moisture content (w) and Degree of saturation (S_r) of moist sand in the bouquet are 2.65, 5.6% and 10%, respectively.

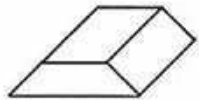


Fig. 2a
Compacted Fill-Pad

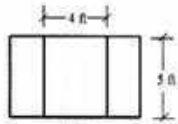


Fig. 2b
Plan

Fig. 2c
Plan

4b) Laboratory test results of the following inorganic soil samples are summarized in the following table. Classify the soils (Use Attachments Chart-1, Chart-2, Chart-5, Chart-6 and Simplified Plasticity Chart as needed) according to ASTM D-2487 (Unified Soil Classification System). 7.5

Soil Sample No.	Atterberg Limits		% passing through # 200 sieve	% retained on # 200 sieve	% retained on # 4 sieve
	Liquid Limit	Plastic Limit			
1	52	21	61	---	14
2	21	17	55	23	---
3 ($C_u = 6.3$, $C_c = 2.7$)	22	17	10	45	---

--- To be calculated

The University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination Spring 2011

Course No.: CE 351 — Course Title: Transportation Engineering I
Full Marks: 30 (= 3 × 10) — Time: 1 hour

Answer all the **three** questions.

1. a) Distinguish between angular and parallel parking. (2)
   b) Describe existing parking condition of Dhaka New Market area. Identify major problems and give some engineering solutions to improve this condition. (3.5)
   c) Suppose, you have to take an important trip from your home to your university. What planning processes should be involved in taking the trip? (2.5)
   d) What is meant by 30th hourly volume? Mention different way of presenting traffic volume data. (2)

2. a) Following data was collected while conducting spot speed studies at certain stretch of a road within the urban area. (6)

Speed Range (mph)	No of vehicles observed
0-6	3
6-12	12
12-18	18
18-24	30
24-30	60
30-36	95
36-42	142
42-48	50
48-54	30
54-60	15
60-66	7
66-72	3

Determine: Upper and lower values of speed limits for regulation
Safe speed
Average speed
Modal speed
Pace

   b) What are the objectives of speed studies? (1.5)
   c) Differentiate between: (2.5)
      i) AADT and ADT
      ii) Flow and Rate of Flow
      iii) Time Mean Speed and Space Mean Speed.

3. **a)** Write down attributes and system components of transportation system. Discuss briefly the various modes of transport. What is meant by air tracked cushion vehicle? **(4)**

b) Describe the relationship between land use pattern and transportation planning. **(1.5)**

c) Using accessibility Vs movement function, describe roadway classification in brief. **(2)**

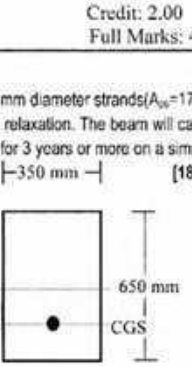
d) Discuss the factors effecting modal split and traffic assignment. What is gravity model? Describe in brief. **(2.5)**

The University of Asia Pacific
Department of Civil Engineering
Mid Term Examination Spring 2011
Program: B. Sc Engineering (Civil)

Course Title: Structural Engineering V Course Code: CE 415 Credit: 2.00
Time: 1.00 Hour Full Marks: 40

Answer any 2 (two) questions

1.a) A concrete beam of dimension 350 mm × 650 mm is pre-tensioned with 18-12.7 mm diameter strands(A_{ps}=1777 mm²). Find out the losses of prestress due to elastic shortening, creep, shrinkage and relaxation. The beam will carry additional superimposed load w_s =10 kN/m when erected at 30 days and is sustained for 3 years or more on a simple span of 15 m. [18]



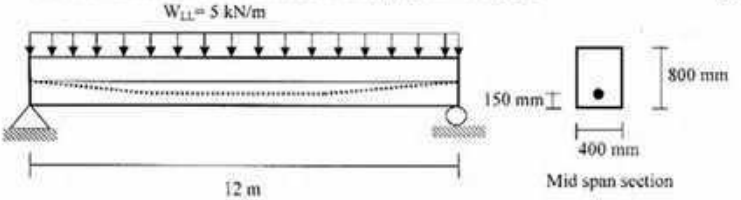
Given data:
E_s= 200×10³ MPa, E_{ci}=25100 MPa, E_c=27400 MPa
f_{pu}=1860 MPa, Initial prestress f=1300 MPa, Shrinkage strain, ε_{sh}= 0.00025
Values of K_{re} , J and C provided in Table attached

Formula: $CR=K_{cr}E_s/E_c(f_{cir}-f_{cds})$, $RE=[K_{re}-J(SH+CR+ES)]C$

b) Write down the different stages of pre tensioning system. [2]

2. (a) A posttensioned bonded concrete beam has a prestress of 1550 kN in the steel immediately after prestressing, which eventually reduces to 1340 kN due to losses. The beam carries a uniformly distributed live load 5 kN/m in addition to its own weight 7.7 kN/m. Compute the extreme fiber stresses at mid-span.

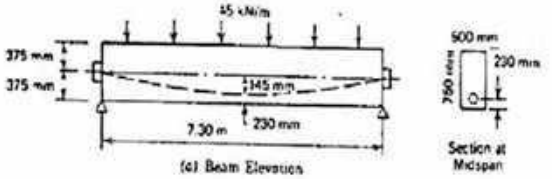
- under the initial condition with full prestress and no live load
- Under the final condition, after the losses have taken place with full live load. [10]



(b) For the beam loaded as in Q-4(a), compute the value of total dead and live load (UDL) that can be carried by the beam, for cracking in the bottom fibers at a modulus of rupture of 3.6 MPa and assuming that concrete can take tension up to that value. Also calculate the load factor against cracking. [06]

(c) Mention the ACI specification for stress in concrete and steel for prestressed concrete at (i) Initial case (ii) Service condition [04]

3. a)A prestressed concrete concrete beam 500 mm by 750 mm has a simple span of 7.30 mm and loaded by a uniform load 45 kN/m including its own weight. The prestressing tendon produces as an effective prestress of 1620 kN. Compute fiber stresses in the concrete at the mid span section. Use the 3rd concept (load balancing concept) [12]



(a) Beam Elevation

(b) Discuss the basic difference between the behavior of Prestressed and reinforced concrete beam section in resisting external moment with necessary figures [04]

(c) Why high strength steel and high strength concrete is required for prestressed concrete? [04]

Appendix

Table: Values C

f_{pi}/f_{pu}	Stress relieve strand and wire	Stress relieved bar or low relaxation strand or wire
0.80		1.28
0.79		1.22
0.78		1.16
0.77		1.11
0.76		1.05
0.75	1.45	1.00
0.74	1.36	0.95
0.73	1.27	0.90
0.72	1.18	0.85
0.71	1.09	0.80
0.70	1.00	0.75
0.69	0.94	0.70
0.68	0.89	0.66
0.67	0.83	0.61
0.66	0.78	0.57
0.65	0.73	0.53
0.64	0.68	0.49
0.63	0.63	0.45
0.62	0.58	0.41
0.61	0.53	0.37
0.60	0.49	0.33

Table: Values of K_{re} and J

Type of Tendon	K_{re} (Mpa)	J
1860 MPa Grade stress-relieved strand or wire	138	0.15
1720 MPa Grade stress-relieved strand or wire	128	0.14
1655 MPa or 1620 MPa Grade stress-relieved wire	121	0.13
1860 MPa Grade low-relaxation strand	35	0.040
1720 MPa Grade low-relaxation s wire	32	0.037
1655 MPa or 1620 MPa Grade low-relaxation strand wire	30	0.035
1000 MPa or 1100 MPa Grade stress-relieved bar	41	0.05

The University of Asia Pacific
Department of Civil Engineering
Mid-term Examination Spring' 2011

Course No. & Title: CE 417 Structural Engineering VI (Design of Steel Structures)
Full Marks: 40 Time: 1 hour
The figures in the margin indicate full marks.
Assume reasonable values for any missing data.
There are FOUR questions. Answer any THREE questions.

1. For a bolted joint subjected to tension show that,

$$\frac{L_e}{D} = \frac{0.714 f_p}{F_u} + \frac{1}{2}$$

where the symbols have their usual meanings. Making necessary assumptions, reduce the aforementioned expression into the usual forms as used in AISC/ASD and AISC/LRFD specifications. 13 1/3

2. A joint is designed with two lines of bolts to transmit a load through two L7x4x5/8 to a ¾-in. gusset plate (Fig. 2). All material is A36 and the bolts are ¾-in. A325 (Standard holes) in a bearing-type connection with threads excluded from shear planes. Using AISC/ASD method, determine the capacity of this joint by checking (i) shear in the bolts (ii) bearing in the angles and gusset plate and (iii) spacing of the bolts. The capacity of the tension member is not required to be checked. Given: Allowable stress in shear for bolts with no thread in shear planes = 30 ksi; Allowable stress in bearing = 1.2 F_u. 13 1/3

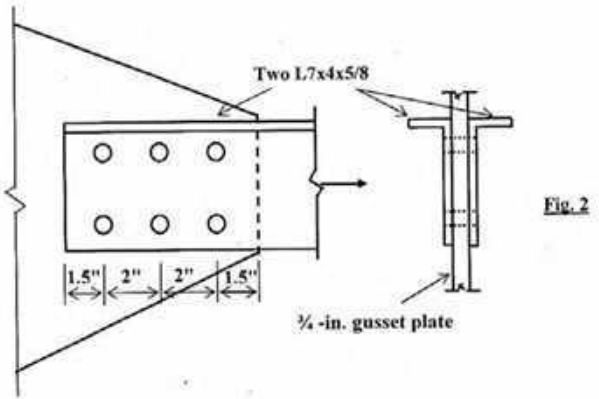


Fig. 2

3. Two plates each ½-in. thick are lap welded as shown in Fig. 3. The transverse weld size is 5/16" and the longitudinal weld size is 7/16". Welds are deposited manually using E80XX electrodes. If the dead load tension is 100 kips, what live load tension may be transmitted through the welded connection? Use AISC/LRFD method. Given: Nominal strength of fillet weld for stress on effective area is 0.6 times the nominal tensile strength of weld metal and ϕ=0.75. 13 1/3

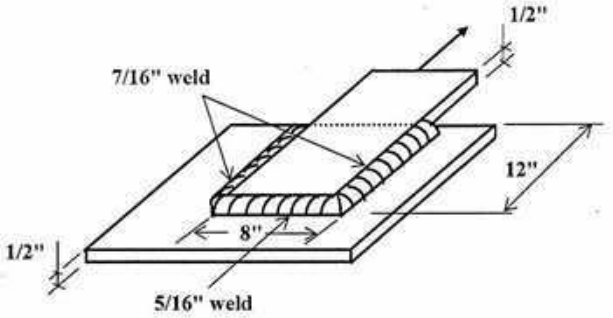
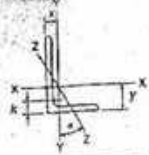


Fig. 3

4. Using AISC/ASD method, design an A36-steel double-angle tension member 15 ft. long. to transmit 40 kips dead load and 110 kips live load. Connection to a A36 gusset plate is by 5/16" fillet welds deposited with E70XX electrodes. Also design the gusset plate and the weld lengths providing transverse as well as longitudinal welds. Annexure-1 is provided to facilitate the design. Given: U=0.85; Allowable stress for shear on effective area of weld is 0.3 times the nominal tensile strength of weld metal; Width of gusset plate at the end of the angles is 10 inch; Allowable stress in shear of gusset plate at edge of welds is $0.4F_y$. 13 1/3

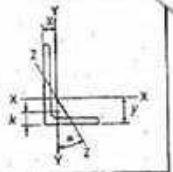
Annex-1



ANGLES
Equal legs and unequal legs
Properties for designing

Size and Thickness		k	Weight per Ft	Area	AXIS X-X				AXIS Y-Y				AXIS Z-Z	
					I	S	r	y	I	S	r	x	r	Tan α
In.		In.	Lb.	In.²	In.⁴	In.³	In.	In.	In.⁴	In.³	In.	In.	In.	
L 5×3½×	½	1⅛	19.8	5.81	13.8	4.28	1.55	1.75	5.55	2.22	0.977	0.996	0.748	0.484
	⅜	1⅛	16.6	4.92	12.0	3.65	1.56	1.70	4.83	1.90	0.991	0.951	0.751	0.472
	⅜	1	13.6	4.00	9.99	2.99	1.58	1.66	4.05	1.56	1.01	0.905	0.755	0.478
	5/16	15/16	12.0	3.53	8.90	2.64	1.59	1.63	3.63	1.39	1.01	0.860	0.758	0.482
	¼	7/8	10.4	3.03	7.78	2.29	1.60	1.61	3.18	1.21	1.02	0.861	0.762	0.486
	3/16	13/16	8.7	2.56	6.60	1.94	1.61	1.59	2.72	1.02	1.03	0.839	0.766	0.489
	1/8	¾	7.0	2.06	5.39	1.57	1.62	1.56	2.23	0.830	1.04	0.814	0.770	0.492
L 5×3 ×	½	1	15.7	4.61	11.4	3.55	1.57	1.80	3.96	1.39	0.915	0.796	0.644	0.340
	⅜	1	12.8	3.75	9.45	2.91	1.59	1.75	3.26	1.15	0.929	0.750	0.648	0.352
	5/16	15/16	11.3	3.31	8.43	2.58	1.60	1.73	2.92	1.02	0.937	0.727	0.651	0.361
	¼	⅞	9.8	2.85	7.37	2.24	1.61	1.70	2.54	0.886	0.945	0.704	0.654	0.364
	3/16	13/16	8.2	2.40	6.26	1.89	1.61	1.68	2.15	0.753	0.953	0.681	0.656	0.368
	1/8	¾	6.6	1.94	5.11	1.53	1.62	1.66	1.44	0.614	0.961	0.657	0.663	0.371
L 4×4 ×	½	1⅛	16.5	5.44	7.67	2.81	1.19	1.27	7.67	2.81	1.19	1.27	0.778	1.000
	⅜	1	13.7	4.61	6.66	2.42	1.20	1.23	6.66	2.42	1.20	1.23	0.779	1.000
	⅜	⅞	12.8	3.75	5.56	1.97	1.22	1.18	5.56	1.97	1.22	1.18	0.782	1.000
	5/16	15/16	11.3	3.31	4.97	1.75	1.23	1.16	4.97	1.75	1.23	1.16	0.785	1.000
	¼	⅞	9.8	2.84	4.38	1.52	1.23	1.14	4.36	1.52	1.23	1.14	0.788	1.000
	3/16	13/16	8.2	2.40	3.71	1.29	1.24	1.12	3.71	1.29	1.24	1.12	0.791	1.000
	1/8	¾	6.6	1.94	3.04	1.05	1.25	1.09	3.04	1.05	1.25	1.09	0.795	1.000
L 4×3½×	½	1⅛	11.9	3.50	5.32	1.94	1.23	1.23	3.79	1.52	1.04	1.00	0.722	0.750
	7/16	⅞	10.6	3.09	4.76	1.72	1.24	1.23	3.40	1.35	1.05	0.978	0.724	0.753
	⅜	15/16	9.1	2.67	4.16	1.48	1.25	1.21	2.95	1.17	1.06	0.955	0.727	0.755
	5/16	¾	7.7	2.25	3.56	1.26	1.26	1.18	2.55	0.994	1.07	0.932	0.730	0.757
	¼	11/16	6.2	1.81	2.91	1.03	1.27	1.16	2.09	0.808	1.07	0.909	0.734	0.758

ANGLES
Equal legs and unequal legs
Properties for designing



Size and Thickness		k	Weight per Ft	Area	AXIS X-X				AXIS Y-Y				AXIS Z-Z	
					I	S	r	y	I	S	r	x	r	Tan α
In.		In.	Lb.	In.²	In.⁴	In.³	In.	In.	In.⁴	In.³	In.	In.	In.	
L 4 ×3 ×	9/16	11/16	11.1	3.25	5.05	1.89	1.25	1.33	2.42	1.12	0.864	0.827	0.639	0.543
	½	⅝	9.8	2.87	4.52	1.68	1.25	1.30	2.18	0.992	0.871	0.804	0.641	0.547
	7/16	9/16	8.5	2.48	3.96	1.46	1.26	1.28	1.92	0.866	0.879	0.782	0.644	0.551
	3/8	½	7.2	2.09	3.38	1.23	1.27	1.26	1.65	0.734	0.887	0.759	0.647	0.554
	5/16	7/16	5.8	1.69	2.77	1.00	1.28	1.24	1.36	0.599	0.896	0.736	0.651	0.558
L 3½×3½×	½	⅝	11.1	3.25	3.64	1.49	1.06	1.06	3.64	1.49	1.06	1.06	0.683	1.000
	7/16	9/16	9.8	2.87	3.26	1.32	1.07	1.04	3.26	1.32	1.07	1.04	0.684	1.000
	3/8	½	8.5	2.48	2.87	1.15	1.07	1.01	2.87	1.15	1.07	1.01	0.687	1.000
	5/16	7/16	7.2	2.09	2.45	0.976	1.08	0.990	2.45	0.976	1.08	0.990	0.690	1.000
	¼	3/8	5.8	1.69	2.01	0.794	1.09	0.968	2.01	0.794	1.09	0.968	0.694	1.000
L 2½×3 ×	½	11/16	10.2	3.00	3.45	1.45	1.07	1.13	2.33	1.10	0.881	0.875	0.621	0.714
	7/16	⅝	9.1	2.65	3.10	1.29	1.08	1.10	2.09	0.975	0.889	0.853	0.622	0.718
	3/8	9/16	7.9	2.30	2.72	1.13	1.09	1.06	1.85	0.851	0.897	0.830	0.625	0.721
	¼	½	6.6	1.93	2.33	0.954	1.10	1.06	1.58	0.722	0.905	0.808	0.627	0.724
	3/16	7/16	5.4	1.56	1.91	0.776	1.11	1.04	1.30	0.589	0.914	0.785	0.631	0.727
L 2½×2½×	½	11/16	9.4	2.75	3.24	1.41	1.09	1.20	1.36	0.760	0.704	0.705	0.534	0.466
	7/16	¾	8.3	2.43	2.91	1.26	1.09	1.18	1.23	0.677	0.711	0.682	0.535	0.491
	3/8	5/8	7.2	2.11	2.56	1.09	1.10	1.16	1.09	0.592	0.719	0.660	0.537	0.496
	5/16	½	6.1	1.78	2.19	0.927	1.11	1.14	0.939	0.504	0.727	0.637	0.540	0.501
	¼	7/16	4.9	1.44	1.80	0.755	1.12	1.11	0.777	0.412	0.735	0.614	0.544	0.506
L 3 ×3 ×	½	11/16	9.4	2.75	2.22	1.07	0.898	0.932	2.22	1.07	0.898	0.932	0.584	1.000
	7/16	⅝	8.3	2.43	1.99	0.954	0.905	0.910	1.99	0.954	0.905	0.910	0.585	1.000
	3/8	9/16	7.2	2.11	1.76	0.833	0.913	0.888	1.75	0.833	0.913	0.888	0.587	1.000
	5/16	½	6.1	1.78	1.51	0.707	0.922	0.865	1.51	0.707	0.922	0.865	0.589	1.000
	¼	7/16	4.9	1.44	1.24	0.577	0.930	0.842	1.24	0.577	0.930	0.842	0.592	1.000
	3/16	⅜	3.71	1.09	0.962	0.441	0.939	0.820	0.962	0.441	0.939	0.820	0.596	1.000

Annex-1

DOUBLE ANGLES

Two unequal leg angles

Properties of sections

Long legs back to back

Designation	Wt. per Ft 2 Angles	Area of 2 Angles	AXIS X-X				AXIS Y-Y				Q_s*			
							Radii of Gyration Back to Back of Angles, in.				Angles in Contact		Angles Separated	
			I	S	r	y					F_y = 36 ksi	F_y = 50 ksi	F_y = 36 ksi	F_y = 50 ksi
	Lb.	in.^{2}	in.^{4}	in.^{3}	in.	in.	0	3/8	3/4					
L 8×8 ×1	86.4	26.0	151.0	30.2	2.49	2.66	2.39	2.52	2.66		—		—	
7/8	67.6	19.9	126.0	23.3	2.53	2.56	2.35	2.48	2.62		—		—	
1/2	46.0	13.5	88.6	16.0	2.56	2.47	2.32	2.44	2.57		—		.911	.834
L 8×4 ×1	74.8	22.0	109.0	28.1	2.52	3.05	1.47	1.61	1.75		—		—	
3/4	57.4	16.9	109.0	21.8	2.55	2.95	1.42	1.56	1.69		—		—	
1/2	39.2	11.5	77.0	15.0	2.59	2.86	1.38	1.51	1.64		—		.911	.834
L 7×4 × 3/4	52.4	15.4	75.9	16.8	2.22	2.51	1.48	1.62	1.76		—		—	
1/2	36.8	10.5	53.3	11.6	2.25	2.42	1.44	1.57	1.71		—		.965	.837
3/8	27.2	7.97	41.1	8.88	2.27	2.37	1.43	1.55	1.68		—		.828	.720
L 5×4 × 3/4	47.2	13.9	48.0	12.5	1.86	2.08	1.55	1.69	1.83		—		—	
5/8	40.0	11.7	42.1	10.6	1.90	2.03	1.53	1.67	1.81		—		—	
1/2	32.4	9.50	34.8	8.67	1.91	1.99	1.51	1.64	1.78		—		.965	.837
3/8	24.6	7.22	26.9	6.64	1.93	1.94	1.50	1.62	1.76		—		.911	.834
L 6×3½× 5/8	35.4	6.84	25.7	6.43	1.94	2.04	1.26	1.39	1.53		—		.911	
7/16	19.6	5.74	21.8	5.47	1.95	2.01	1.26	1.38	1.51		—		.825	
L 5×2½× 5/8	39.8	11.6	27.8	8.55	1.55	1.75	1.40	1.53	1.68		—		—	
1/2	27.2	8.00	20.0	5.97	1.58	1.66	1.35	1.49	1.63		—		—	
3/8	20.8	6.09	15.6	4.59	1.60	1.61	1.34	1.46	1.60		—		.982	
5/16	17.4	5.12	13.2	3.87	1.61	1.59	1.33	1.45	1.58		—		.911	
L 5×3 × 1/2	25.8	7.50	18.9	5.82	1.59	1.75	1.12	1.25	1.40		—		—	
3/8	19.6	5.72	14.7	4.47	1.61	1.70	1.10	1.23	1.37		—		.982	
5/16	16.4	4.80	12.5	3.77	1.61	1.68	1.09	1.22	1.36		—		.911	
1/4	13.2	3.88	10.2	3.06	1.62	1.66	1.08	1.21	1.34		—		.804	

* Where no value of Q_s is shown, the angles comply with the noncompact section criteria of Specification Sect. B5.1 and may be considered fully effective.

For F_y = 36 ksi: $Q_s = 126.1/\sqrt{Q_a}$

For F_y = 50 ksi: $Q_s = 107.0/\sqrt{Q_a}$

DOUBLE ANGLES

Two unequal leg angles

Properties of sections

Long legs back to back

Designation	Wt. per Ft 2 Angles	Area of 2 Angles	AXIS X-X				AXIS Y-Y				Q_s*			
							Radii of Gyration Back to Back of Angles, in.				Angles in Contact		Angles Separated	
			I	S	r	y					F_y = 36 ksi	F_y = 50 ksi	F_y = 36 ksi	F_y = 50 ksi
	Lb.	in.^{2}	in.^{4}	in.^{3}	in.	in.	0	3/8	3/4					
L 4 ×3½×½	23.8	7.00	10.6	3.87	1.23	1.25	1.44	1.58	1.72		—		—	
7/16	18.2	5.34	8.25	2.99	1.25	1.21	1.42	1.56	1.70		—		—	
5/16	15.4	4.49	7.12	2.53	1.26	1.18	1.42	1.55	1.69		—		.997	.855
1/4	12.4	3.63	5.83	2.05	1.27	1.16	1.41	1.54	1.67		—		.982	.911
L 4 ×3 ×½	22.2	6.50	10.1	3.78	1.25	1.33	1.20	1.33	1.48		—		—	
7/16	17.0	4.97	7.98	2.82	1.26	1.28	1.18	1.31	1.45		—		—	
5/16	14.4	4.18	6.76	2.47	1.27	1.26	1.17	1.30	1.44		—		.997	.855
1/4	11.6	3.38	5.54	2.00	1.28	1.24	1.16	1.29	1.43		—		.911	.834
L 3½×3 ×7/16	15.8	4.59	5.45	2.25	1.09	1.08	1.22	1.36	1.50		—		—	
5/16	13.2	3.87	4.66	1.91	1.10	1.06	1.21	1.35	1.49		—		.966	
1/4	10.8	3.13	3.80	1.55	1.11	1.04	1.20	1.33	1.48		—		.965	.837
L 3½×2½×7/16	14.4	4.22	5.12	2.19	1.10	1.16	.976	1.11	1.26		—		—	
5/16	12.2	3.55	4.38	1.85	1.11	1.14	.966	1.10	1.25		—		.966	
1/4	9.8	2.88	3.60	1.51	1.12	1.11	.958	1.09	1.23		—		.965	.837
L 3 ×2½×5/16	13.2	3.84	3.31	1.62	.928	.956	1.02	1.16	1.31		—		—	
1/4	9.8	2.63	2.56	1.12	.945	.911	1.00	1.13	1.28		—		—	.961
3/16	6.77	1.89	1.81	.869	.957	.868	.993	1.12	1.27		—		.911	.834
L 3 ×2 ×5/16	11.8	3.47	3.06	1.56	.940	1.04	.777	.917	1.07		—		—	
1/4	10.0	2.93	2.63	1.33	.948	1.02	.767	.903	1.06		—		—	
3/16	8.2	2.38	2.17	1.08	.957	.999	.757	.891	1.04		—		—	.961
1/8	6.1	1.80	1.68	.830	.966	.976	.749	.879	1.03		—		.911	.834
L 2½×2 ×5/16	10.6	3.09	1.82	1.09	.768	.831	.819	.961	1.12		—		—	
1/4	9.0	2.62	1.58	.932	.776	.809	.809	.948	1.10		—		—	
3/16	7.2	2.13	1.31	.763	.784	.787	.799	.935	1.09		—		—	
1/8	5.5	1.62	1.02	.586	.793	.764	.790	.923	1.07		—		.962	.840

* Where no value of Q_s is shown, the angles comply with the noncompact section criteria of Specification Sect. B5.1 and may be considered fully effective.

For F_y = 36 ksi: $Q_s = 126.1/\sqrt{Q_a}$

For F_y = 50 ksi: $Q_s = 107.0/\sqrt{Q_a}$

American Institute of Steel Construction

The University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination Spring 2011
Program: B.Sc. Engineering (Civil)

Course Title: Environmental Engineering III Course Code: CE 431 Credit: 2.00
Time- 1 hour Full marks: 60

There are **FOUR** questions. Answers any **THREE**. *(3 X 20 = 60)*

1. (a) Describes shortly with diagram of recycling and resources recovery system in urban centers. (12)

   (b) Write down the functional elements of a complete solid waste management. (8)

2. (a) Write down the types of waste materials. (5)

   (b) Using the typical percentage distribution data given below the table, (below) estimate the energy of each fraction the solid wastes. If 80% of the cardboard, 80% of paper and 80% of yard wastes are recovered by the home owner, also estimate the remaining energy of solid wastes. (7.5+7.5)

Component	Weight (%)
Food waste	32.5
Paper (mixed)	35
News print	5
Cardboard	4
Rubber	0.5
Plastics	3
PVC	0.5
Leather shoe	0.5
Textiles	3
Yard waste	13
wood	3

3. (a) What is source reduction? Differentiate between the hauled container system and stationary container system with necessary figures. (2+6)

   (b) Solid waste from a new industrial park is to be collected in large containers, some of which will be used in conjunction with stationary compactors. Based on traffic studies at similar parks, it is estimated that the average time to drive from the garage to the first container (t_1) and from the last container (t_2) to the garage each day will be 30 and 25 minutes, respectively. The average time required to drive between containers is7 minutes and the one-way distance to the disposal site is 30 km (speed limit: 56 km/h). Determine the actual length of the working day. (12)

4. (a) Name the collection systems on the basis of availability of services. Write down the benefits of transfer station. (2+6)

(b) Solid wastes from Dhanmondi area to be collected using a stationary container collection system having 5 cubic meter containers. Determine the appropriate truck capacity for the following conditions: (12)

- Container utilization factor = 0.70
- Average number of containers at each location = 2
- Collection – vehicle compaction ratio= 2.5
- Container unloading time= 0.15 h/ container
- Average drive time between container location= 0.15 h
- One way haul distance= 35 km
- Speed limit= 72 km/hr
- Time from garage to first container location= 0.25 h
- Time from garage to last container location= 0.35 h
- Number of trips to disposal site per day= 2
- Length of working day= 8h

The University of Asia Pacific
Department of Civil Engineering
Mid-Term Examination, Spring 2011

Course # CE 441 | Course Title: Geotechnical Engineering II
Full Marks: 40 (10 X 4 = 40) | Time: 1 hour

Answer any **four (4)** of the following **five (5)** questions

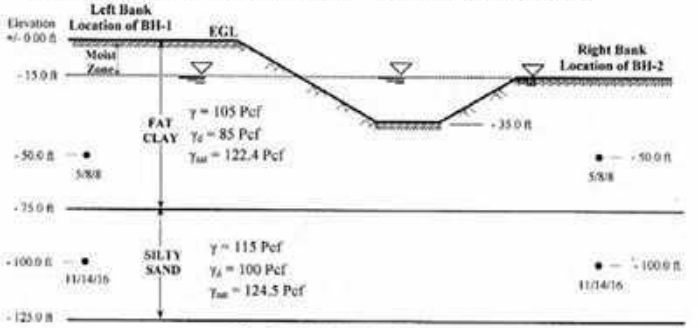
1. (a) Define geotechnical sub-surface exploration (SSE). Mention (names only) the steps of field investigation phase of a geotechnical subsurface exploration program. 2

   (b) Write down any three (3) general guidelines (GG) used for the selection of depths of boreholes. 3

   (c) Mention the names of four drilling/boring techniques used for making exploratory boreholes. Also mention the one, most frequently used in Bangladesh. Mention its reason. 3

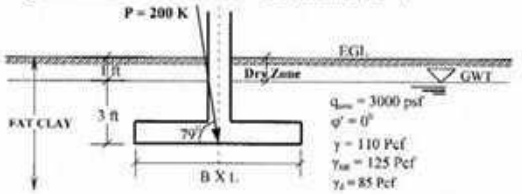
   (d) Write down the names of any five (5) in-situ testing performed in the field under the field investigation phase of a sub-surface exploration (SSE) program. Which one is most commonly used? 2

2. A **preliminary** geotechnical site investigation was conducted at a site, in Bangladesh, as shown below. Determine cohesion and angle of internal friction at corresponding depths (for both boreholes) of the clay and sand deposits, respectively, based on the available data (Use empirical correlations as provided in **Appendix**). Use hammer efficiency as 0.55%. **10**



Subsurface Soil Stratigraphy

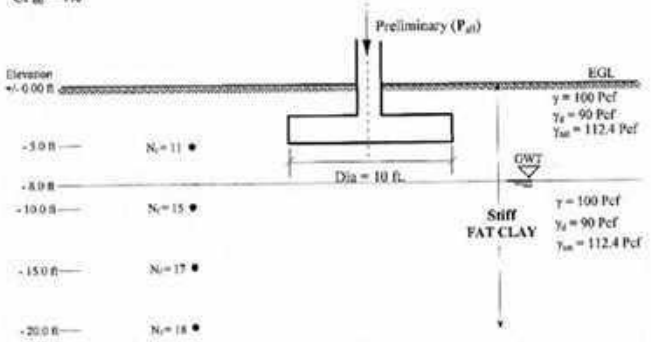
3. Using General Bearing Capacity Equation (GBCE), design the size of the rectangular footing for the following conditions. L = 1.5B. Use FS = 2.5. Assume $D_f/B < 1$. **10**



4. (a) Write down the advantages of General Bearing Capacity Equation (GBCE) over Terzaghi's Bearing Capacity Equations (TBCE). 2.5

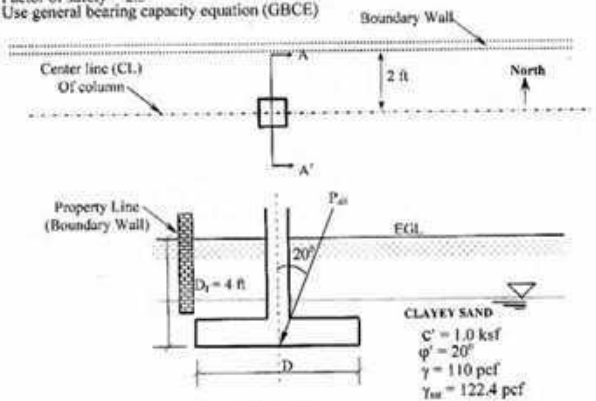
(b) During a field investigation SPT-N values were obtained at each 5-foot depth intervals. Using Terzaghi's bearing capacity equation (as appropriate), calculate the allowable column load of the individual column circular footing for the following condition. Use FS = 3. 7.5

NOTES: No laboratory tests were conducted to obtain the shear strength of the clay formation. So, use empirical correlation (thumb) to estimate the average shear strength below the foundation level and use that for estimating preliminary allowable column load. Assume $CF_{st} = 1.0$



5. For the following given conditions, determine the allowable column load (P_{all}) for the following footing. 10

- Foundation spread cannot go beyond the interior of the boundary wall
- Centerline (CL) of the column is 2 feet south of the property line
- Circular footing
- Column location cannot be moved
- Factor of safety = 2.5
- Use general bearing capacity equation (GBCE)



SEC A-A'

The University of Asia Pacific
Department of Civil Engineering
Mid-Term Examination Spring' 2011

Course No: CE 451 — Course Title: Transportation Engineering II
Full Marks: 60 — Time: 1 hour

Answer any 3 out of 4 questions:

1. Design is required for a new pavement to be constructed in 2015. The annual average daily traffic for commercial vehicles on the opening day will be 1200. Growth rate = 3% , Subgrade CBR = 5% , Design life = LR1132 standard. Draw the cross section of the pavement as well. (20)

2. Determine the pavement thickness for a rigid pavement based on given specifications:
– design load = 45 msa
– 28 day cube concrete strength of the pavement = 50 Mpa
– Granular Type 1 subgrade with CBR value = 5%
– Failed slabs = 10%
(a) What will be the slab thickness at 50% probability of survival for JRC (R = 636 mm^2/m) and URC? (10)
(b) How much will the thickness vary if we expect 85% probability of survival? (5)
(c) If the pavement has tied shoulder then what will be its thickness when the probability of survival is 85%? (5)

3. A pavement has a current rate of flow of 800 commercial vehicles per day using the slow lane. It is 8 years old. The damage factor over the time since opening is set at 0.9. The historic growth rate was estimated at 2%. The standard deflection was measured as 50×10^{-2} mm.
Assume a bituminous roadbase and surfacing:
(a) Estimate the life in millions of standard axles that the pavement has a 0.5 probability of achieving (5)
(b) Estimate the life in millions of standard axles that the pavement has a 0.9 probability of achieving. (5)
Comment on the condition of the pavement (regarding how much of the design life got exhausted)
(c) If a further 10 years of service is required from the pavement and the vehicle damage factor is expected to be 1.03 over this time span, estimate the thickness of bituminous overlay required to provide sufficient strengthening. The future growth rate for traffic is set at 4%. Assume a 0.5 probability level. (10)

4. (a) A CBR test on a sample of subgrade as well as that of the standard material yielded the data shown in Table 1. Calculate the CBR of the subgrade. Comment on the result. What is the name of the standard material having CBR = 100%? (12)

Table 1

Test Sample		Standard Material (CBR = 100%)	
Penetration (mm)	Load (kN)	Penetration (mm)	Load (kN)
2	5.2	2	11.5
4	8.1	4	17.6
6	12.7	6	22.2
8	18.4	8	26.3
10	22.5	10	30.3
12	15.1	12	33.5

(b) Assume that due to some limitations it was not possible to perform CBR test for a subgrade soil. Instead, the engineers calculated the plastic limit and liquid limit of the soil to be 70 and 100 . The road was being built in a landscape where the water table is more than 500 mm below formation level. The road area is protected during adverse weather conditions. A thick pavement construction has been recommended by the engineers. What will be the CBR of the soil sample? (8)

The University of Asia Pacific
Department of Civil Engineering
Semester Final Examination, Spring - 2011
Program: B. Sc Engineering (2nd Year/ 1st Semester)

Course Title: Basic Electrical Engineering Course No. ECE 201 Credit Hours: 3.00

Time: 1.00 Hour Full Marks: 60

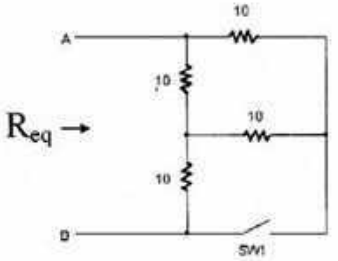
[There are **four** questions. Answer any **three**. Figures in the right margin indicate marks]

1 a. Define the following term 10

i) Voltage ii) Current iii) Power iv) Active element v) Dependent source

b. Find out R_{eq} at the terminal A-B i) when SW1 is open ii) when SW1 is closed 10

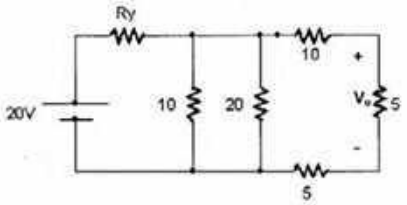
All the resistance values are in ohms.



2. a. State KVL and ohm's Law. 4

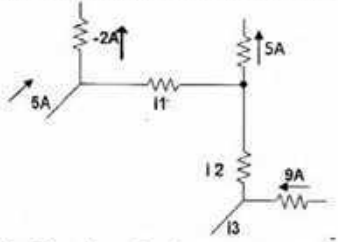
b. Find out the equation of current in a straight conductor. 5

c. Find out the V_o and also the value of R_y. Given that $R_T = 10$ ohm. All the resistance values are in ohms. 11

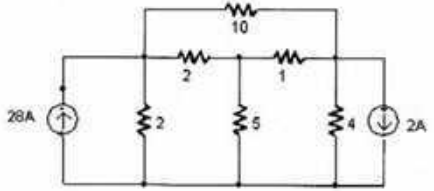


3 a. What do you understand by short and open circuit condition? 5

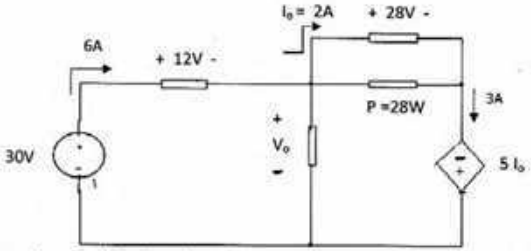
b. Find out the value and the direction of unknown currents in the given circuit 5



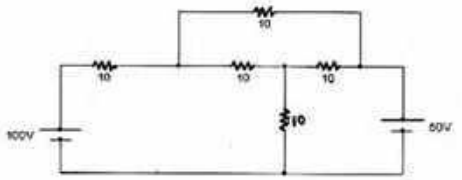
c Using Nodal analysis find out the node voltages. All the resistance values are in ohms. 10



4 a. Find out V_o. All the resistance values are in ohms. 10



b. Using mesh analysis find out the mesh currents. All the resistance values are in ohms. 10



The University of Asia Pacific
Department of Architecture/ Business Admin/ CE/ CSE
Mid-term Examination: Spring 2011
Program: B Arch/ BBA/ B. Sc Engineering

Course Title: English Language I | Course Code: HSS 101 | Credit: 3 .00
Time: 1.00 Hour | Full Mark: 20

Name of the Student:..... Registration No:.....

Department:.....Invigilator's Signature:.....

(Answer all the questions on the question paper)

Q. 1. The following extract is about *Paul.* Read and complete the questions. 2.5

Paul is a singer in a band. He has already made 42 records. He started to sing with a band named Whispering Bob in 1999. He has five band members in the studio and they have all been together as a band since then. When he was at school, he started writing songs in his bedroom. Some of their concerts were pretty bad. They play guitar, violin, piano, bass and keyboards... They describe their style of band as rock band. They are going to play in Australia in 2012 for the first time.

a. ----------records ----------?

b. When ----------?

c. ----------as a band?

d. How ----------?

e. Where ---------- next year?

Q.2. Complete the following sentences with negatives. (any three) 3

a. She had a cold. So she ---------- party.

b. She is the only child of her parents. She ----------.

c. I've to look up the words in the dictionary because I ----------.

d. Butterflies ----------.

e. I liked everything except the climate. ----------.

Q.3. Complete the following sentences using appropriate forms of pronouns (any five) 2.5

It's Friday afternoon and Samira is ready to go home...

'Oh good! The wages are here. Now which envelope is ----------? It's great. My very first wage packed! And I earned it all ----------. Which one is --------, Annie? The other one must be for Stella. Yes, this one's ----------. It's much bigger than --------- ---------- because ---------- earns more than we do.

Q.4. Complete the following passage using *any, some, anything, somebody, nothing* etc. 2.5

I think I need ---------- changes in my life. I don't seem to get ---------- pleasure from my job ---------- more. I along with some of my friends went to a restaurant last

night. But the restaurant didn't look very nice. So I said, "Can we go ---------- else?" Sumi said, "What do you want for supper?" ----------, I don't mind.

Q.5. Read the passage and put in the missing *a, an, the or – (for no article)* where necessary. **2.5**

When you arrive, get ---------- taxi from ---------- airport to 'The Lodge'. It is---------- vegetarian guest house up in ---------- hills outside ---------- capital. ---------- owners are two musicians from Swansea, who wanted to create ---------- kind of holiday that they had always wanted to have. The guest house costs less than ---------- hotel, and ---------- is clean and the food is fresh and healthy. You can hire ---------- bicycle to go there.

Q.6. Write a biography of Albert Einstein, one of the most influential scientists of this age, from the information below **7**

Name:	Albert Einstein
Born:	March 14, 1879 Ulm, Württemberg, Germany
Died:	April 18, 1955 (aged 76) Princeton, New Jersey, U.S.
Spouse(s):	Mileva Marić (1875 - 1948) Elsa Einstein (1876 - 1936)
Children:	Eduard Einstein (1910 - 1965) Hans Albert Einstein (born in 1904)

Achievements:

1905: Known as his "Annus Mirabilis" — or "miracle year". Obtains his Doctorate degree and publishes four of his most influential research papers, including the Special Theory of Relativity.

1921: Awarded the Nobel Prize in physics.

1933: Emigrates to the USA, takes up professorship at the prestigeous Institute for Advanced Study.

Start writing here:

The University of Asia Pacific
Department of Architecture/ Business Admin/ CE/ CSE
Mid-term Examination: Spring 2011
Program: B Arch/ BBA/ B. Sc Engineering

Course Title: English Language II Course Code: HSS 103 Credit: 3 .00
Time: 1.00 Hour Full Mark: 20

Name of the Student:.....Registration No:.....

Department:.....Invigilator's Signature:.....

1. Rewrite any six (06) of the following sentences correctly: 03
   a) His stories of success was appreciated by the audience.
   Ans: .....
   b) The United States have a big army.
   Ans: .....
   c) The data cited here is collected from authentic sources.
   Ans: .....
   d) One of the students have not turned up yet.
   Ans: .....
   e) All the paragraphs in this essay is well-constructed.
   Ans: .....
   f) Neither the boy nor his friends is present.
   Ans: .....
   g) Each of the loans have been recalled by the bank.
   Ans: .....
   h) I, you and he can easily work as a team.
   Ans: .....

2. Change the forms of voice of any six (06) of the following sentences: 03
   a) His report confused me.
   Ans: .....
   b) Do not touch anything without permission.
   Ans: .....
   c) The investigation will be started by the police next month.
   Ans: .....
   d) He did not give any suggestion about this.
   Ans: .....
   e) Who showed you my work?
   Ans: .....
   f) Which book do you prefer?
   Ans: .....
   g) Hurrah! We have won the match.
   Ans: .....
   h) They did nothing until he came.
   Ans: .....

3. Complete any four (04) of the following sentences using correct conditionals: 02
   a) If you invite me, ...
   b) ....., if I were you.
   c) If I had enough money, ...
   d) ....., he would do it.

e) If he had been thirsty, ...

f) ..... if you are not careful.

4. Change the forms of speeches of any six (06) of the following sentences: 03

a) The teacher said to me, "Did you understand my instructions?"

Ans: .....

b) He said to me, "I met my best friend last year."

Ans: .....

c) He told us that he had come to see us.

Ans: .....

d) The teacher said to the students, "Take down all the points."

Ans: .....

e) He said to me, "Let us work together."

Ans: .....

f) He said to me, "Shall I send it to you by post?"

Ans: .....

g) He said, "Alas! The house is on fire."

Ans: .....

h) "Run away, children," said their mother.

Ans: .....

5. Make sentences with any two (02) of the following pairs of words: 02

a) Crime:.....

Sin :.....

b) Hire :.....

Rent :.....

c) Climate:.....

Weather:.....

6. Write one synonym and one antonym of any two (02) of the following words and make sentences with those synonyms and antonyms: 04

a) *Absurd:*

Synonym:..... Sentence: .....

Antonym:..... Sentence: .....

b) Counterfeit:

Synonym:..... Sentence: .....

Antonym:..... Sentence: .....

c) Durable:

Synonym:..... Sentence: .....

Antonym:..... Sentence: .....

7. Make sentences with any six (06) of the following phrases: 03

a) Put Heads together: .....

b) By heart:.....

c) Give a hand: .....

d) In the soup: .....

e) Never mind: .....

f) Red-handed: .....

g) Green with envy: .....

h) User friendly: .....

Marks Obtained:**.....** ***Examiner's Signature:*** **.....**