Tanta University
Faculty of Engineering

Course Title: Transportation and Traffic Engineering

Time: 3 hours | Final Exam (70%) | Date:22nd January 2014

Solve All Questions & Assume Reasonably any Missing Data & Total Marks =70 Marks

Problem (1): (20 Marks)

a) Complete the following Sentences: **[6 Marks]**

1. To be effective, a traffic control device should meet five requirements ……., ……., ……., ……., and …….
2. The main purpose of intersection design is to ……. and …….
3. The boundary conditions for Greenshield's Model are……., ……. ,…… and…….

b) Draw the flow chart of the comprehensive urban transportation planning. **[4 Marks]**

c) Define each of the following expressions, use neat sketches as possible: **[10 Marks]**

1. Channelization
2. Types of Intersections
3. Desire lines diagrams
4. Level of Service
5. Travel Resistance
6. Utility Function
7. Non Home Based Trips
8. Trip
9. Occupancy Rate
10. Effective Green Time

Problem (2): (30 Marks)

An urban area is consisting of four zones; the existing (O/D) is given below:

O\D	1	2	3	4	Future Trips
1		200	150	100	**1800**
2	200		170	130	**1200**
3	150	170		120	**2200**
4	100	130	120		**800**
Future Trips	**1350**	**1100**	**2150**	**1400**	

It is required to:

a) Determine the future interchanges between the four zones using the **Average Growth Factor** method (Two iterations only are required). **[12 Marks]**

b) Determine the future interchanges between zones1-2, 2-3 using the **gravity model** if it is known that the trips between two zones are inversely proportional to the second power of travel time between zones, which is uniformly 20 minutes (One iteration only is required). **[4 Marks]**

c) Assign the (O/D) (existing trips) given above to the same network shown in **Figure (1), Use the All-or-nothing technique** (assume average running speed of 30 Km/hr). **[6 Marks]**

d) The utility function of the model choice is as follows: **[8 Marks]**

$$U_m = a_m - 0.05\,X_1 - 0.02\,X_2 - 0.015\,X_3 - 0.005\,X_4$$

If the future number of trips between zones is 1000 trip /person/ day. Considering a user choosing between three modes, passenger car (A), public bus (B) and Taxi (T). Also, considering the following situation:

Variable	X_1	X_2	X_3	X_4	a_m
Passenger car	6	3	20	200	-0.15
Public bus	10	15	40	50	-0.53
Taxi	4	5	15	150	-0.21

Determine the modal split ratios and number of future trips in PCUS for using passengers' cars, bus and Taxi, knowing that (Occupancy rates for passenger car , public bus and taxi are 2 & 30& 2.0 respectively, Also, one Public bus = 4 PCU.

Problem (3): **(20 Marks)**

a) A multilane highway needs to be designed with an expected DDHV of 1800 veh/hour with 10% trucks and a PHF of 0.90. Make the following assumptions: 11.0-ft lanes, adequate shoulders, undivided highway, 20 access points/mile on each side, 55 mph for the 85-th percentile speed, rolling terrain. Design the highway for a LOS (C). **[10 Marks]**

b) A small city consists of four zones (**I, II, III, IV**) as shown in **Figure (2)** where, **the average running speed is 50 Km/hr.** Assume that **DHV = 0.15 A.D.T.** and the lane capacity is 125 PCU/hr/lane. The future interchanges between zones represented as PCUS as resulted from the model split process and after applying the occupancy rate of all available modes of transportation in the city are represented in the following matrix

O\D	I	II	III	IV
I		1200	1500	1200
II	200		1000	900
III	1500	1000		1500
IV	1200	900	1500	

Adjustment for Lane Width	
Lane Width (ft)	Reduction in FFS mi/hr
12	0.0
11	1.9
10	6.6

Adjustment for Median Type	
Median Type	Reduction in FFS mi/hr
Undivided	1.6
Divided	0.0

Adjustment for Access points	
Access points/ mile	Reduction in FFS mi/hr
0	0
10	2.5
20	5.0
30	7.5
≥40	10

Adjustment for Lateral Clearance			
Four Lane Highways		Six Lane Highways	
Total Lateral Clearance (ft)	Reduction in FFS mi/hr	Total Lateral Clearance (ft)	Reduction in FFS mi/hr
12	0.0	12	0.0
10	0.4	10	0.4
8	0.9	8	0.9
6	1.3	6	1.3
4	1.8	4	1.7
2	3.6	2	2.8
0	5.4	0	3.9

Passenger Car Equivalent on Extended General Highway Segments			
Factor	Type of terrain		
	Level	Rolling	Mountainous
E_T	1.5	2.5	4.5
E_R	1.2	2.0	4.0

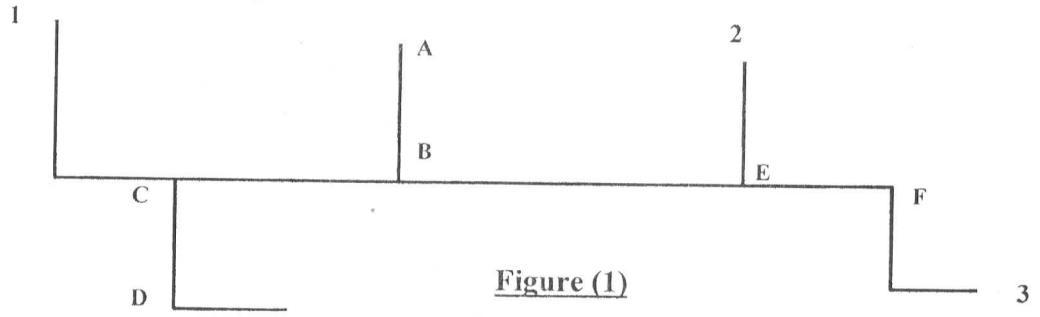


Figure (1)

Scale 1: 100000

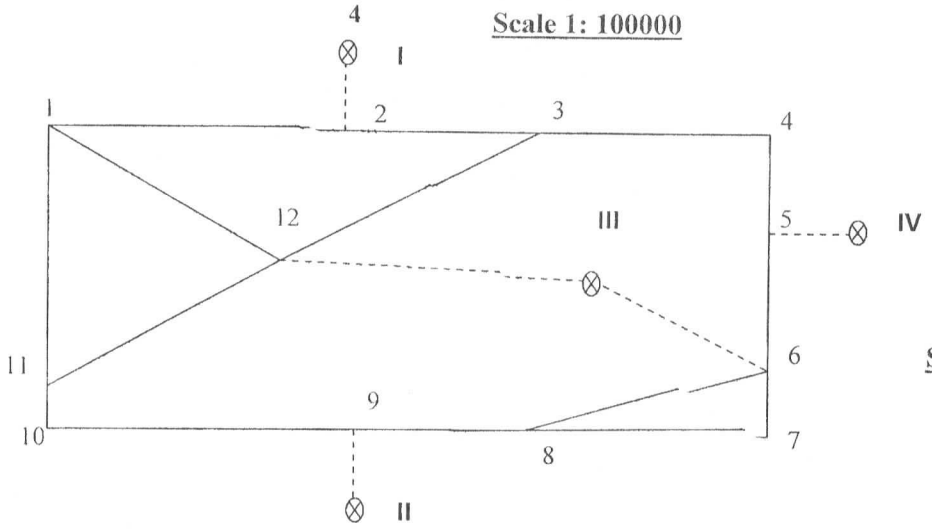
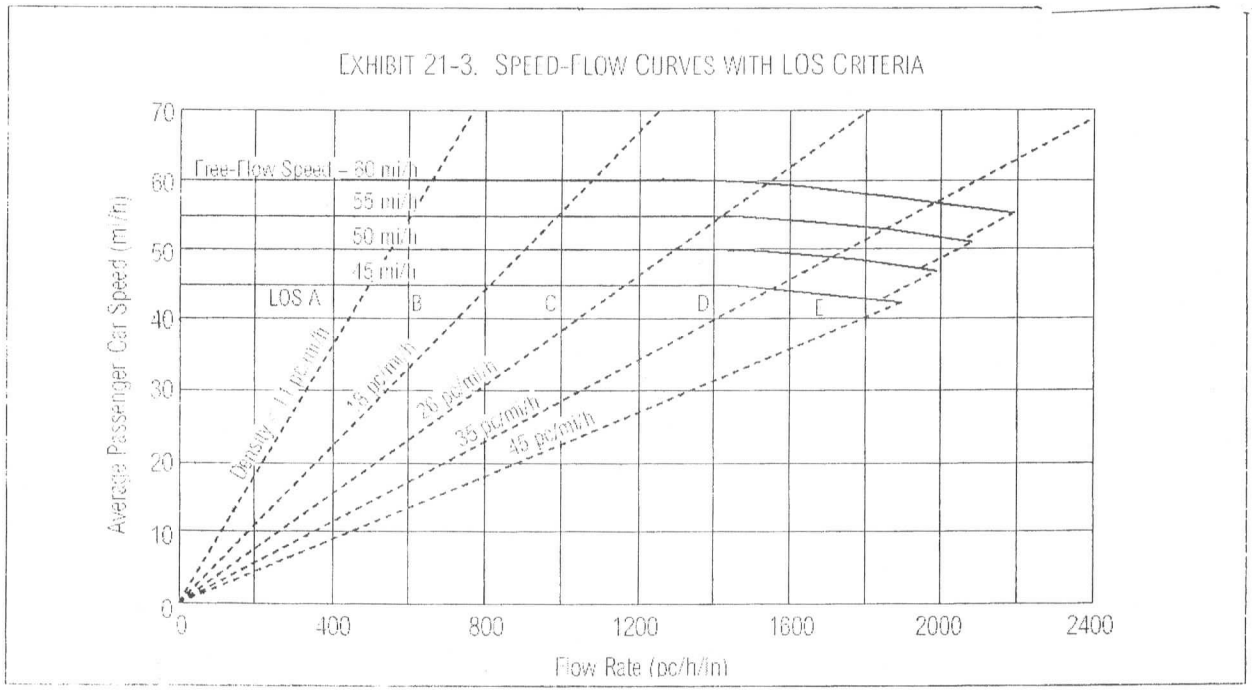


Figure (2)

Scale 1: 120000



TANTA UNIVERSITY

FACULTY OF ENGINNERIN

Theory of Structural | **Course Code: CSE 3109**

Third Year (هندسة مدنية) | **January 2014 (First Term)**

Allowed time: 4 hrs | **Total Marks: 125 Marks** | **No. of Pages: (2)**

Solve all questions

Question I (15 Marks)

Using the force method, draw the bending moment and shear force diagrams for the shown symmetric continuous beam in Fig. 1. **EI = constant.**

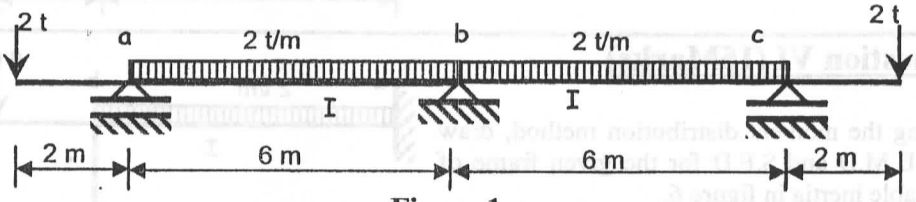


Figure 1

Question II (20 Marks)

For the two-hinged frame shown in Figure 2 (EI = constant), It is required to:

1. Use the force method to draw the bending moment and shear force diagrams due to the subjected loads.
2. In the absence of loads, draw the B.M.D. due to vertical downward movement 2 cm accompanied with horizontal outside movement 2 cm at support a.

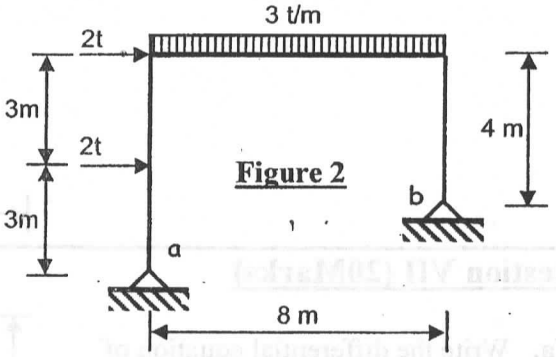


Figure 2

Question III (20 Marks)

Figure 3 shows a frame with an intermediate hinge at joint c. It is required to:

1. Draw the bending moment diagram.
2. Find the vertical deflection at c.

EI = 3000 t.m^2 and EA = 15000 t for link bd.

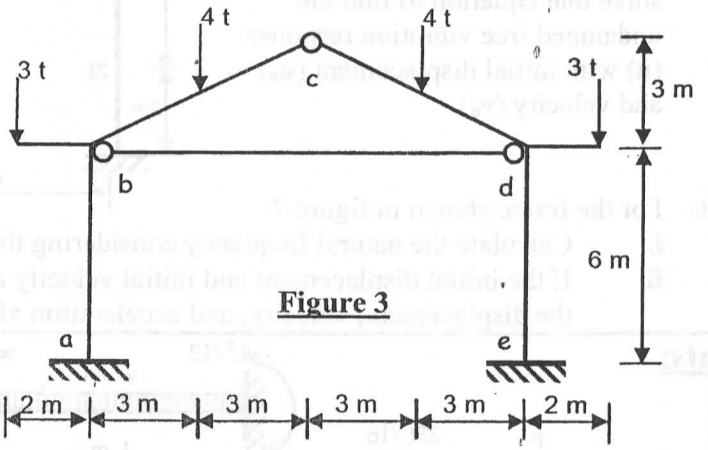


Figure 3

Question IV (15 Marks)

Using the slope deflection method, find the value of force P such that the maximum negative moment at b equals the maximum positive moment in span **bc**, further draw the B.M.D. and S.F.D for the given beam in Figure 4.

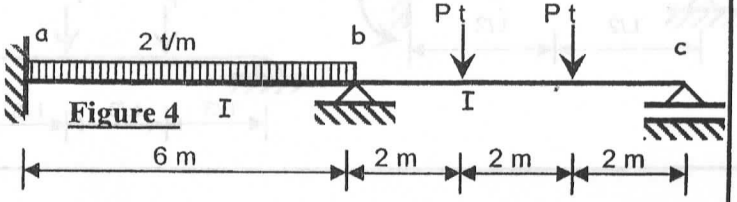


Figure 4

Question V (20 Marks).

Using slope-deflection method, draw the B.M.D for the given frame in figure 5.

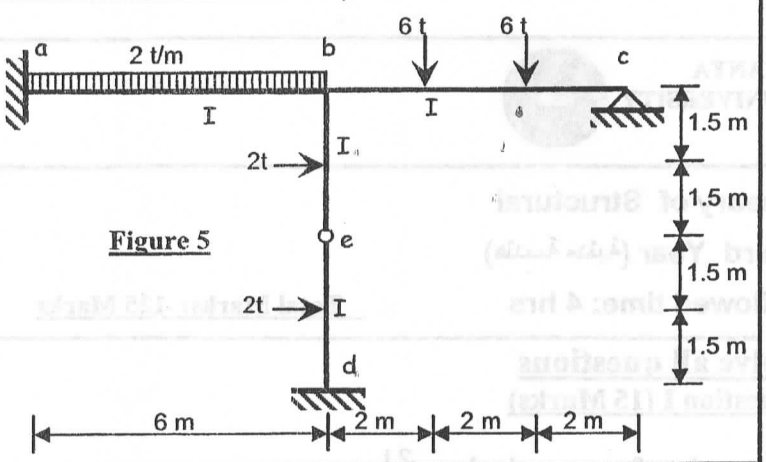


Figure 5

Question VI (15Marks)

Using the moment distribution method, draw the B.M.D and S.F.D for the given frame of variable inertia in figure 6.

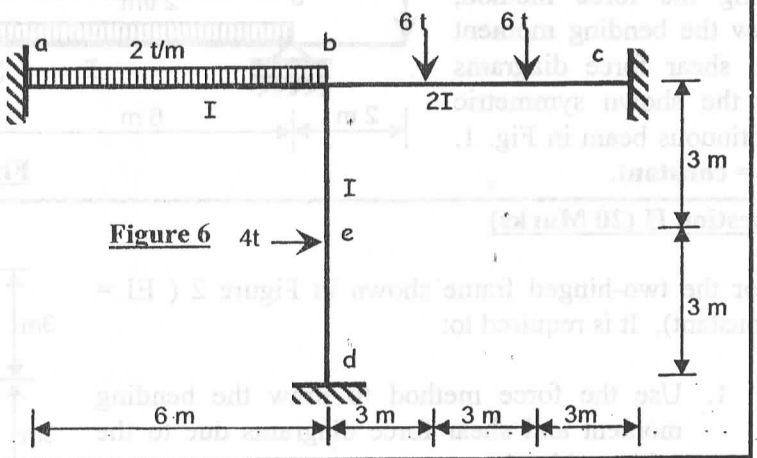


Figure 6

Question VII (20Marks)

a. Write the differential equation of undamped free body motion and solve that equation to find the undamped free vibration response (**u**) with initial displacement ($\mathbf{u_o}$) and velocity ($\mathbf{v_o}$).

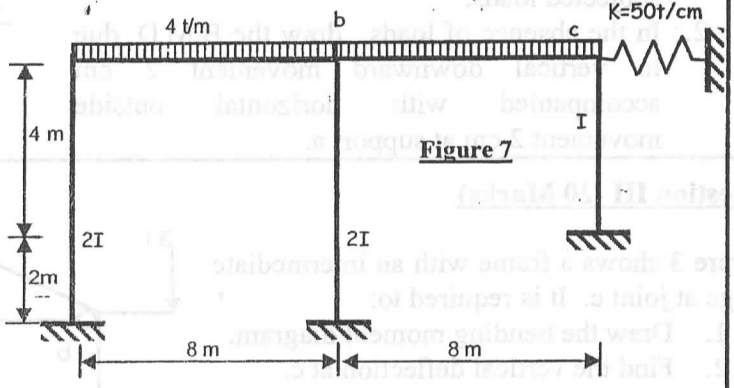
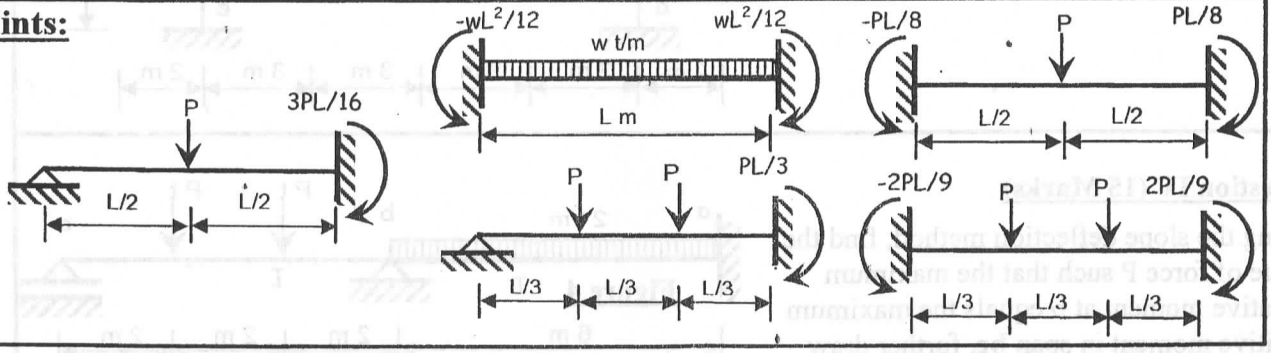


Figure 7

b. For the frame shown in figure 7:
   i. Calculate the natural frequency considering the horizontal girder to be infinity rigid.
   ii. If the initial displacement and initial velocity are 2cm and 40 cm/sec, respectively, find the displacement, velocity, and acceleration after 2 seconds.($I=0.04m^4$, $E=200t/cm^2$)

Hints:



ميكانيكا التربة (٢) ٣ مدنى

Tanta University

Department: Structural Engineering
Total Marks: 75 Marks

Faculty of Engineering

Course Title: Soil Mechanics (2)	Course Code: CSE3112	Year: 3rd Civil Eng.
Date: January 2014 (First term)	Allowed time: 3 hrs	No. of Pages: (4)

- Assume any missing data
- Answers should be supported by sketches
- **Answers should be <u>on the same order of Questions</u> (i.e., Answer No. 1, then No. 2, then No. 3 .... and so on)**

<u>Question Number (1)</u> ***(17 Marks)***

a) **What** is the purpose of soil exploration?. (2 marks)
b) **What** are the different steps of soil exploration?. (2 marks)
c) Using clear sketch, **show** how the geophysical testing can be used in soil exploration. (2 marks)
d) **Show** how the obtained value of "N" from Standard Penetration Test "SPT" should be modified to get "N_m". (3 marks)
e) Using clear sketch, **show** how to find out the in-situ density in case of cohesionless soil. (3 marks)
f) In a field density test, a core cutter weighing 970 gm is driven into the ground. The weight of the cutter filled with soil is 2890gm. considering that the cutter is 10cm diameter & 13 cm height, **find** the in-situ bulk density. If the natural water content is found to be 23%, **find** the in-situ dry density. (5 marks)

<u>Question Number (2)</u> ***(15 Marks)***

a) Why do we compact the soil in the field? (2 marks)
b) Why do we compact the soil in the laboratory? (2 marks)
c) Briefly explain a field test to determine the dry density of silty clay. (3 marks)
d) Define the term "Relative Compaction". (1 marks)
e) The following results were obtained from a standard compaction test. (The volume of the standard mould is 1000 cm^3 and $G_s = 2.7$)

Mass (g)	1768	1929	2074	2178	2106	2052	2007
w (%)	4	6	8	10	12	14	16

(I) Determine the optimum moisture content and maximum dry density. (3 marks)
(II) Plot the curves of 100%, 90% and 80% degree of saturation. (3 marks)
(III) Give the degree of saturation of the soil at the maximum dry density. (1 marks)

<u>Question Number (3)</u> ***(15 Marks)***

a) **Sketch** the relationship between type of earth pressure on a wall versus the displacement of the wall. (2 marks)
b) The following figure (1) shows two cases of retaining walls that are retaining approach fill of a bridge. **Sketch and label the type of earth pressures** distributions on vertical line AB in cases 1 and 2. Discuss the reason for your answer. (4 marks)
c) Assume the water front vertical wall in the following Figure (2) is a vertical wall which can rotate about its base a sufficient amount to produce a state of plastic equilibrium in the soil behind the wall. Considering the short term (undrained) and long term (drained) cases:
(I) **Estimate** and draw the earth pressure distributions behind the wall. (5 marks)
(II) **Estimate** and draw the earth pressure distributions in front of the wall below the dredged level. (4 marks)

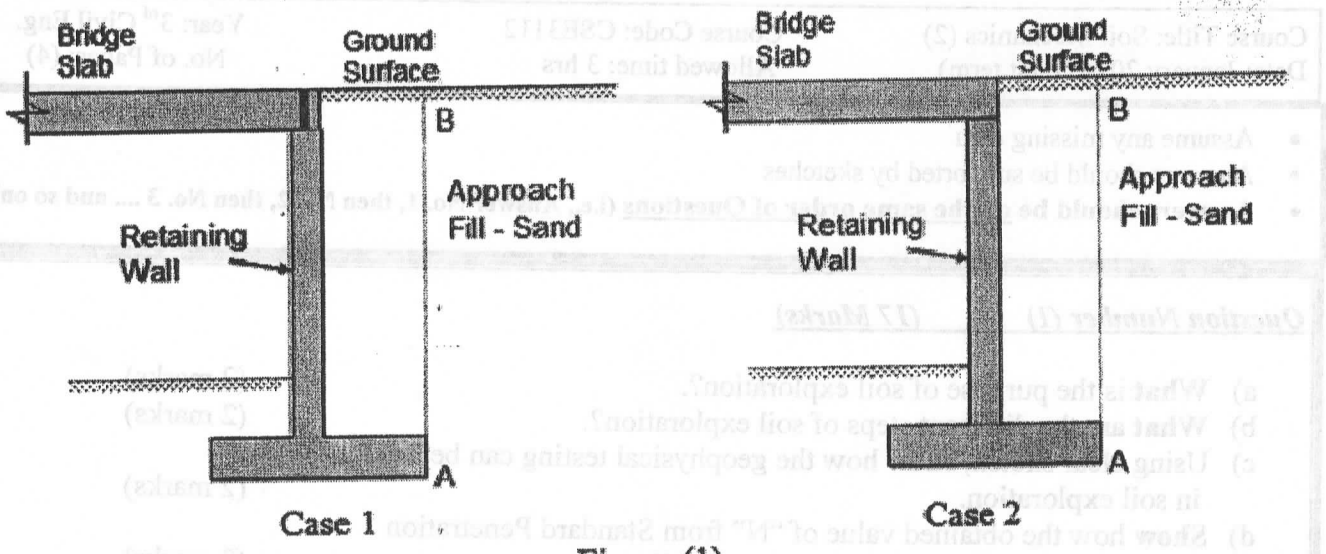


Figure (1)

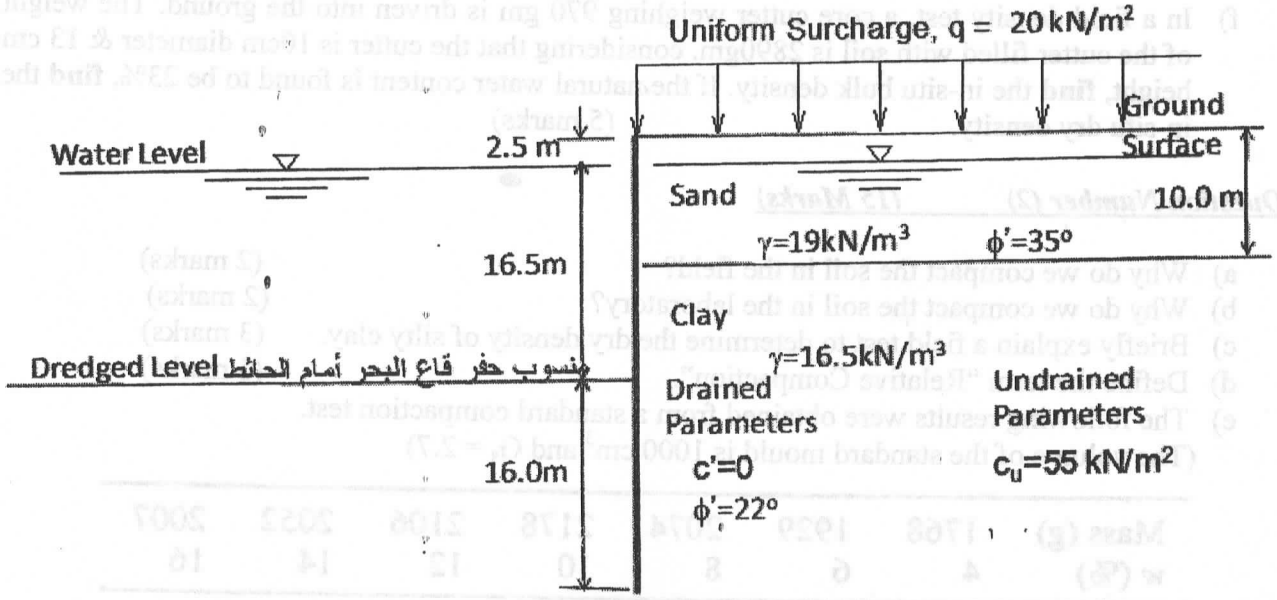


Figure (2)

Question Number (4) ***(16 Marks)***

a) An infinite slope exists at an angle "β" to the horizontal in a clay soil having a unit weight "γ" and effective strength parameters "c' " and "φ' ". Derive an expression for the factor of safety against failure along a shallow slip plane parallel to the ground surface. (3 Marks)

b) For the R.C. retaining wall shown in Fig. (3), Compute the factor of safety against sliding, overturning, bearing capacity failure, and the factor of safety against the shown trial rotational slip failure. (7 Marks)

c) Without checking the factor of safety against stability failure, it is required to design **the stem and the web** of a counterfort retaining wall to retain an earth embankment of 8.0 meters high above ground level. The foundation is to be 1.50 m deep where the net safe bearing capacity is 2.0 kg/cm^2 . The retained soil has a unit weight of 1.80 t/m^3 and the angle of internal friction = 30°. Draw to an appropriate scale the full details of reinforcements for the designed members. Consider fc= 50kg/cm^2, fs = 1400 kg/cm^2 (k_1=0.36, k_2=1237, q_{sh} =5.0 kg/cm^2, and q_b= 10 kg/cm^2). (6 Marks)

مدنية ٢٠١٤/١١/٤

TANTA UNIVERSITY
FACULTY OF ENGINEERING
DEPARTMENT OF STRUCTURAL ENGINEERING
EXAMINATION (THIRD YEAR) STUDENTS OF CIVIL ENGINEERING هندسة مدنية

TITLE: DESIGN OF REINFORCED CONCRETE STRUCTURES (2) a			COURSE CODE: CSE3110
DATE: January - 2014	TERM: FIRST	TOTAL ASSESSMENT MARKS: 85	TIME ALLOWED: 4 hours

Systematic arrangement of calculations and clear neat drawings are essential. Any missing data can be reasonably assumed. The exam consists of FOUR problems in two pages.

TRY ALL PROBLEMS

Problem # One (28Marks)

(A) Fig. 1 shows a plan of a typical floor of RC flat slab with panel 6.4 × 7.6m and slab thickness 0.25m (t_s= 250mm) without drop panel and with column head 1.60m×1.60m. The flat slab is resting on square columns 0.6mx0.6m. The marginal beams 0.3x0.9m are used at the outer edges of the flat slabs. The flat slab is subjected to uniformly ultimate (factorized) load, Wu= 21kN/m^2. **Materials:** f_{cu}= 30MPa, f_y= 360MPa. Using the empirical method of the Egyptian code of practice for design of flat slab, it is required to carry out the following:

i- Determine the critical bending moment in column and field strips in X direction only. **(6Marks)**

ii- Design the critical sections due to bending moment of strips in X direction only. **(6Marks)**

iii- Check one-way and two-way shear stresses (punching shear) for the interior column C1, considering the case of the total load only. **(6Marks)**

iv- Draw on plan and in cross sections the reinforcement details of the column and field strips in X direction only. **(5Marks)**

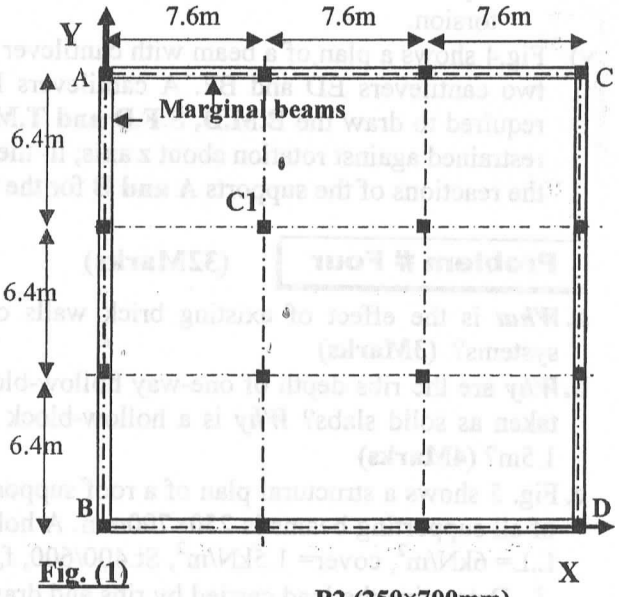


Fig. (1)

(B) Compute the loads acting on the marginal beam AB and the straining actions at critical sections if the live load is 7kN/m^2 and flooring cover is 1.75kN/m^2. **(5Marks)**

Problem # Two (7Marks)

Fig. 2 shows the layout of the first floor resting on eight columns with area 12×13.2m. The panelled beams system is required to cover the floor using the beam modules shown in figure. The slab is subjected to L.L= 6kN/m^2 and cover= 1.5kN/m^2. The slab thickness is 100mm. It is required to make a complete design (design + drawing details) of the panelled beam **Bx1** only. Determine the applied loads on the supporting beam **B2**. **Materials:** f_{cu}= 30MPa, f_y= 360MPa

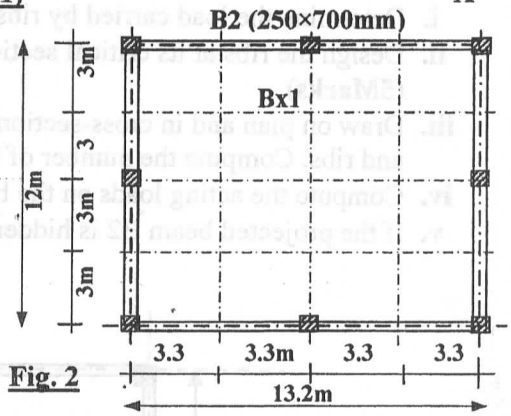


Fig. 2

Problem # Three (28Marks)

i) ***Discuss*** the actions of a longitudinal reinforcement providing in a torsional stresses? ***Proof*** the Code equation of the nominal ultimate torsional shear stress $q_{tu}= M_{tu}/2A_o*t_e$. **(3marks)**

ii) ***Why*** the code is recommended reducing the maximum ultimate shear stresses for sections subject to combined shear and torsion? ***Sketch*** the shear and torsion stirrups recommended by the Egyptian and ACI Codes. **(4marks)**

iii) ***Determine*** the **minimum depth, t,** of a cross-section shown in **Fig. 3** to resist an ultimate torsional moment M_{tu}= 160kN.m, taking the following **two cases**: i- without torsion reinforcement; ii- with torsion reinforcement. Consider $\Phi_{stirrup}$= 16mm, f_{cu}= 40MPa, $f_{y,stirrup}$= 240MPa, $f_{y,Long\ bars}$= 360MPa. **(7mark)**

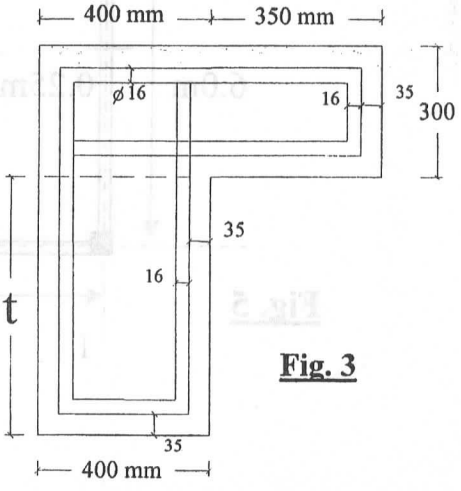


Fig. 3

P.T.O

iv) ***What*** are the differences between the following: **(5marks)**

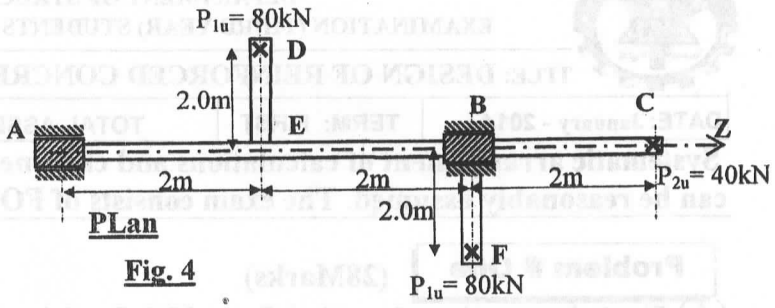
a- Minimum allowable stresses for shear and torsion.

b- Cross-section resisted shear stress and other resisted torsional shear stress.

c- Internal and external torsional moments.

d- Real and plastic hinges.

e- Equilibrium and statically indeterminate torsion.



PLan

Fig. 4

v) Fig.4 shows a plan of a beam with cantilever ABC supports a concentrated load 40kN at C. The beam carries two cantilevers ED and BF. A cantilevers ED and BF support concentrated loads 80kN at its ends. It is required to draw the **B.M.D, S.F.D and T.M.D** of the beam ABC in two cases: i- the supports A and B are restrained against rotation about z axis; ii- the support **A** is restrained against rotation about z axis. Determine the reactions of the supports **A and B** for the two cases. **(9marks)**

Problem # Four (32Marks)

a. ***What*** is the effect of existing brick walls on two-way hollow-block slab systems? ***Define*** a waffle slab systems? **(3Marks)**

b. ***Why*** are the ribs depth of one-way hollow-block slab systems taken as beams, whereas the bending moment taken as solid slabs? ***Why*** is a hollow-block slab system not effective in cantilever slabs of span less than 1.5m? **(4Marks)**

c. Fig. 5 shows a structural plan of a roof supporting on six projected beams and six columns. The cross-section of all supporting beams is 250×700mm. A hollow-block slab system is required. Consider the following data: L.L= 6kN/m^2, cover= 1.5kN/m^2, St.400/600, f_{cu}= 30MPa. It is required to carry out the following:

i. Determine the load carried by ribs and draw the B.M.D and S.F.D of critical ribs. **(6Marks)**

ii. Design the ribs at its critical sections. Compute the width of the needed solid parts due to the B.M and S.F. **(5Marks)**

iii. Draw on plan and in cross-sections the reinforcement details of the slabs and the arrangement of the blocks and ribs. Compute the number of blocks required to cover the slabs. **(5Marks)**

iv. Compute the acting loads on the beams **B1, B2** and on the column **C**. **(4Marks)**

v. If the projected beam B2 is hidden, determine its dimensions required to resist S.F and B.M. **(5Marks)**

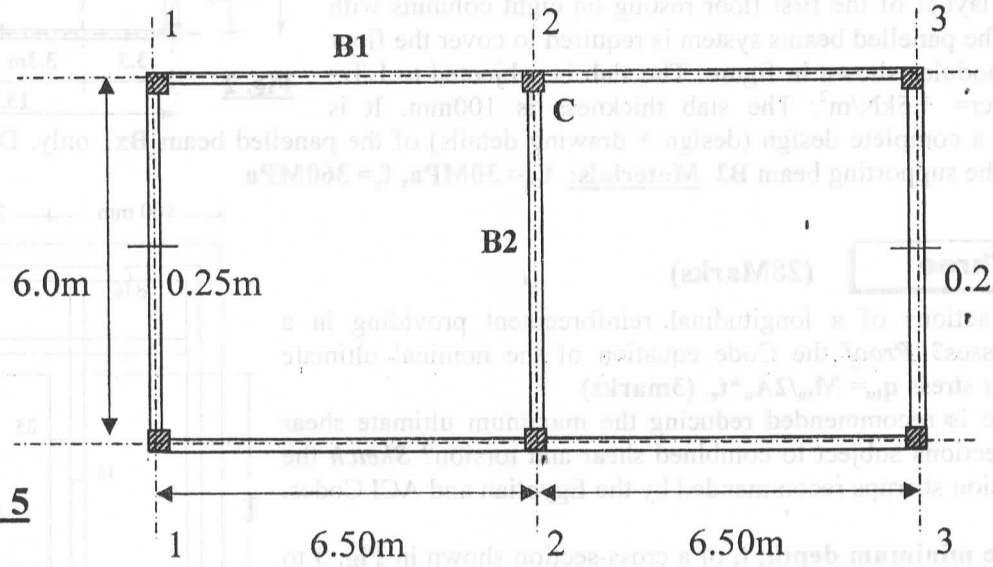


Fig. 5

All the best

Prof. Dr. Mohamed Kasem Prof. Dr. Tarek Fawzy El-Shafiey

Dept.: Structural Engrg.	Faculty: Engineering	University : Tanta
Time allowed: 3 hr. Date: January 2014	Course: Design of steel structures (a)	Course code: CSE3111 and CSE3124 Structural Dept[s].

Note:

- **It is allowed to use any tables or Egyptian Code of Practice books.**
- **Any missing data may be reasonably assumed.**
- **Attempt all questions. Max. Credit 100 % only.**
- **Number of examination pages: (03).**

112%

Question 1:

The double cantilever steel skeleton of an entrance of a building is built up of trusses type shown below. The cover of the system is reinforced concrete slab (γ = 2.5 t/m^3, 10 cm thickness) supported on purlins (spaced 1.5 m). The covered area of the entrance is 9.0 m (4.5+4.5) x 25 m. The spacing between trusses is 4.0 m.

Given the following data, answer the required questions.

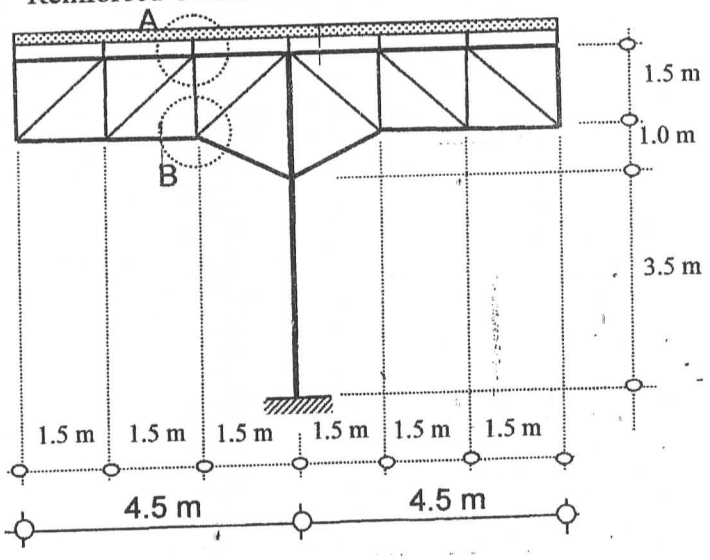
Data:

- Spacing between main systems = 4.0 m
- Own weight of steel structure **of roof only** = 40 kg/m^2 of covered area.
- Live load **on roof only** = 300 kg/m^2
- R.C. cover of 10 cm slab = 250 kg/m^2
- Finishing = 200 kg/ m^2

- Use steel grade **St52 (F_y = 3.6 t/cm^2 and F_u = 5.2 t/cm^2).**

Live load is 300 kg/m^2

Reinforced Concrete slab cover of 10 cm



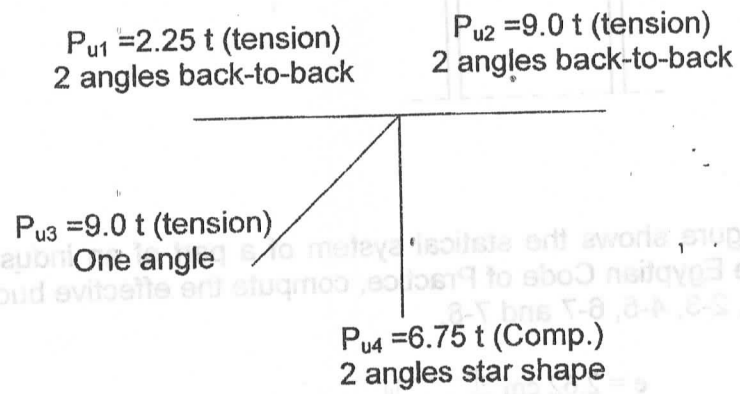
Required:

a) Draw to sketch different views showing the arrangements of bracing systems. The length of the covered area is 25.0 m. **(20 %)**

b) Calculate the ultimate design forces **(ONLY)** in marked members at joints B. **(15 %)**

c) Design an intermediate purlin as rolled steel section. **(15 %)**

d) The following figure shows suggested (P_u) given for truss members at joint **(A) of the previous truss**. It is required to **design** the members at this joint (consider their connections as welded ones). Also, calculate the required **welded lengths**. **Draw to scale 1:10** the details of joint **(A)** showing the purlin and the cover.**(25 %)**



Question 2:

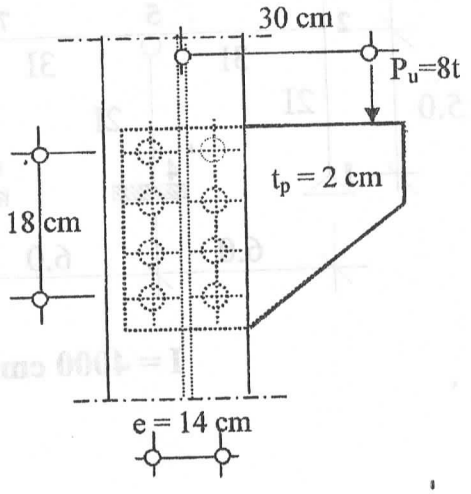
2-a) **Check the stresses for the bolts in the following bracket by using high strength bolts of grade 10.9 as bearing type (M20) and use steel plate of grade St 52.** **(15 %)**

$$e_{effective} = e_{actual} - \frac{1+n}{2}$$

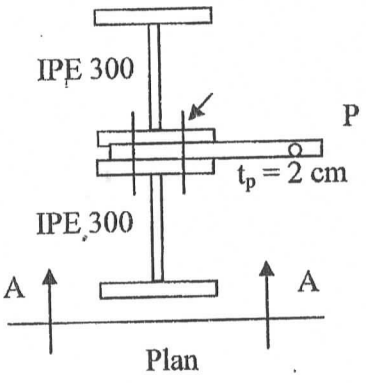
$$F_h = \frac{M_t * y}{\sum_{i=1}^{i=n} r_i^2}$$

$$F_v = \frac{M_t * x}{\sum_{i=1}^{i=n} r_i^2}$$

$$R = \sqrt{F_h^{\,2} + (F_v + \frac{P_u}{n})^2}$$

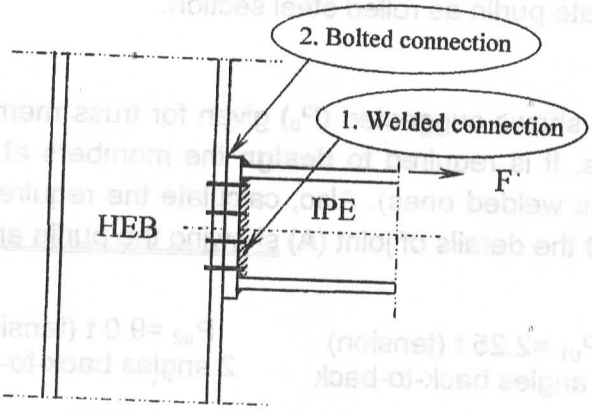


Elevation A-A



2-b) Describe, **with net sketches and without any calculations**, the straining action and the design procedure of the following steel connection:

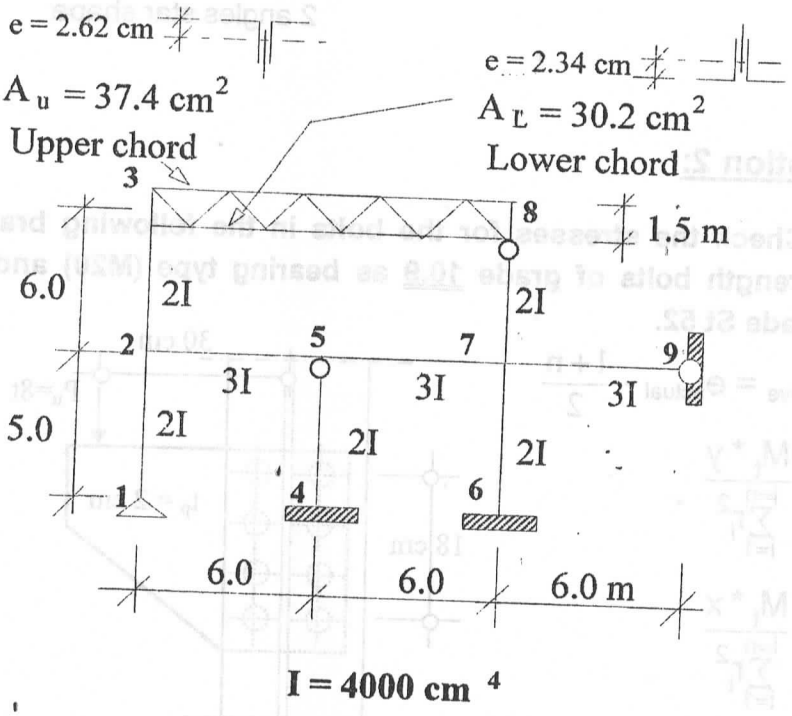
(10 %)



Question 3:

(12 %)

The following figure shows the statical system of a part of an industrial building. According to the Egyptian Code of Practice, compute the effective buckling lengths for columns 1-2, 2-3, 4-5, 6-7 and 7-8.



Best wishes

Prof. Dr. Mohamed A. Dabaon + Exam. committee

TANTA UNIVERSITY

FACULTY OF ENGINEERING
IRRIGATION AND HYDRAULICS DEPARTMENT
EXAMINATION (3rd YEAR) - CIVIL ENGINEERING

COURSE TITLE: 0PENE CHANNEL HYDRAULICS

DATE: JANUARY 2014	TERM: FIST	TOTAL ASSESSMENT MARKS: 75	TIME ALLOWED: 3 HOURS

QUESTION 1: **(15 Degrees)**

A. State one main difference between each of the following: **(3 Degrees)**
- gradually varied flow, rapidly varied flow;
- steady non-uniform flow, unsteady uniform flow;
- subcritical laminar flow, supercritical turbulent flow.

B. Prove that the flow is critical at minimum specific force. **(4 Degrees)**

C. A channel has cross-section as shown in Fig.(1). Compute the discharge through the channel and Froude number where: **(8 Degrees)**
- Bed slope = 0.0001
- n = 0.025

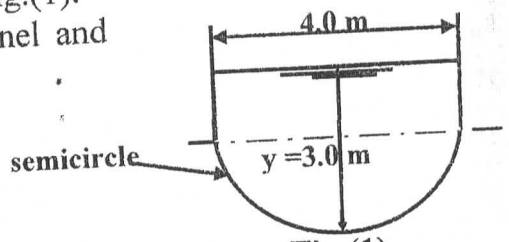


Fig.(1)

QUESTION 2: **(15 Degrees)**

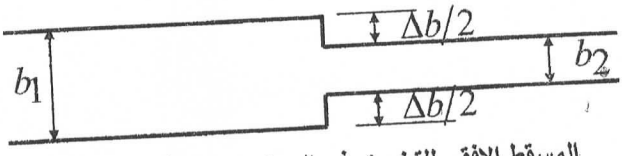
A. Mention **with drawing** the types of Transitions Problems. **(3 Degrees)**

B. Give five methods to calculate the discharge through the channels with horizontal or adverse slopes. **(3 Degrees)**

C. Prove that the shear stress at open channel wetted perimeter can be expressed as: **(3 Degrees)**

$$\tau=\gamma R S_o$$

D. A rectangular channel whose width is 8.0 m (Fig. (2)) passes a discharge of 25 m^3/sec, the channel contracted to 7.0 m at downstream, Find the water depth and minimum contracted breadth to get critical flow. **(6 Degrees)**



المسقط الافقى للتضييق فى المجارى المائية المكشوفة
Fig. (2)

Question No 3: **(15 Degrees)**

A. Mention **with drawing** the types of hydraulic jumps. **(3 Degrees)**

B. Prove that the specific force can be expressed as: **(5 Degrees)**

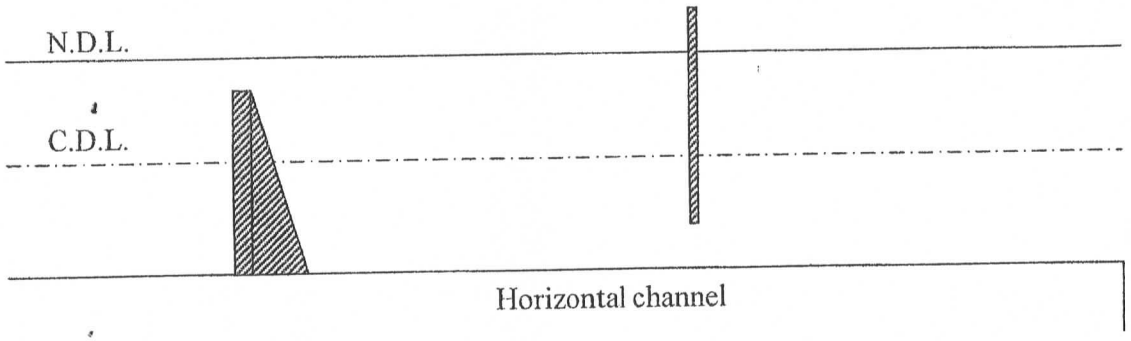
$$F = \frac{Q^2}{gA} + A\bar{y}$$

C. A rectangular channel whose width is 10.0 m passes a discharge of 50 m^3/sec, the depth of water is 0.88 m, Find if the hydraulic jump may be happened or not, if the hydraulic jump is happened calculate: **(7 Degrees)**

1. The sequent water depth
2. The head loss by the jump

Question No 4: **(30 Degrees)**

1. Draw the possible water profiles for the following open channels: **(6 Degrees)**



2. Discuss the position and name of the hydraulic jump occurring when the bed slope changes from steep slope to mild slope. **(6 Degrees)**

3. Prove that the dynamic equation of **triangular** section using **Manning's** equation as: **(8 Degrees)**

$$\frac{dy}{dx} = S_o \frac{1-(y_n/y)^{16/3}}{1-(y_c/y)^5}$$

4. A trapezoidal channel has a width of 8.0 m and side slopes 2:1, bed slope 0.004, carries a discharge of 70.9 m^3/sec. and Manning's coefficient 0.027. If the channel has a free over fall at the downstream end, compute the length of the surface profile developed. (Use **three strips**, Δy) **(10 Degrees)**

تمنياتنا لكم بالتوفيق

أ.د /ابراهيم محمد حسين رشوان واللجنة