Tanta University

Department: Structural Eng. Dept.
Max. Credit 100 % only

Faculty of Engineering

Course Title: Design of Metallic Structures	**Course Code:** CS3103	**Year:** 3rd
Date: January 2010 (First term)	**Allowed time:** 3 hrs	**No. of Pages:** (3)

Remarks: 1- It is allowed to use any tables or Egyptian Code of Practice books. 2- Any missing data may be reasonably assumed. 3- Attempt all questions.

1) The steel skeleton of a car shed is built up of trusses type shown below. The system shown is **a double cantilever truss supported on a fixed column (a-b-c-d,** Given the following data, answer the required questions.

Data:

- Spacing between trusses	= 5.0	m
- Own weight of steel structure	≈ 0.35	kN/m^2 of covered area.
- Live load	= 0.6	kN/m^2
- Weight of cover	= 0.20	kN/m^2
- Use steel grade **St37**.		

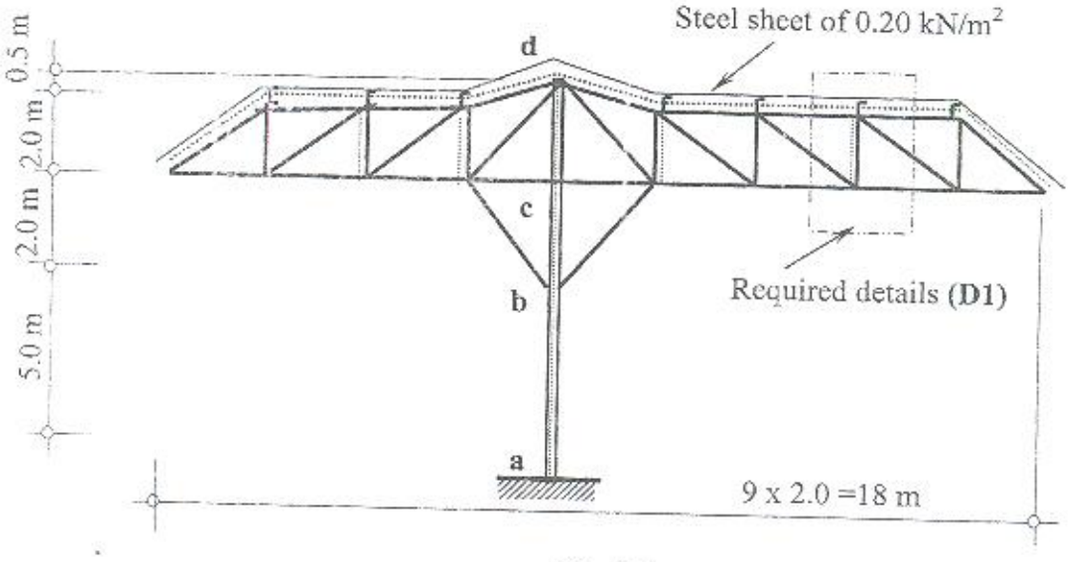


Fig. (1)

Required:

a) Draw with suitable scale different views showing the arrangements of bracing systems. The length of the covered area is 30.0 m. **(20 %)**

b) Calculate the design forces in marked members at Detail (**D1**). (**Do not design the attached members**). Neglect wind load. **(12 %)**

c) Design an intermediate purlin as rolled steel section. **(12 %)**

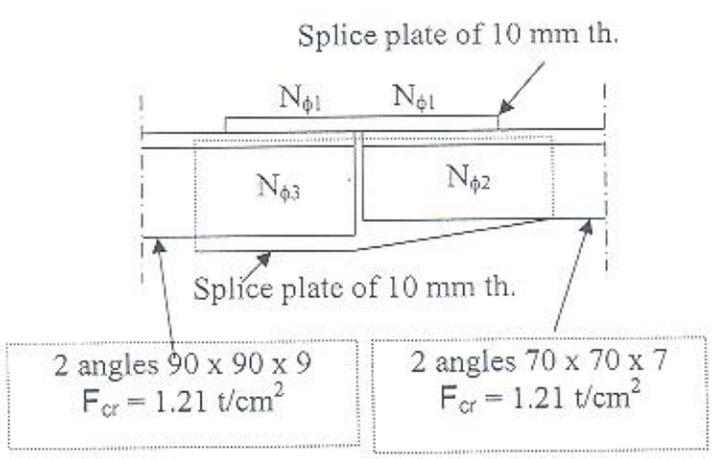
d) By assuming truss members at required detail (**D1**), draw to scale 1:10 this detail (D1) of Fig. (1). **(16 %)**

P.T.O.

2) The following table shows D.L, L.L. and W.L. By calculating the design **ultimate forces** of the following separate truss members, **design** the members as rolled steel sections taken into consideration that all the members are connected with the gusset plates with **ordinary bolts M16 mm**. **Calculate**, **also**, **the number** of bolts required for connecting the following separated members with there gusset plates. **(30%)**

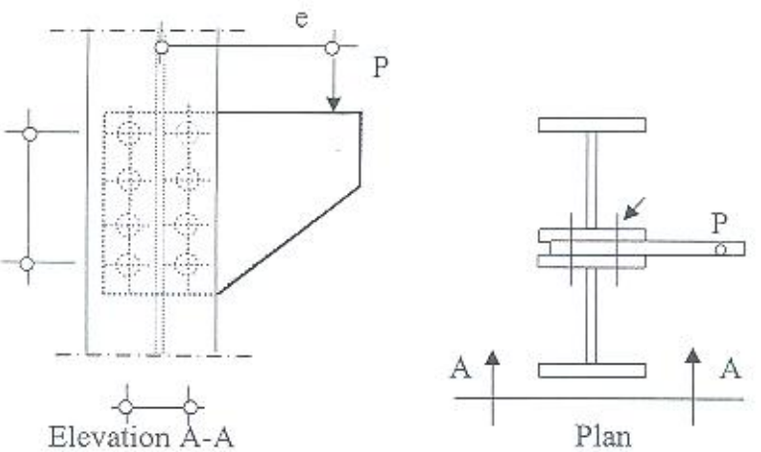
member	D.L [t]	L.L [t]	W.L [t]	Length L_h [m]	L_{bx} [m]	L_{by} [m]	notes
1	7.0 (comp.)	8.0 (comp.)	3.0 (comp.)	5.0	5.0	10.0	upper chord
2	3.0 (comp.)	10.0 (comp.)	2.0 (comp.)	5.0	5.0	5.0	lower chord
3	2.0 (tension)	9.0 (tension)	5.0 (tension)	7.0	--	--	Vertical
4	5.0 (tension)	6.0 (tension)	10.0 (tension)	5.0	--	--	horizontal
5	Zero	Zero	Zero	4.0	?!	?!	----

3. The following drawing is a splice in a compression member with variable cross-section. It is required to calculate the number of connected bolts $N_{\phi 1}$, $N_{\phi 2}$ and $N_{\phi 3}$. **(10%)**

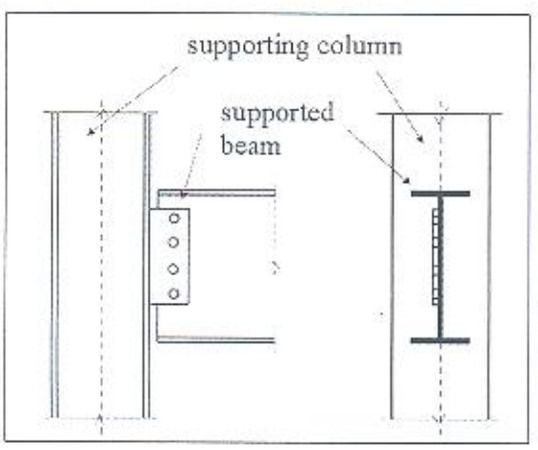


4. Without calculations, discuss the straining actions of the following connections:

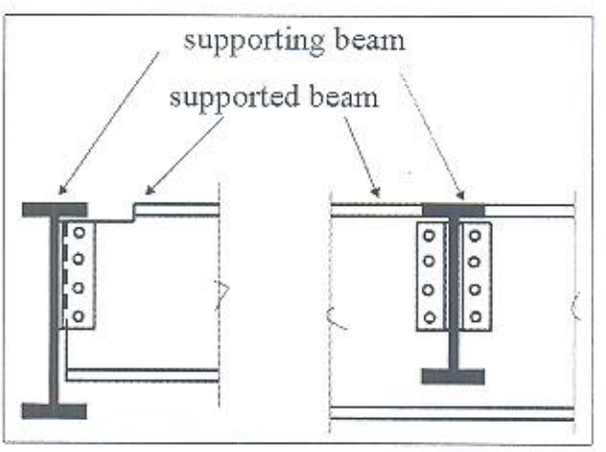
(a) **(20%)**



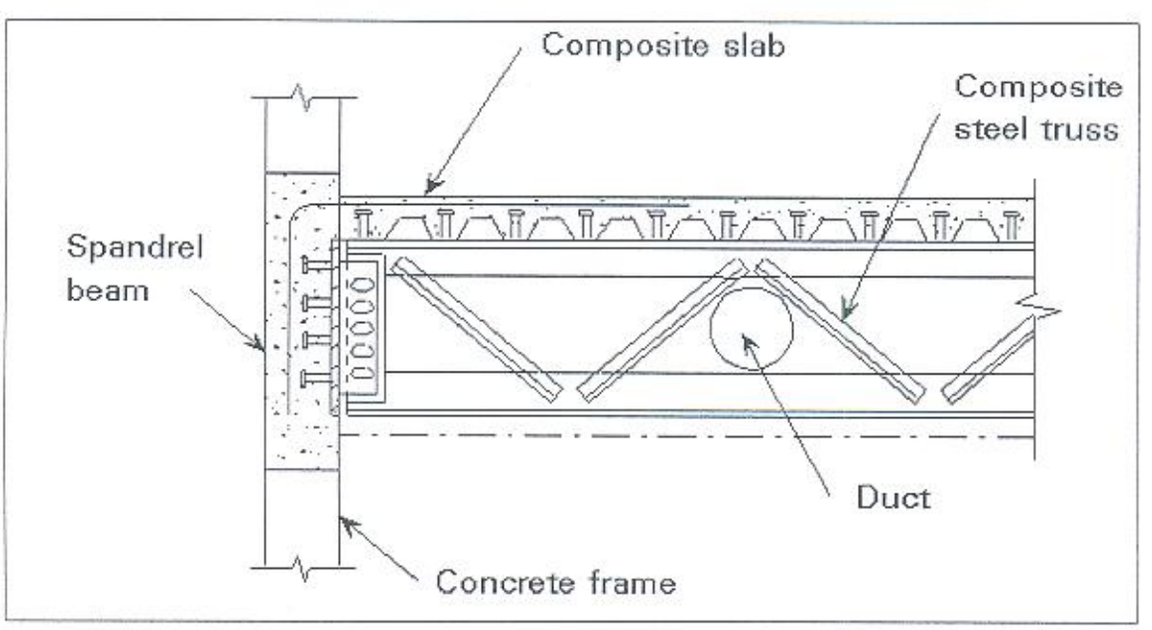
(b)



(c)



(d)



With best wishes,

Tanta University

Department: Structural Engineering
Total Marks: 90 Marks

Faculty of Engineering

Course Title: Structure Analysis (3)	Course Code: CS3101	Year: Third Year (هندسة إنشائية - لائحة قديمة)
Date: January, 2010 (First term)	Allowed time: 3 hrs	No. of Pages: (2)

Remarks: (**a** .answer the following questions. - **b.** assume any missing data.)

Q1) Problem (1) 13 Marks:

For the given statically indeterminate beam of constant I shown in **Fig. (1)**, using the force method draw the B.M.D. and find the vertical deflection of the intermediate hinge **c** if EI= 10000 t.m^2

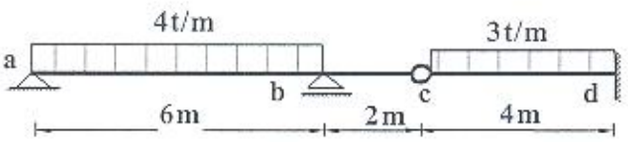


Fig. 1

2- Problem (2) 16 Marks:

Using the force method, draw the B.M.D. and S.F.D. for the statically indeterminate frame hinged at **a** and fixed at **b** given in **Fig. (2)**.

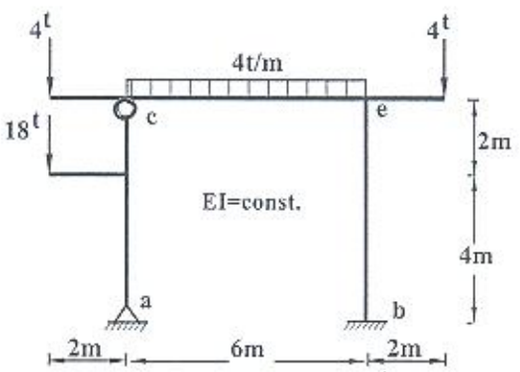


Fig. 2

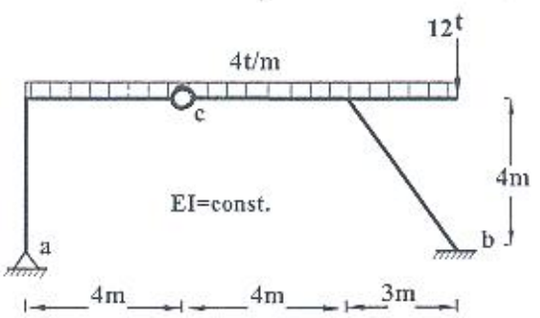


Fig. 3

3- Problem (3) 19 Marks:

For the statically indeterminate frame hinged at **a** and fixed at **b** given in **Fig.(3)**, draw the B.M.D due to the applied loads using the force method, also find the vertical deflection of the intermediate hinge **c** if EI= 10000 t.m^2 .

4- Problem (4) 13 Marks:

Using the slope-deflection method, draw the B.M.D. for the given frame of variable I shown in **Fig.(4)**.

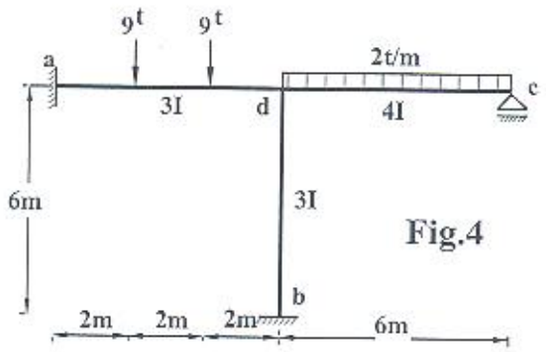


Fig.4

5- Problem (5) 19 Marks:

Using the slope-deflection method, draw the B.M.D. for the given frame of variable I shown in **Fig.(5)**.

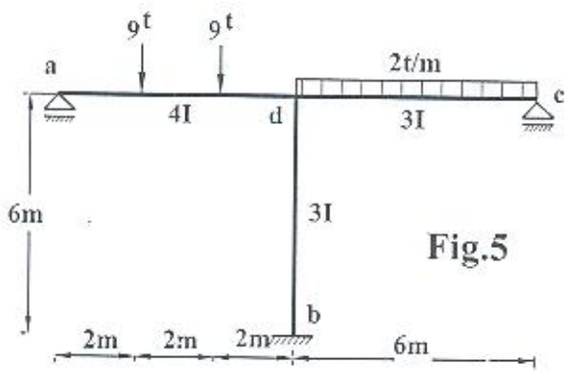


Fig.5

6- Problem (6) 16 Marks:

Using the moment distribution method, draw the B.M.D. and S.F.D. for the given frame of constant I shown in **Fig. (6)**.

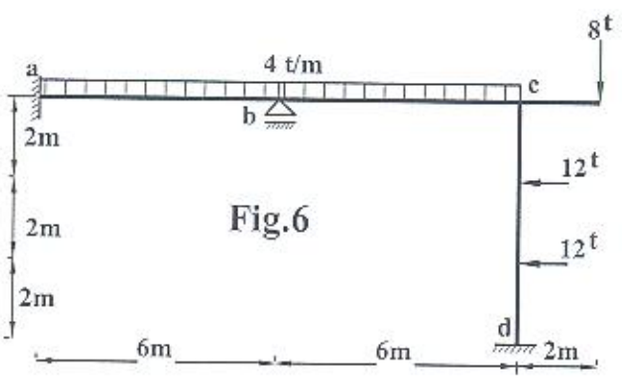


Fig.6

With the best wishes

Course Examination Committee

Prof. Dr. Mohamed A. Kasem & Assist. Prof. Tarek Mohamady

Tanta University
Faculty of Engineering
Public Works Department
3rd Year, Structural Engineering

1/3

Final Exam
2009-2010
Time : 3.0 Hours

Traffic and Highways Engineering (لائحـــه قديمـــه)

* Try all questions, if possible
*Assume reasonably any missing data
*Use clear and net sketches to illustrate your answers as much as you can

يسمح باستخدام الجداول والمنحنيات الخاصة بالمادة

The Maximum Marks = 70

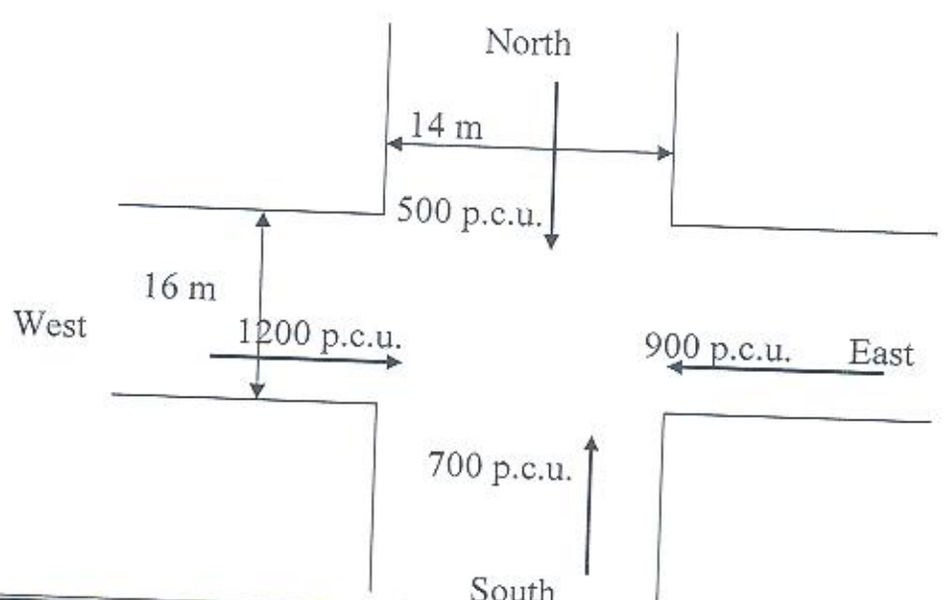
Question (1) (25 Marks)

a) Drive the relationship between jam density, free-flow speed and maximum traffic volume.

b) Design the signalized intersection shown in the figure below if the following data were obtained:

	North	South	East	West
Gradient	-2%	-3%	0	+2%
Left-turn	3%	4%	10%	15%
Right-turn	10%	9%	13%	15%
Bus	5%	3%	2%	2%
Truck	5%	2%	3%	7%

It is required to calculate the saturation flow for each approach taking into consideration the corrections. Calculate the optimum cycle time and the green time for each approach at the intersection. Sketch the timing diagrams for this intersection. Assume starting delay of three-second per phase. Assume that the truck is equivalent to 3.0 P.C.U and bus is equivalent to 2.5 P.C.U.



Question (2) (30 Marks) 2/3

a) The following table give the particulars collected for a section of road 0.7 Km long during the course of moving car observer method for overall traffic stream volume and speed calculations. The equivalent factors for the truck and bus are 3.0 and 2.5, respectively. Calculate the journey and running speed of flow.

From East to West

Run Number	Running Time (sec)	Delays (sec)	Vehicles met with			Vehicles in the same way	
			Car	Truck	Bus	Overtaking	Overtaken
1	64	4	11	0	5	1	0
2	56	6	13	0	0	2	1
3	68	8	19	2	11	1	1
4	64	4	14	2	4	1	0
5	48	8	2	0	11	0	1
6	66	6	19	1	7	2	1

From West to East

Run Number	Running Time (sec)	Delays (sec)	Vehicles met with			Vehicles in the same way	
			Car	Truck	Bus	Overtaking	Overtaken
1	69	6	10	0	3	1	1
2	76	5	2	0	2	1	0
3	62	6	23	1	6	2	1
4	54	6	7	0	1	2	0
5	43	4	8	0	1	1	1
6	60	6	11	0	8	2	0

b) A vertical curve connects a (–1.5%) with a (+2%) grade. If the design speed of the highway is 60 mph, compute the elevation of the curve at 100ft stations. Grades intersect at station 263+16 at an elevation of 90ft.

c) An existing vertical curve joins a +4% grade to –2.5% grade. If the length of the curve is 250 ft. Grades intersect at station 340+00 at an elevation of 1323ft.

i) What is the max. safe speed ?

ii) What is the station and level of PC, PT and highest point ?

Question (3) (25 Marks) 3/3

a) A corner of a building is 36 ft from the centerline of a curved section of a 4-lane rural highway. If this section has a grade of 5% and the radius of the curve is only 320 ft, what speed limit will you recommend at this section if :

i. The highway has no median,

ii. The highway has an 8 ft median.

b) An existing vertical curve joins two grades. Grades intersect at station 110+92.5 at an elevation of 947.11ft. The station and level of PC are 109+00 and 950 ft. The station of the low point is 110+65. What is the max. safe speed ?

c) A circular curve connects two tangents (*2-lane undivided highway*) that deflect at an angle of 54°. If the point of intersection is at station (347+38.5), design speed is 70 mph and superelevation is 8%.

i) Determine the station of PC, PT and the deflection angles for setting out the curve at 100 ft stations from PC.

ii) Draw to a reasonable scale, the progress of obtaining the required superelevation when revolving the pavement around the centerline of the pavement.

GOOD LUCK

Dr. Islam Abu El-Naga

Tanta University

Structural Engineering Department
Total Marks: 70 Marks

Faculty of Engineering

Course Title: Soil-Structure Interaction	Course Code: CS	Year: 3rd
Date: January 21st 2010 (First term)	Allowed time: 3 hrs (Term Exam)	No. of Pages: (2)

Answer the following questions … answers should be supported by sketches

Problem number (1) **(17.5 Marks)**

a) What are the different types of foundation settlement? (3.5 Mark)

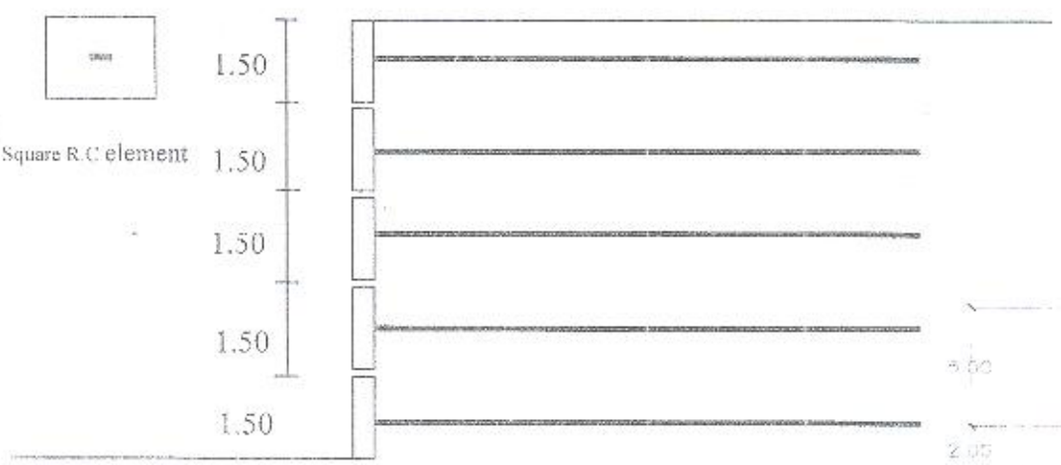
b) Discuss the different factors affecting the coeffecient of subgrade reaction. (3.5 Mark)

c) For the shown combined footing, if the elastic modulus of reinforced concrete $= 2\times10^{6}$ t/m^2 and the uncorrected sub grade reaction of soil = 2.00 kg/cm^3; find out the bending moment using elastic line method (10.5 Mark)

Problem number (2) **(17.5 Marks)**

a) what are the different material of facing elements used in the reinforced earth retaining walls? (3.5 Mark)

b) For the shown reinforced earth retaining wall, find out the required dimensions for ties and design the facing elements. If the used fill is sand ($\varphi = 30$, $\gamma = 1.80$ t/m^3) and ties are steel with width 70 mm and allowable stress is 2000 kg/cm^2 (8.0 Mark)



c) The soil profile of a site consists of a clay layer of 2.00 m thickness between two layers of sand as shown in the figure if the clay properties is :-

Compression index, Cc = 0.16, Water content, wc % = 30

Specific gravity, Gs = 2.70, The ground water level at the ground level.

Compute the total consolidation settlement under a uniform distributed load of 30 kN/m^2 on raft 10 x 10 m assuming that the clay is fully saturated and normally consolidated (6.0 Mark)

Problem number (3) **(17.5 Marks)**

a) Explain the effect of lateral loads on the stress distribution under isolated footing. State how to check the stability of such footing. (3.0 Marks)

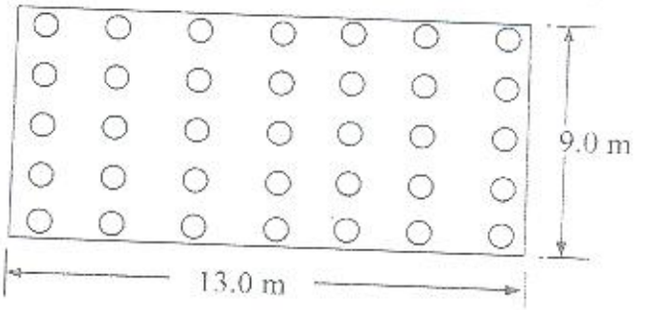
b) Using clear sketches, discuss the difference between shallow foundations and deep foundations. (3.0 Marks)

c) Figure 1 shows the dimensions of the raft foundation over piles for a residential building. The total load of the structure = 4000.0 t acting in the right bottom quarter with e_x = 0.2 m and e_y = 0.35 m. The acting moment on the raft due to considering the lateral loads in x direction = 800 tm. If the pile diameter and spacing are 0.80 m and 2.0 m respectively.

(i) Determine the maximum and minimum loads in the piles. (6.5 Marks)

(ii) State only without calculations how to determine the maximum and the minimum loads in the piles if one of the them was broken during the construction. (5.0 Marks)

Figure 1



Problem number (4) **(17.5 Marks)**

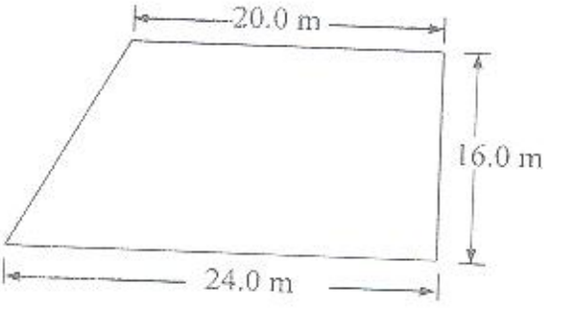
a) Using clear sketches, discuss the difference between strap footing and smells. (3.5 Marks)

b) The figure shows the dimensions of the raft foundation for a residential building. The total load of the structure = 8000.0 t acting in the left bottom quarter with e_x = 0.15 m and e_y = 0.25 m. The acting moment on the raft due to considering the lateral loads in y direction = 1000 tm. Determine the maximum and minimum stresses under the raft foundation:

(i) under vertical loads only (7.0 Marks)

(ii) under both vertical and lateral loads (7.0 Marks)

Figure 2



Course Examination Committee

Dr. Mostafa Elsawwaf

Dr. Ashrf Kmal Nazer

TANTA UNIVERSITY
FACULTY OF ENGINEERING
DEPARTMENT OF STRUCTURAL ENGINEERING
EXAMINATION (THIRD YEAR) STUDENTS OF STRUCTURAL ENGINEERING هندسة الإنشاءات-لائحة قديمة

COURSE TITLE: DESIGN OF REINFORCED CONCRETE STRUCTURES (2) a			COURSE CODE: CS 3102
DATE: January - 2010	TERM: FIRST	TOTAL ASSESSMENT MARKS: 70	TIME ALLOWED: 3 hours

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

For all problems consider: f_{cu}= 40MPa, f_y= 400MPa for the main RFT

Problem # One (20Marks)

TRY ALL PROBLEMS

a. Define the statically determinate and statically indeterminate torsion, whose of them is more dangerous and why? **(3Marks)**

b. Calculate the minimum stirrups for a beam cross-section 500×800mm subjected to shear and torsion. Consider the area of stirrups are equally for shear and torsion and $f_{y,stir}$= 360MPa. **(5Marks)**

c. Draw the B.M.D, S.F.D and T.M.D for the main beam AB shown in Figure 1 at critical cases (neglect the beam own weight), g= dead load, p= live load. **(6Marks)**

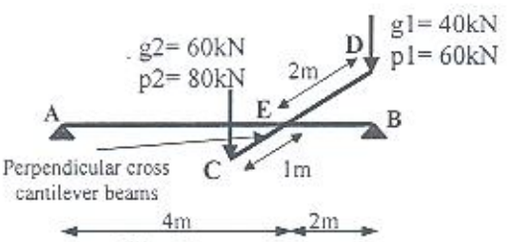


Fig. 1

d. Figure 2 shows the critical section of a beam subjected to an ultimate torsional moment M_{tu}= 180kN.m. It is required to carry out the following:
   i. Calculate the needed torsion reinforcement. **(4Marks)**
   ii. Reinforcement details in cross section. **(2Marks)**

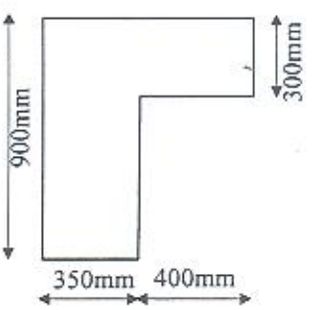


Fig. 2

Problem # Two (8Marks)

Figure 3 shows layout of a first floor resting on eight columns with area of 12x14.4m. The panelled beams system is required to cover this floor using the beam modules shown in figure. The slab is subjected to L.L= 6kN/m^2 and cover= 1.3kN/m^2. The slab thickness is 100mm. It is required to make a complete design (design + drawing details) of the panelled beam **B1** only. Determine the load applied on supported beam **B2**.

Problem # Three (26Marks)

a. Compare between waffle and two-way ribbed slabs. **(3Marks)**

b. Why the depth of rib in one-way hollow-block slab systems is taken as beams, whereas its bending moment is taken as solid slabs? Why the hollow-block slab system is not efficient in a cantilever slabs? **(4Marks)**

c. Figure 4 shows structural plan of a roof **ABCD** with cantilevers. The roof is rest on four beams that supported on four columns. The **hollow-block** slab system is required. Consider that: live load = 4kN/m^2; flooring cover = 1.3kN/m^2. The cross section of all beams is 250*700mm. It is required to carry out the following:

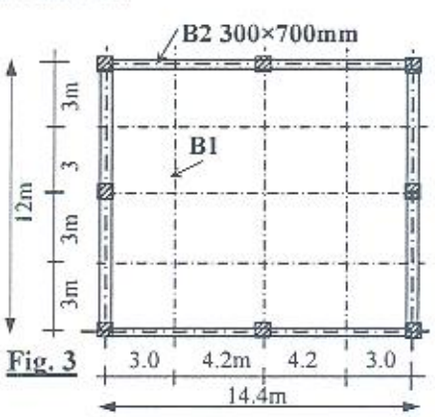


Fig. 3

i- Draw B.M.D and S.F.D of critical strips. **(4Marks)**

ii- Design the slabs at critical sections. Calculate the width of solid part due to shear and moment. **(6Marks)**

iii- Draw to scale 1:50 the plan and needed cross sections showing the reinforcement details and arrangement of hollow blocks. **(5Marks)**

iv- Calculate the loads carried by the supporting beam **GFJ**. **(4Marks)**

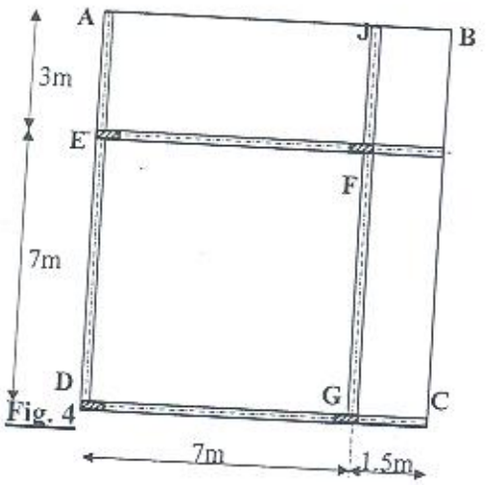


Fig. 4

Problem # Four (24Marks)

Figure 5 shows plan of typical floor of RC flat slab with panel 7.2m×7.2m and slab thickness 0.25m (t_s= 240mm) without drop panel and with column head 1.60m×1.60m. The flat slab is resting on square columns 0.5mx0.5m. The marginal beams 0.3mx0.9m are used at the outer edges of the flat slab AB, AC, and BD. The edge CD is free without marginal beam. The flat slab is subjected to a uniformly live load 6kN/m^2 and cover flooring 1.5kN/m^2. 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 for the interior column C1 considering the case of the total loads only (dead and live loads). **(6Marks)**

iv- Draw on plan the reinforcement details of the column and field strips in X-direction only. Draw in cross section the reinforcement details of the column head. **(6Marks)**

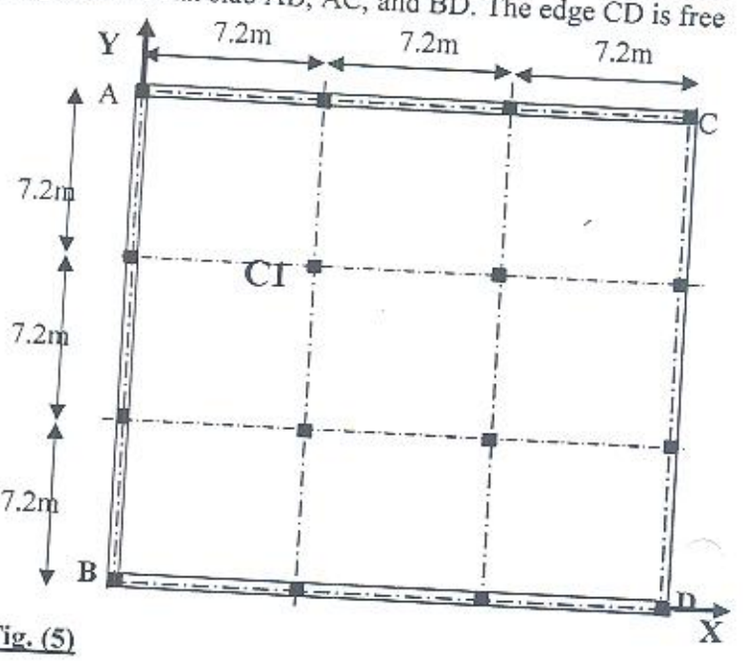


Fig. (5)

أطيب الأمنيات بالتوفيق

أ.د/ طارق فوزى الشافعى

أ.د/ محمد أحمد قاسم

انشاءات قديم

Tanta University

Structural Engineering Department
Total Marks: 70 Marks

Faculty of Engineering

Course Title: Soil-Structure Interaction	Course Code: CS	Year: 3rd
Date: January 21st 2010 (First term)	Allowed time: 3 hrs (Term Exam)	No. of Pages: (2)

Answer the following questions … answers should be supported by sketches

Problem number (1) **(17.5 Marks)**

a) What are the different types of foundation settlement? (3.5 Mark)

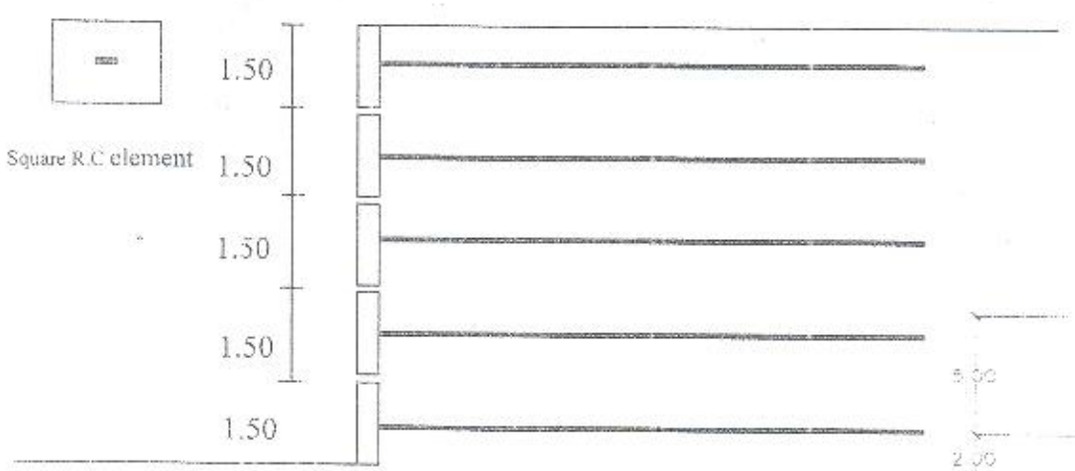
b) Discuss the different factors affecting the coeffecient of subgrade reaction. (3.5 Mark)

c) For the shown combined footing, if the elastic modulus of reinforced concrete $= 2 \times 10^6$ t/m^2 and the uncorrected sub grade reaction of soil = 2.00 kg/cm^3; find out the bending moment using elastic line method (10.5 Mark)

Problem number (2) **(17.5 Marks)**

a) what are the different material of facing elements used in the reinforced earth retaining walls? (3.5 Mark)

b) For the shown reinforced earth retaining wall, find out the required dimensions for ties and design the facing elements. If the used fill is sand ($\varphi = 30$, $\gamma = 1.80$ t/m^3) and ties are steel with width 70 mm and allowable stress is 2000 kg/cm^2 (8.0 Mark)



c) The soil profile of a site consists of a clay layer of 2.00 m thickness between two layers of sand as shown in the figure if the clay properties is :-

Compression index, Cc = 0.16, Water content, wc % = 30

Specific gravity, Gs = 2.70, The ground water level at the ground level.

Compute the total consolidation settlement under a uniform distributed load of 30 kN/m^2 on raft 10 x 10 m assuming that the clay is fully saturated and normally consolidated (6.0 Mark)

P.T.O.

Problem number (3) **(17.5 Marks)**

a) Explain the effect of lateral loads on the stress distribution under isolated footing. State how to check the stability of such footing. (3.0 Marks)

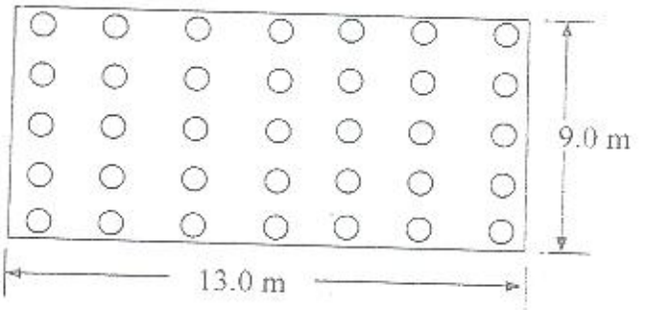
b) Using clear sketches, discuss the difference between shallow foundations and deep foundations. (3.0 Marks)

c) Figure 1 shows the dimensions of the raft foundation over piles for a residential building. The total load of the structure = 4000.0 t acting in the right bottom quarter with e_x = 0.2 m and e_y = 0.35 m. The acting moment on the raft due to considering the lateral loads in x direction = 800 tm. If the pile diameter and spacing are 0.80 m and 2.0 m respectively.

(i) Determine the maximum and minimum loads in the piles. (6.5 Marks)

(ii) State only without calculations how to determine the maximum and the minimum loads in the piles if one of the them was broken during the construction. (5.0 Marks)

Figure 1



Problem number (4) **(17.5 Marks)**

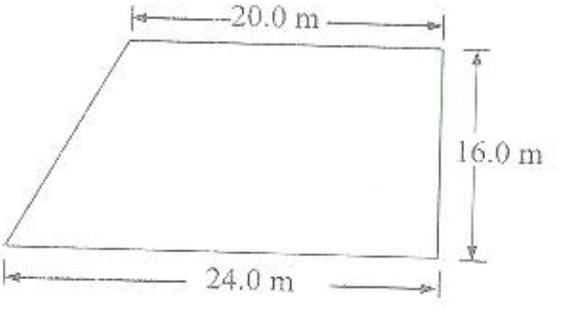
a) Using clear sketches, discuss the difference between strap footing and smells. (3.5 Marks)

b) The figure shows the dimensions of the raft foundation for a residential building. The total load of the structure = 8000.0 t acting in the left bottom quarter with e_x = 0.15 m and e_y = 0.25 m. The acting moment on the raft due to considering the lateral loads in y direction = 1000 tm. Determine the maximum and minimum stresses under the raft foundation:

(i) under vertical loads only (7.0 Marks)

(ii) under both vertical and lateral loads (7.0 Marks)

Figure 2



Course Examination Committee

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