Course Title: Design of Metallic Structures	**Course Code:** CSE3124	**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**.

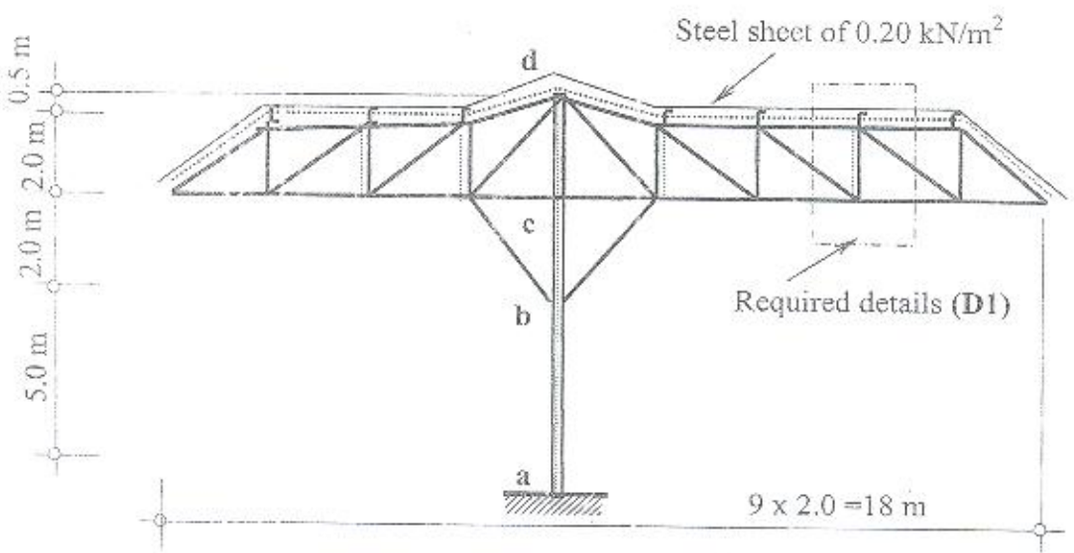


Fig. (1)

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 %)**

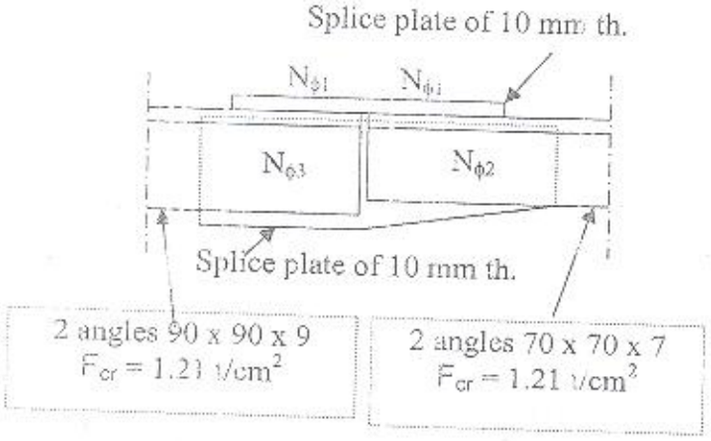
2) The following table shows D.L, L.L. and W.L. By calculating the design **ultimate forces** of the following separate truss members, **design** the members as rolled steel sections taken into consideration that all the members are connected with the gusset plates with **ordinary bolts M16 mm. Calculate,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

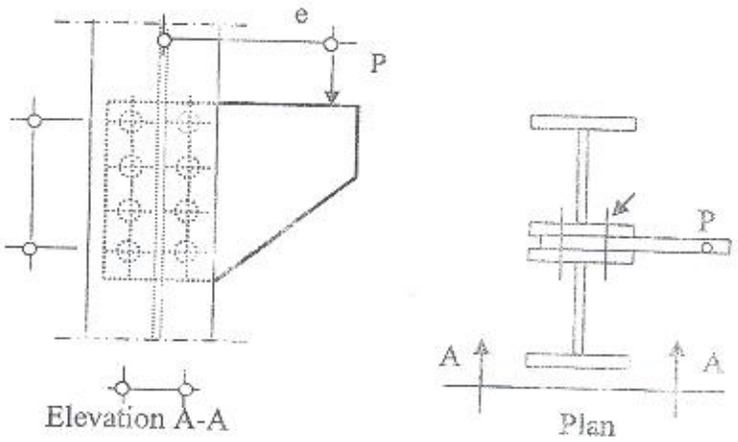


P.T.O.

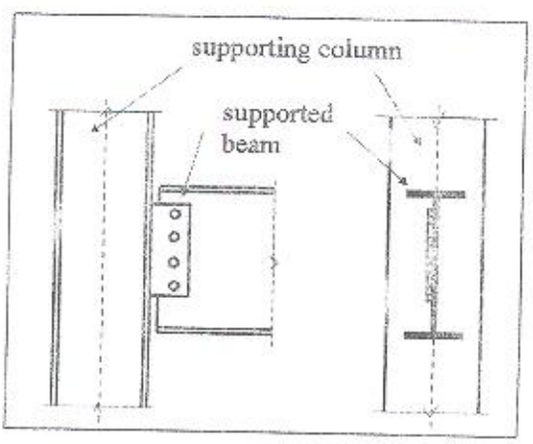
4. Without calculations, discuss the straining actions of the following connections:

(20%)

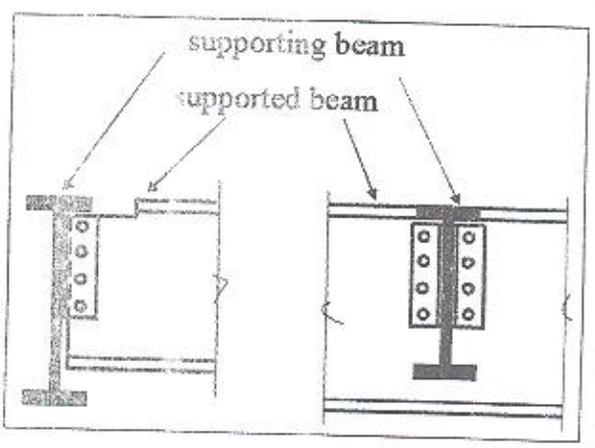
(a)



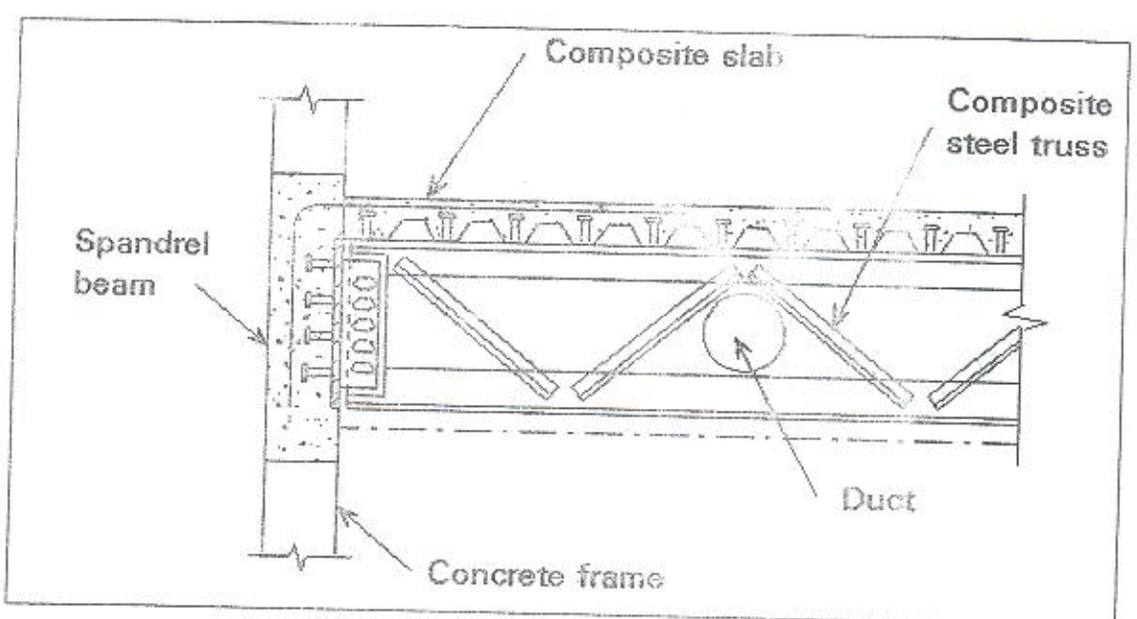
(b)



(c)



(d)



With best wishes,

Tanta University

Department: Structural Engineering
Total Marks: 75 Marks

Faculty of Engineering

Course Title: Soil Mechanics (3)	Course Code: CSE3125	Year: 3rd Structural Eng.
Date: 31 January 2010 (First term)	Allowed time: 3 hrs	No. of Pages: (3)

- Assume any missing data
- Answers should be supported by sketches

Question Number (1) ***(19 Marks)***

a) What is the main goal of compacting soil? (3 Marks)

b) Describe briefly using clear sketches how to assess the maximum dry density of compacted sand in the field using the sand cone device. (3 Marks)

c) State the main differences between the standard and the modified proctor tests. (3 Marks)

d) Discuss the main factors that affect the soil compaction. (3 Marks)

e) The following results were obtained using a standard proctor test: (7 Marks)

Moisture content (%)	5	8	10	13	16	19
Bulk density (Mg/m^3)	1.87	2.04	2.13	2.20	2.16	2.09

If the specific gravity of the tested soil is 2.70, it is required to:

1. Draw the graph of dry density against moisture content and determine the maximum dry density and optimum moisture content.
2. On the same axes, draw the curves for zero and 5 per cent air voids, and determine the air-voids content at maximum dry density.
3. Under field conditions variations in the applied compaction effect may cause the air-void content to vary by ±2 per cent. Also, the field moisture content may vary above and below the optimum value by 3 per cent. Indicate, therefore, the range of dry densities that may be found after compaction in the field.

Question Number (2) ***(19 Marks)***

a) Draw net sketches showing the details of reinforcement for counter-fort wall. (5 Marks)

b) For the reinforced concrete retaining wall shown in Fig. (1), it is required to:- (14 Marks)

1. Check the stability of this wall, if the allowable bearing capacity for the supporting soil is 13 kN/m^2.
2. Find out the required reinforcement for the wall and base.
3. Draw to scale 1/25 the cross section of this wall showing the arrangement of the reinforcement.

Question Number (3) ***(19 Marks)***

a) Explain the factors affecting the bearing capacity of soil. (4 Marks)

b) Explain the effect of the ground water table on bearing capacity of soil in cases of:
(i) sand. (ii) clay. (4 Marks)

P.T.O.

c) Explain using sketches the concept of floating foundations. (3 Marks)

d) Find the maximum allowable load (P) to achieve factor of safety of 3 under square footing shown in Fig. (2). (8 Marks)

Question Number (4) ***(18 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. (4 Marks)

b) Use the expression derived in (a) to find the maximum stable slope where $c' = 0$, $\varphi' = 20°$ and $\gamma = 19$ kN/m^3. (2 Marks)

c) Fig. (3) shows the section through a cutting in clay. ABC is a trial slip surface and CD is an assumed tension crack, 4.5 m deep. The area ABCDE is 152 m^2 and its centroid is at C. The crest of the slope shall be loaded by a live load of 20 kN/m^2 as shown in figure. The density of the soil is 1.92 t/m^3 and its cohesion is 43 kN/m^2. Find the factor of safety against a slip along the surface ABC. (8 Marks)

d) If the slope described in (c) is unsafe, show, using clear sketches, how to protect this slope against failure. (4 Marks)

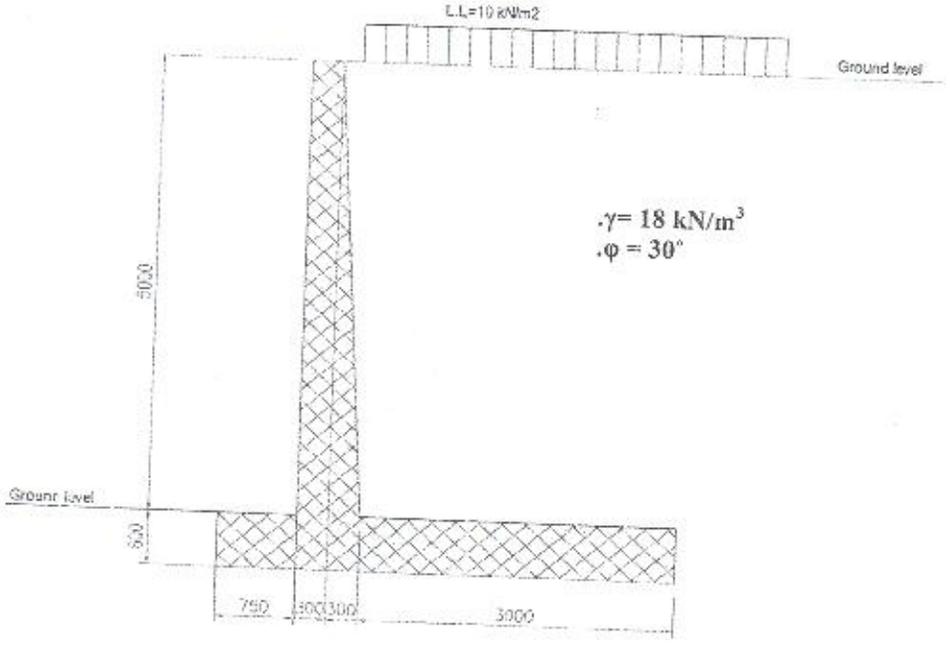
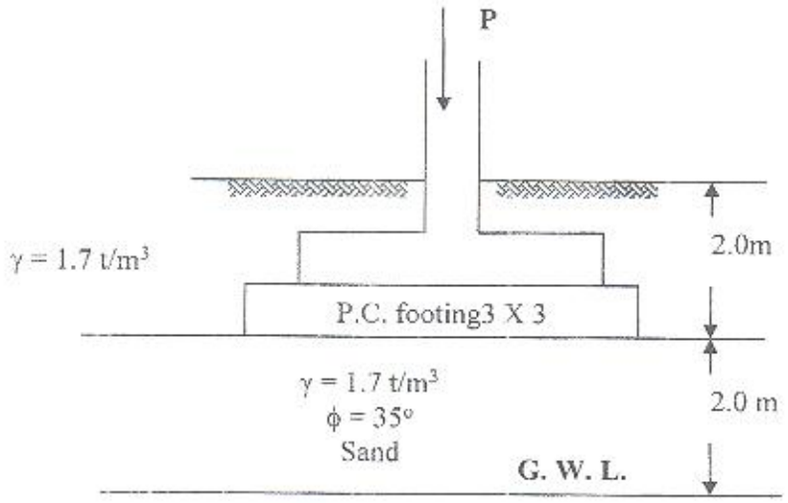


Fig. (1)



$\gamma = 1.8$ t/m³ Drained Shear Strength Parameters
$q_{un} = 12$t/m² $c' = 3$ t/m²
Clay $\phi' = 20°$

Fig. (2)

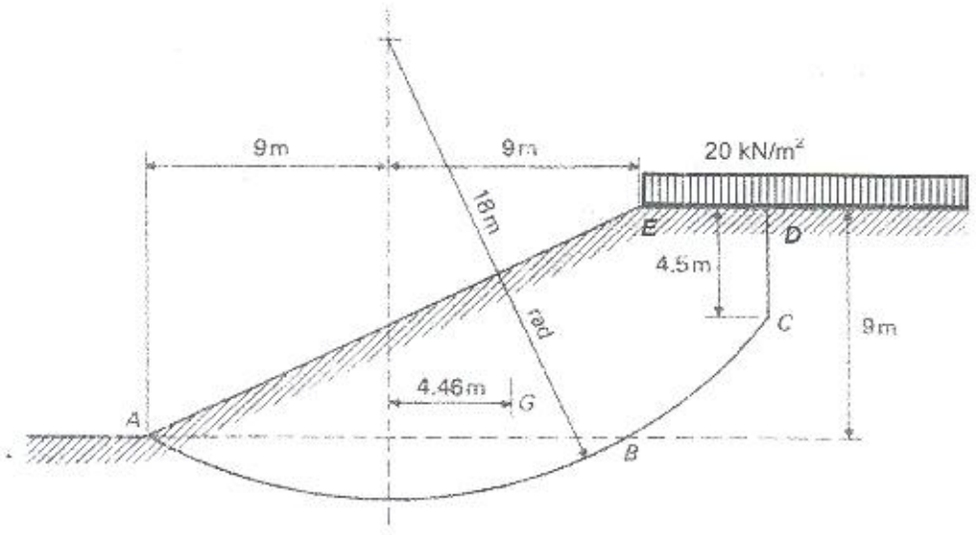


Fig. (3)

Best Wishes.....

Course Examination Committee

ϕ °	N_c	N_q	N_γ		ϕ °	N_c	N_q	N_γ
0	5.0	1.0			27.5	25.0	14.0	7.0
5	6.5	1.5			30	30.0	18.0	10.0
10	8.5	2.5	0.5		32.5	37.0	25.0	15.0
15	11.0	4.0	1.0		35	46.0	33.0	23.0
20	15.0	6.5	2.0		37.5	58.0	46.0	34.0
22.5	17.5	8.0	3.0		40	75.0	64.0	53.0
25	20.5	10.5	4.5		42.5	99.0	92.0	83.0

Tanta University

Department: Structural Engineering
Total Marks: 85 Marks

Faculty of Engineering

Course Title: Structure Analysis (3) (i) | Course Code: CSE3122 | Year: Third Year (هندسة إنشائية - لائحة جديدة)
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) 12 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

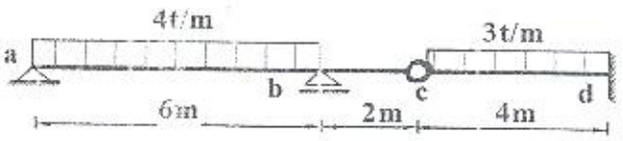


Fig. 1

2- Problem (2) 15 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)**.

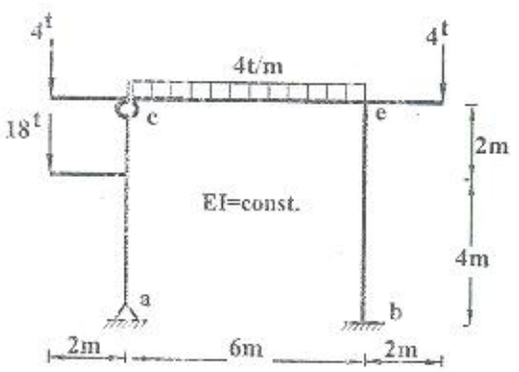


Fig. 2

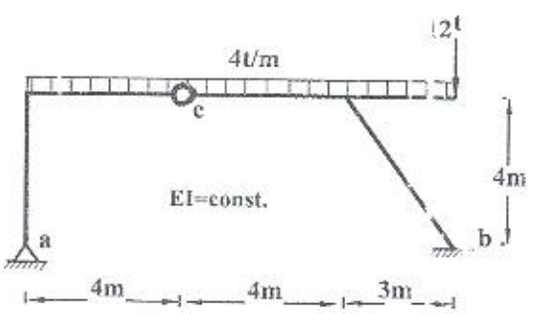


Fig. 3

3- Problem (3) 18 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 .

P.T.O.

4- Problem (4) 12 Marks:

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

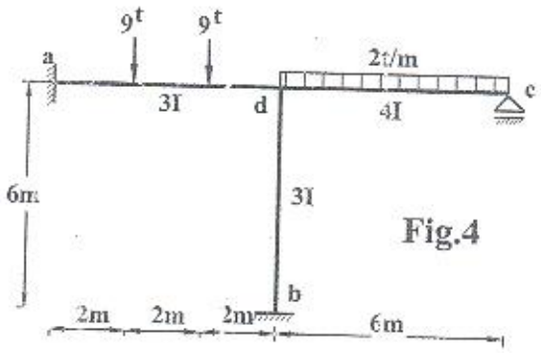


Fig.4

5- Problem (5) 18 Marks:

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

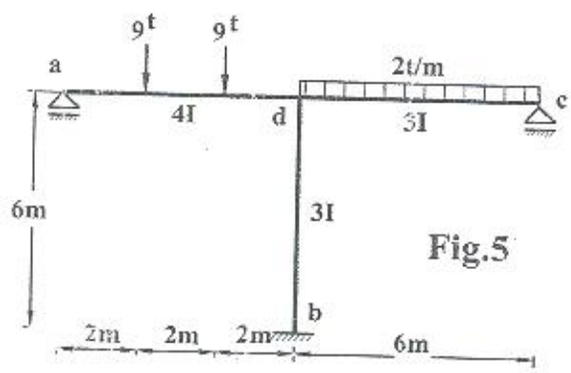


Fig.5

6- Problem (6) 15 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)**.

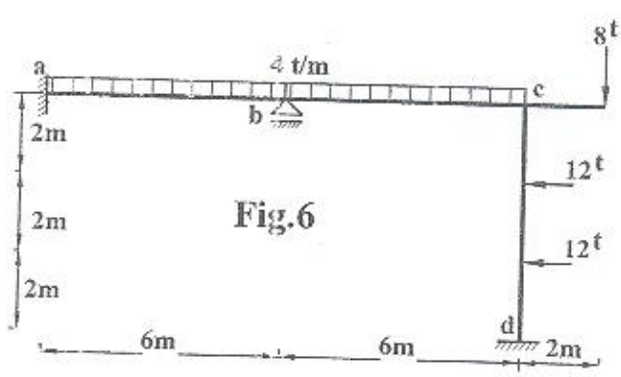


Fig.6

With the best wishes

Course Examination Committee

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

Tanta University

Structural Engineering Department
Total Marks: 85 Marks

Faculty of Engineering

Course Title: Soil-Structure Interaction	Course Code: CSE3127	Year: 3rd
Date: February 2nd 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) **(21.0 Marks)**

a) Discuss the different equations used to estimate the consolidation settlement depending on its stress history ? **(4.0 Marks)**

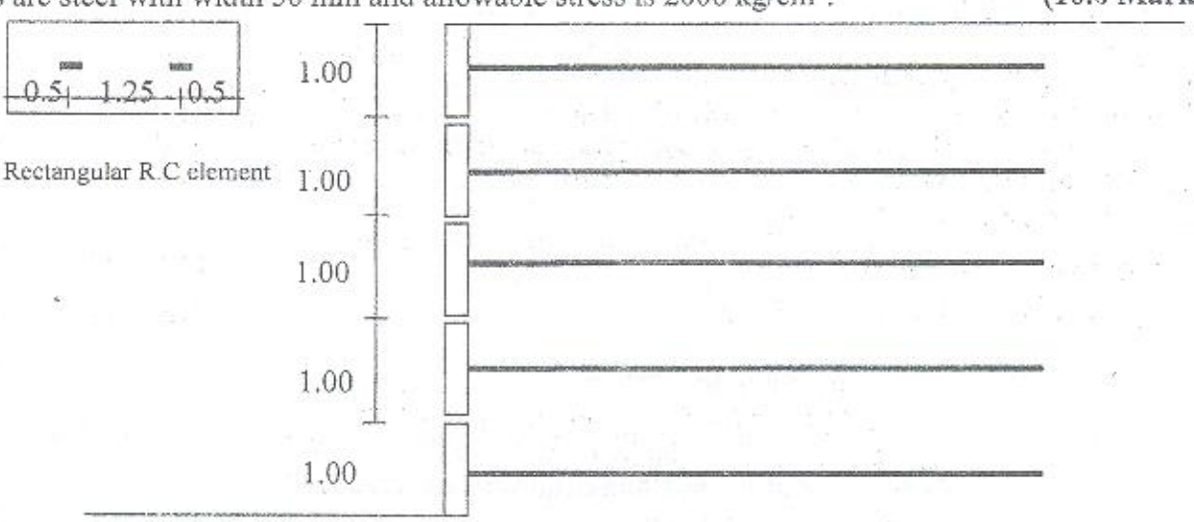
b) Discuss the different equations used to estimate the consolidation settlement depending on its stress history ? **(4.0 Marks)**

c) For the shown combined footing, if the elastic modulus of reinforced concrete = $2x10^{6}$ 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 **(13.0 Marks)**

Problem number (2) **(21.5 Marks)**

a) Show different material of facing elements used in the reinforced earth retaining walls? **(3.5 Marks)**

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 50 mm and allowable stress is 2000 kg/cm^2. **(10.0 Marks)**



c) A new building is constructed on a saturated clay layer. A sample of this clay is obtained from depth of 5.00 below the existing (G.L) and tested, the following results are obtained

Pressure, kPa	20	40	80	160	320	640	1280	320	80	20	0
Voids ratio	0.953	0.948	0.938	0.92	0.878	0.789	0.691	0.791	0.754	0.791	0.89

If a building give uniform pressure of 325 kN/m^2 on area of (10x10)m;
Find out the preconsolidated pressure and estimate the consolidation settlement of this building. **(8.0 Marks)**

P.T.O.

Problem number (3) **(21.0 Marks)**

a) Using clear sketches, illustrate the difference between the strap footing and combined footing. **(4.0 Marks)**

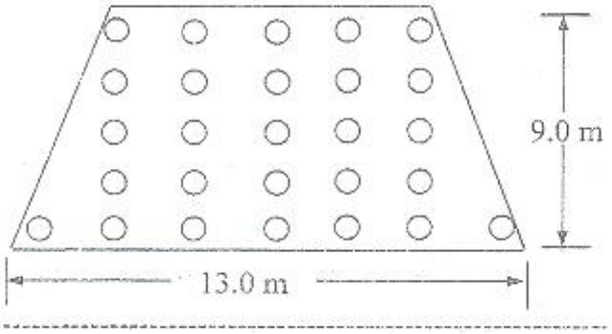
b) Draw the stress distribution under isolated footing due to vertical and lateral loads. State how to check the stability of such footing. **(4.0 Marks)**

c) Figure 1 shows the dimensions of a raft foundation over piles for a residential building. The total load of the structure = 2000.0 t acting in the left bottom quarter with e_x = 0.2 m and e_y = 0.25 m. The acting moment on the raft due to considering the lateral loads in y direction = 1200 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. **(8.0 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) **(21.5 Marks)**

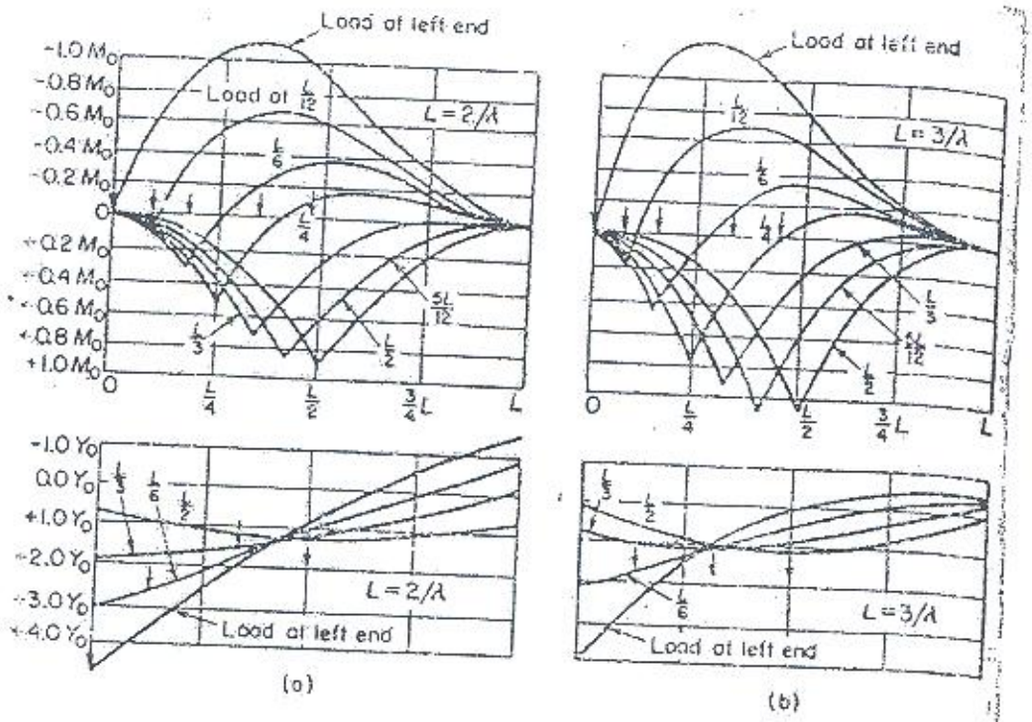
a) Using clear sketches, discuss the difference between friction and bearing piles. **(3.5 Marks)**

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 = 0.25 m and e_y = 0.20 m. The acting moment on the raft due to considering the lateral loads in x direction = 800 tm. Determine the stresses under the raft foundation at point (A), (C) and (D)

(i) under vertical loads only **(9.0 Marks)**

(ii) under both vertical and lateral loads **(9.0 Marks)**

Figure 2



Note: $\lambda = 4\sqrt{\frac{Bk}{\quad}}$

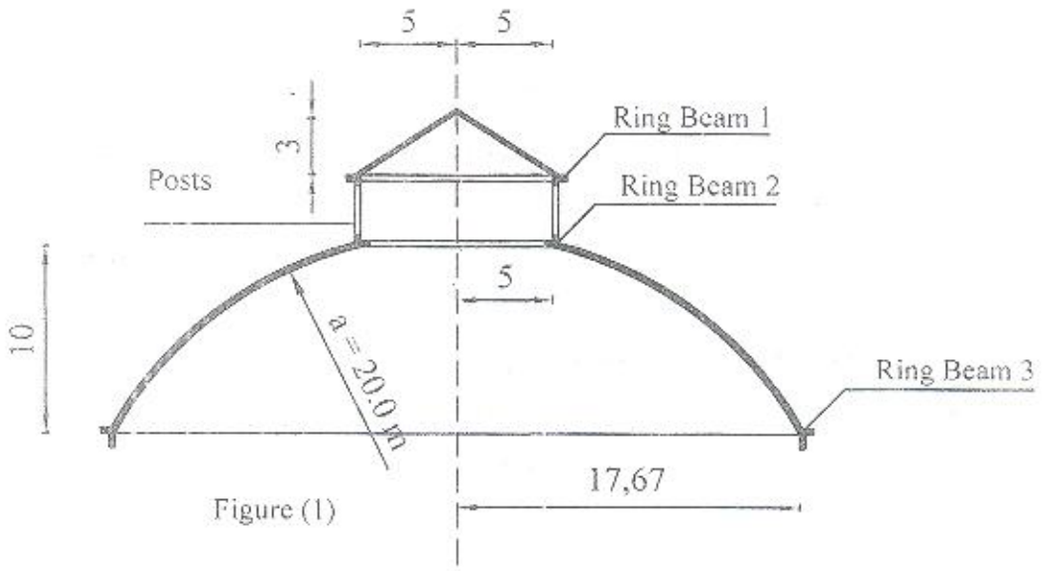


Figure (1)

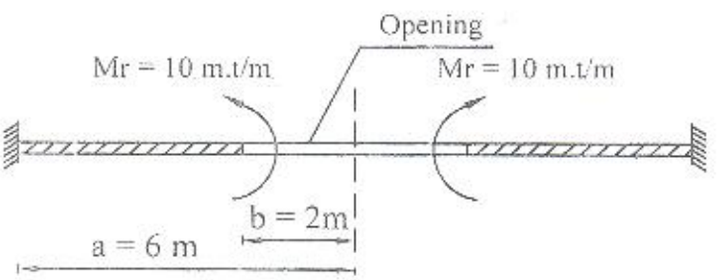


Figure (2)

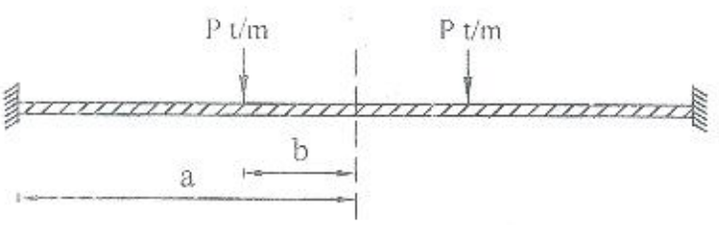


Figure (3)

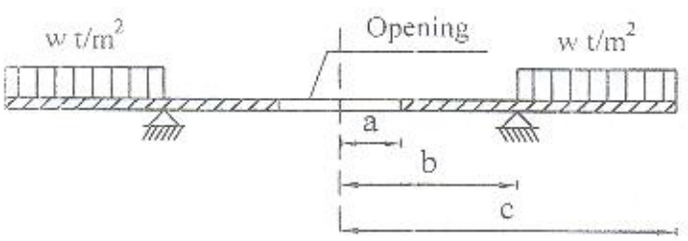


Figure (4)

Good Luck

Course Examination Committee

Assoc. Prof. Ayman A. Seleemah

Dr. Omnia Kharoob

Course Coordinator: Assoc. Prof. Ayman A. Seleemah

Tanta University

Department: Structural Engineering
Total Marks: 85 Marks

Faculty of Engineering

Course Title: Theory of Plates and Shells	Course Code: CSE3130	Year: 3rd
Date: Feb. 2nd 2010 (First term)	Allowed time: 3 hrs	No. of Pages: (2)

Remarks: (answer the following questions… assume any missing data… answers should be supported by sketches…etc)

Problem No. 1 (35 Marks)

The hall shown in Figure (1) is covered by a cone which is supported on a spherical shell of radius of 20.0 m with the dimensions shown in the Figure.

1- Calculate and draw the stress resultants in the cone (Ns and Nθ) and the part of the sphere (Nϕ and Nθ) due to own weight g = 400 kg per square meter of surface area.

2- Calculate the forces in the ring beams No. 1 & 2 and 3.
(Neglect the weight of the posts and ring beams)

Problem No. 2 (35 Marks)

The circular plate shown in Figure (2) is fixed at the outer edge and has an opening of radius (b=2m) and is subjected to radial moment Mr = 10 m.t/m acting on the free edge of the opening.

1- Drive an expression for Mr and Mt assuming that ($\mu = 0.0$) for simplification.

2- Draw the distribution of Mr and Mt.

3- Find the maximum deflection of the plate.

Problem No. 3 (15 Marks)

For the circular plates shown in Figures (3) and (4)

1- Write the appropriate expressions for the shearing force Q

2- Write the relations that can be used to get the constants of integration.

$$N_\phi = \frac{-W}{2\pi r_2 \sin^2 \emptyset}$$

$$N_\phi = \frac{-1}{r_2 \sin^2 \emptyset}\left[\int r_1 r_2 (P_r \cos\emptyset + P_\emptyset \sin\emptyset)\sin\emptyset \, d\emptyset + C\right]$$

$$\frac{N\phi}{r_1} + \frac{N\theta}{r_2} = -P_r$$

$$N_s = \frac{-1}{S \sin\emptyset}\left[\int (P_r \cos\emptyset + P_\emptyset \sin\emptyset) S \, ds + c\right]$$

$$\frac{d}{dr}\left[\frac{1}{r}\cdot\frac{d}{dr}(r\emptyset)\right] = \frac{-Q}{D}$$

$$Mr = D\left[\frac{d\emptyset}{dr} + \mu\frac{\emptyset}{r}\right] \qquad Mt = D\left[\frac{\emptyset}{r} + \mu\frac{d\emptyset}{dr}\right]$$

$$W = -\int \emptyset \, dr$$

P.T.O.

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

1/3

Final Exam
2009-2010
Time: 3 hours

Traffic and Transportation Engineering

* 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

Question (1)

a. Write briefly what is meant by the following terms:

1. Free flow speed
2. Space mean speed
3. Time mean speed
4. Jam density
5. Saturation Flow
6. Moving car method
7. Flow-density model
8. Cycle Time
9. Running speed
10. Overall speed

(10 Marks)

b. For the following O\D matrix given below;
Determine the future tripe distribution between the different zones (future O\D matrix) using the average factor method

	1	2	3	4	P.P	F.P
1	0	100	300	200	600	1200
2	100	0	200	100	400	2000
3	300	200	0	300	800	2400
4	200	100	300	0	600	600
P.A	600	400	800	600		
F.A	900	1200	3200	900		

Where:

P.P = Present Production
F.P = Future Production
P.A = Present Attraction
F.A = Future Attraction

(10 Marks)

c. In stream of vehicles 30% of the vehicles travel at a constant speed of 60 kph, 30% at constant speed of 80 kph and 40% of the vehicles travel at a constant speed of 00 kph. An observer travelling at a constant speed of 70 kph with the stream over a length of 5.0 Km is passed by 17 vehicles more than he passes. When the observer travels against the stream at the same speed and over the same length of highway, the number of vehicles met are 303. How many vehicles travelling at 100 kph pass the observer, while he travels with stream?

(5 Marks)

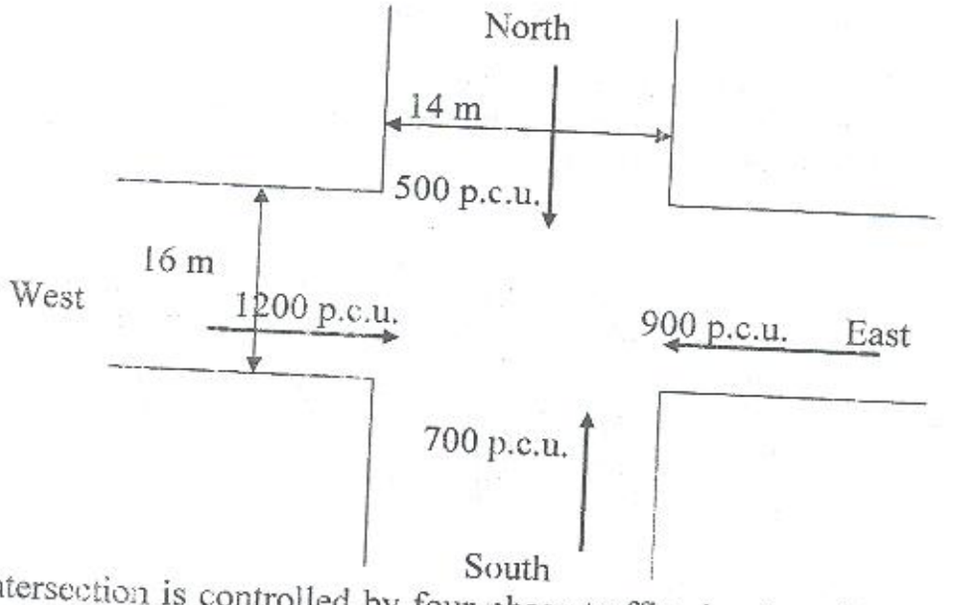
Question (2) 2/3

a. 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.

(15 Marks)



b. An intersection is controlled by four-phase traffic signals, with a cycle time of 100 sec. The value of lost time per green time of 2 sec is assumed. Saturation flows on all approaches are identical, but the maximum traffic flows on two of the phases are twice the maximum traffic flows in the remaining two phases. Determine the actual green times for each phase of this intersection.

(5 Marks)

c. A section of highway is known to have a free-flow speed of 90 Km/hr and capacity of 3300 veh./hr. In a given hour, 2100 vehicles were counted at a specified point along this highway section. What would you estimate the space-mean speed of these vehicles to be?

(5 Marks)

Question (3)

The following table gives 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. **(20 Marks)**

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

GOOD LUCK

Dr. Islam Abu El- Naga

كلية الهندسة

قسم هندسة الانشاءات
مجموع الدرجات: ٨٠ درجة

جامعة طنطا

عنوان المقرر: حساب الكميات و اعداد المواصفات	كود المقرر: CSE3126	الفرقة الثالثة
التاريخ:الخميس ٢٠١٠/٢/٤ (الترم الاول)	الزمن :٣ ساعات	عدد الصفحات :٣

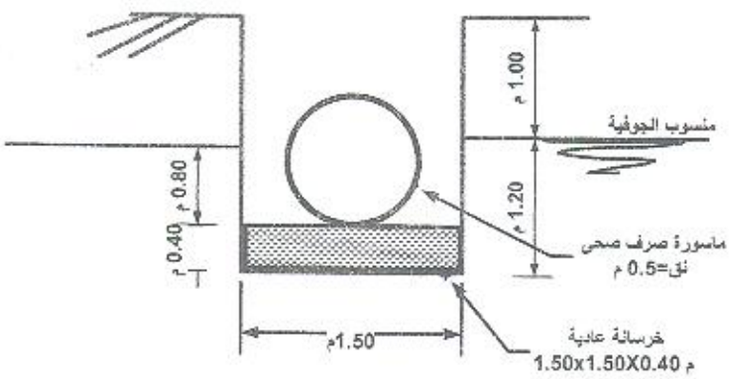
اجب عن جميع الاسئلة، كل سؤال فى صفحات متتالية، افترض اى بيانات ناقصة بقيم معقولة.

السؤال الاول: (٢٠ درجة)

١. اذكر باختصار اهداف المالك و المقاول معا من حساب الكميات
٢. يقوم المالك والمقاول بعمل مقايسات مختلفة تختلف باختلاف مراحل المشروع. حدد بدون شرح انواع المقايسات المختلفة.
٣. تختلف تكلفة اعمال الحفر طبقا لمتغيرات كثيرة يجب اخذها فى الاعتبار. اذكر بدون شرح اربع متغيرات مع ذكر امثلة ان امكن
٤. الشكل التالى مقطع عرضى لاحد خنادق تمديد مواسير الصرف الصحى. فاذا كان خط المواسير نصف قطرة الخارجى ٠,٥٠ متر و طولة ٢٠٠ متر و يوجد تحت المسورة فرشة من الخرسانة العادية كما هو موضح بالشكل. مع العلم بان هذا الخط ينفذ بطريقة سند الجوانب للحفر بستخدام السنادات الخشبية.

المطلوب:

i. اقتراح بنود الاعمال فى دفتر الكميات الازمة لتنفيذ المشروع
ii. اختيار وحدة القياس المناسبة لكل بند
iii. حساب كميات الحفر و الردم من وجة المالك والمقاول على حدة

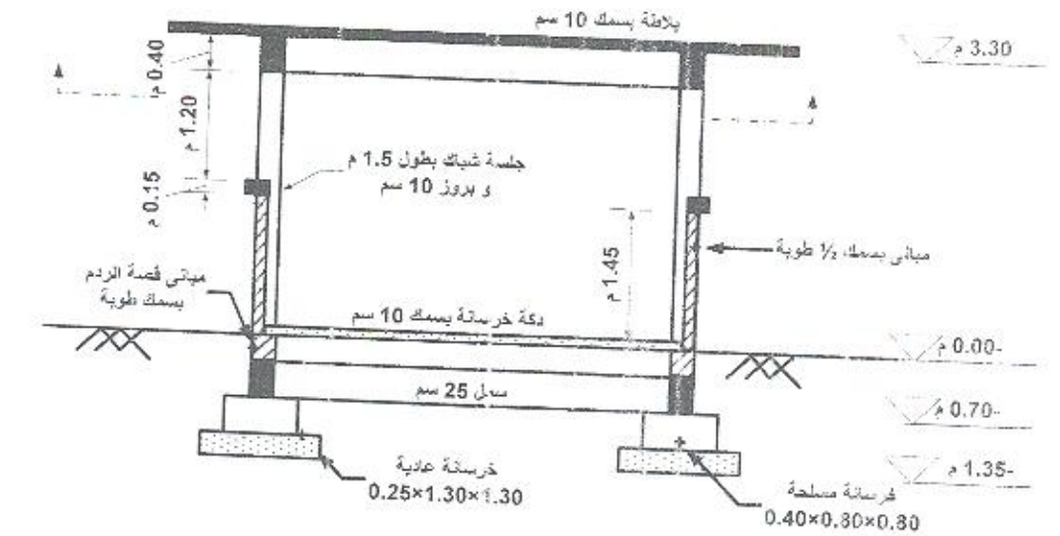


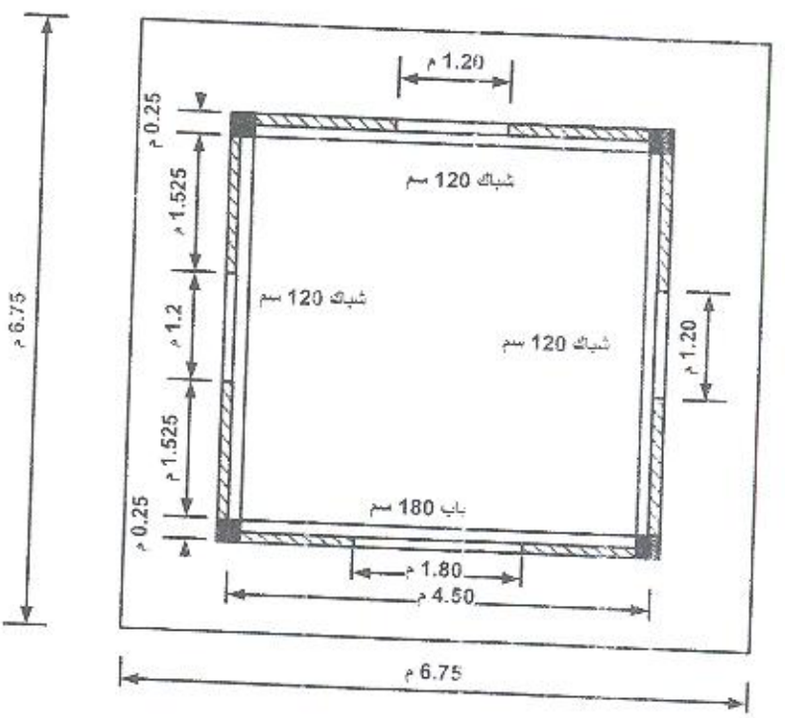
السؤال الثانى (٣٠ درجة)

١. بوصفك مهندس الاستشارى بالموقع, أحسب الكميات الأتية لتنفيذ غرفة أمن على بوابة أحدى القرى السياحية علما بأن الشكل التالى يوضح قطاع افقى لسقف الغرفة بالاضافة الى قطاع راسى

i. الحفر (قواعد – سملات)
ii. الخرسانة العادية (قواعد خ ع – دكة ارضية – جرسانة الميول للسطح بسمك ٧ سم)
iii. الخرسانة المسلحة (قواعد خ م – سملات – عمدان – كمرات – بلاطات)
iv. المبانى بالطوب
v. اعمال عزل القواعد فقط لقصة الردم

٢. اقتراح لبنود الاعمال الازمة لتنفيذ الغرفة بالكامل قبل البدأ فى اعمال التشطيبات





السؤال الثالث:(١٥ درجة)

١. اذكر ثلاث أمثلة لبنود أعمال يستخدم فى قياسها كل من الوحدات التالية:
الوزن – المتر المسطح– المتر الطولى - الحجم

٢. اقترح صياغة مناسبة للبنود التالية
i. حفر لزوم الاساسات فى تربة طينية لعمق فوق منسوب المياة الجوفية
ii. عمل خرسانة عادية لزوم دكة الارضية
iii. عمل الخرسانة المسلحة لزوم البلاطات المفرغة
iv. عمل المبانى من الطوب الاحمر لقواطيع ½ طوبة

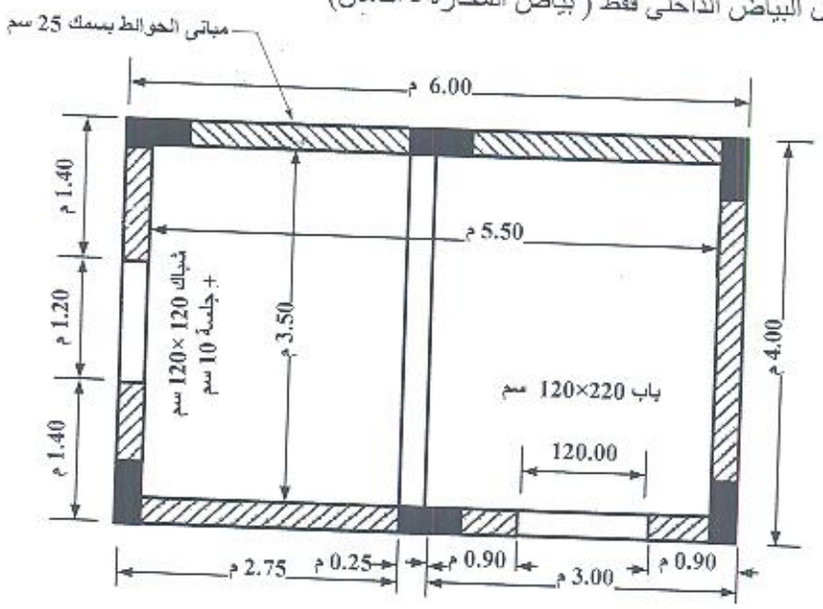
من فضلك اقلب الصفحة

٣. الشكل التالى يبين المسقط الانشائى لغرفة ٤,٠٠م × ٦,٠٠ م تم بنائها حديثا أعلى عقار. اذاكان ارتفاع الدور ٣,٠٠ م ، قطاعات جميع الكمرات ٢٥×٥٠ سم و قطاعات جميع الاعمدة ٢٥×٦٠ سم سمك البلاطة ١٠ سم.

احسب :

i. كمية المبانى الازمة لعمل الحوائط الخارجية للغرفة

ii. اعمال البياض الداخلى فقط (بياض المحارة - الدهان)



السؤال الرابع:(١٥ درجة)

١. ما هى المواصفات الفنية ؟ و ما الخصائص الواجب توافرها فى واضع الموصفات؟

٢. لمن تكتب الموصفات ؟ اذكر بدون شرح ثلاث من العناصر الواجب مراعاتها عند كتابة الموصفات

٣. ضع علامة (√) امام العبارات الصحيحة وعلامة (×) امام العبارات الخاطئة:

i. كلما ذادت اهمية المشروع كلما اذداد التدقيق فى الموصفات و المعلومات الواردة بها

ii. يمكن استخدام موصفات مشروع معدة مسبقا فى اى مشروع متشابة معة

iii. الموصفات و الرسومات يكمل كل منهما الاخر

iv. يتم استخدام الضمائر فى كتابة الموصفات للاختصار

v. تتطلب مصلحة المالك لضمان حقوقة ان تحتوى الموصفات على شروط قاسية على المقاول

vi. يجب عدم ذكر سبب اى مطلب بالموصفات

vii. من المفيد عند كتابة الموصفات استخدام المرادفات لتأكيد المعنى

مع اطيب الامانى بالتوفيق

لجنة الممتحنين:

أ.د / ايمن سليمة — د/ مريم غازى

د/ نشوى يوسف — د/ مصطفى فهمى

منظم المقرر/ د نشوى يوسف

TANTA UNIVERSITY
FACULTY OF ENGINEERING
DEPARTMENT OF STRUCTURAL ENGINEERING
EXAMINATION (THIRD YEAR) STUDENTS OF STRUCTURAL ENGINEERING هـ إنشائية-لائحةجديدة

COURSE TITLE: DESIGN OF REINFORCED CONCRETE STRUCTURES (2) a			*COURSE CODE*: CSE312
DATE: January - 2010	TERM: FIRST	TOTAL ASSESSMENT MARKS: 75	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 **FIVE** questions in three pages.

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

Problem # One (17Marks)

TRY ALL PROBLEMS

a. Define the statically determinate and statically indeterminate torsion, whose of them is more dangerous and why? **(2Marks)**

b. Compare between failure modes of a beam subjected to: **(flexure and shear)** or **(flexure, shear and torsion)** or **(torsion only)**. Whose of them is more dangerous and why? **(4Marks)**

c. 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. **(3Marks)**

d. Draw the B.M.D, S.F.D and T.M.D (if exist) for the main and secondary beams AB and CD shown in Figs.(1-a and 1-b) at critical cases (neglect the beam own weight), g= dead load, p= live load. **(3Marks)**

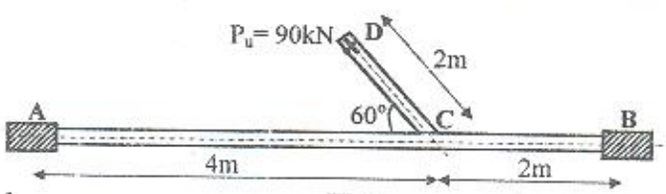


Fig. 1 Plan

e. 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. **(3Marks)**
   ii. Reinforcement details in cross section. **(2Marks)**

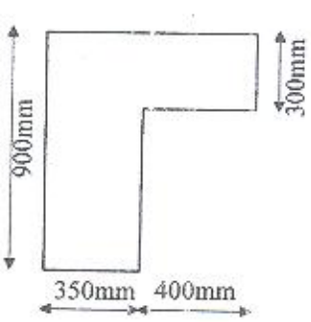


Fig. 2

Problem # Two (6Marks)

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 the 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.

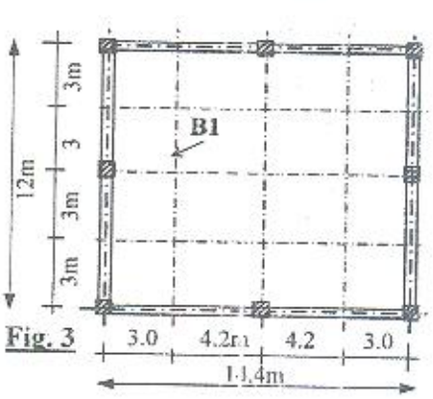


Fig. 3

Problem # Three (22Marks)

a. Compare between waffle and two-way ribbed slabs. **(2Marks)**

b. Why the depth of ribs in one-way hollow-block slab systems is taken as beams, whereas the bending moment is taken as solid slabs? Why the hollow-block slab system is not efficient in cantilever slabs? **(2Marks)**

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. The slab is subjected to live load = 4kN/m^2 and flooring cover= 1.3kN/m^2. The cross section of all beams is 250×700mm. It is required to carry out the following:

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)**

P.T.O ⟶

iii- Draw to scale 1:50 the plan and needed cross sections showing the reinforcement details and arrangement of hollow blocks. **(3Marks)**

iv- Calculate the loads carried by the supporting beam **GFJ**. **(2Marks)**

v- Check the design of the slabs to carry a sand cone load applies on panel **EFGD** without flooring cover. The diameter and the height of the sand cone load are 6 and 2m, respectively. The sand density is 18kN/m^3. **(3Marks)**

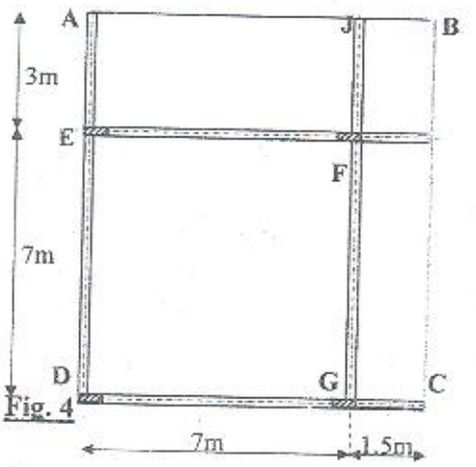


Fig. 4

Problem # Four (22Marks)

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. **(5Marks)**

ii- Design the critical sections due to bending moment of strips in X-direction only. **(5Marks)**

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). **(5Marks)**

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. **(4Marks)**

v- Calculate the load acting on the marginal beam in y-direction and calculate Mu, Qu, and Mtu at critical sections. **(3Marks)**

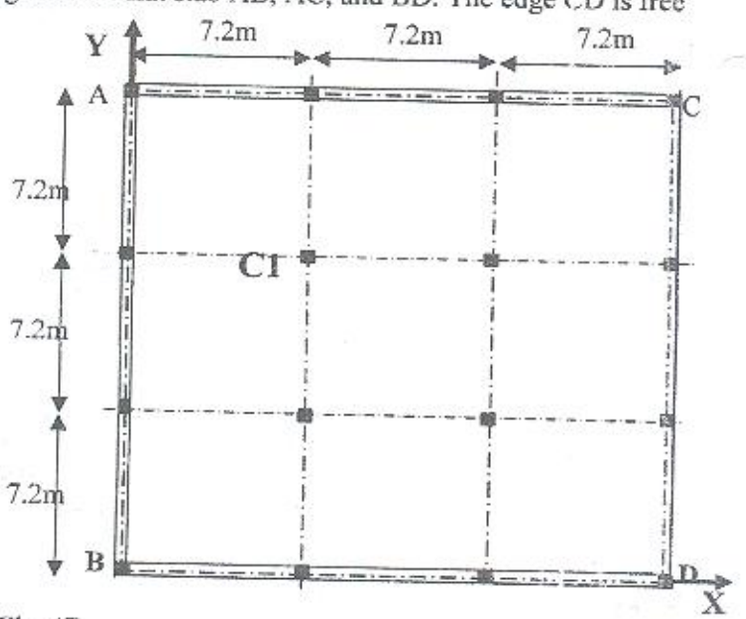


Fig. (5)

Problem # Five (14Marks)

a- Illustrate the expected widespread failures of corbels and its reasons? How the Egyptian Code equations resisting these failures? What are the precautions of the reinforcement details of the corbels? **(6Marks)**

b- Compare between shallow and deep beams regarding: strain distribution – limits according to codes of: ACI (318-2005), ECP-203 2007, Canadian, Euro Code2, BS 8110 (97). What is your opinion about the transition from shallow to deep beams? **(4Marks)**

c- Explain with sketches the effect of the load location on stress analysis of the deep beams. **(4Marks)**

مع أطيب الأمنيات

أ.د/ محمد أحمد قاسم أ.د./ طارق فوزى الشافعى