Tanta University
Faculty of Engineering
Structural Engineering Department
3rd year Civil Engineering

Design of Foundations (1); CSE3232
Term Exam, June. 2016
Thursday; 16 / 6 / 2016
Allowable time: 3 hours

Answer all the following questions. (Exam mark =85)

For all the problems; consider F_{cu} is 250 kg/cm^2 and H.T.S 36/52.

Question No. (1) (10 point)

(a) Using clear sketch, show the critical section of moment for different types of wall footing **(2 point)**

(b) Discuss in details how to determine the stress distribution under an isolated footing subjected to vertical load and bending moment **(2 point)**

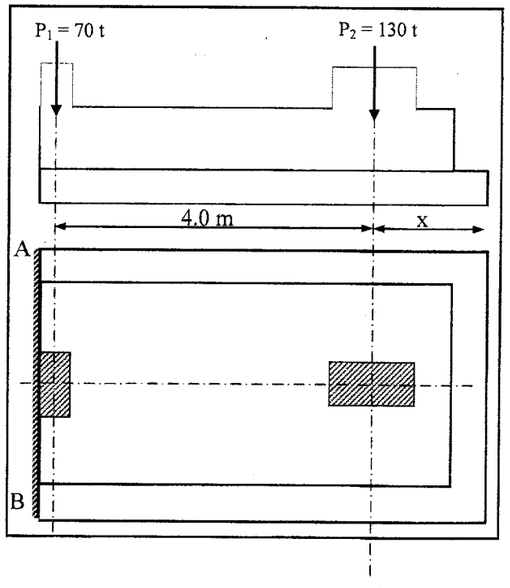
(c) Illustrate the procedures to design ribbed raft foundation. **(2 point)**

(d) Given the numbers of steel reinforcement in short direction of rectangular footing = 40 bar and the footing is (4.5 x 2.0) m, draw sectional elevation of the footing showing the bars distribution **(2 point)**

(e) Using clear sketch, show how to determine the transfer steel reinforcement for
(i) A strip footing with inverted beam (ii) A strip footing without inverted beam. **(2 point)**

Question No. (2) (20 point)

The figure shows the plan of two adjacent columns. The left column is (30 x 60) cm and carries 70.0 t and the right column is (40 x 80) cm and carries 130.0 t. The distance center to center of columns is 4.0 m and the allowable net soil pressure is 1.70 kg/cm^2. The thickness of plain concrete layer = 40 cm. Considering the projection of the plain concrete = 40 cm and the thickness of the R.C footing = 80 cm, you are required to:



(i) Determine the distance (x) required to give uniform stress distribution on soil **(5 point)**

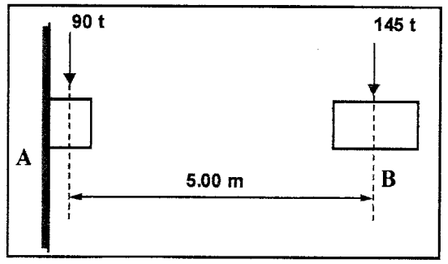
(ii) Check the shear stress adjacent to the left column **(5 point)**

(iii) Determine the maximum negative moment on the R.C combined footing = 80 **(5 point)**

(iv) Determine the reinforcement in the transfer direction under the right column **(5 point)**

Question No. (3) (13 point)

The figure shows the plan of two adjacent columns. The left column is (40 x 40) cm and carries 90 t and the right column is (40 x 80) cm and carries 145 ton. The allowable net bearing capacity of supporting soil =1.80 kg/cm^2. If the thickness of plain concrete layer = 20 cm, you are required to:



a) If a strap footing is used, design only the strap beam considering the eccentricity of the left footing = 0.80 m **(7 Point)**

b) If there is an obstructions preventing the projecting of the footings beyond the right columns, Determine only the dimensions of the trapezoidal footing and draw the contact pressure. **(6 Point)**

Question No. (4) (14 point)

(a) Using clear sketches define the negative skin friction for piles and illustrate its effect on pile capacity. **(3 point)**

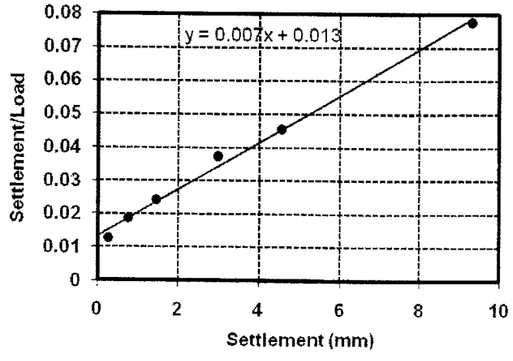
(b) The figure shows a pile load test results drawn according to modified Chin. The pile diameter is 50 cm and its length = 20 m. The Modulus of elasticity for pile material = 140 t/cm^2. Using the figure and tabulated results, you are required to

(i) Predict the load settlement relationship according to Brinch Hansen method. **(4 Point)**

(ii) Estimate the safe pile load using the predicted figure **(4 Point)**

(iii) Can you consider the test is successful? **(3 Point)**

Load, (tons)	0	20	40	60	80	100	120
Settlement , mm	0.0	0.26	0.75	1.46	2.98	4.55	9.31



Question No. (5) (11 point)

(a) Illustrate the different types of piles according to the installation method showing the advantages and disadvantages of each method. **(3 point)**

(b) A pile cap is subjected to column load of 300 ton. The column dimensions are 30 x 100 cm and the pile diameter = 60 cm. If the allowable pile load is 90 ton, you are required to:-

(i) Design the pile cap. **(5 point)**

(ii) Draw a neat sketch for plan reinforcement of this cap. **(3 point)**

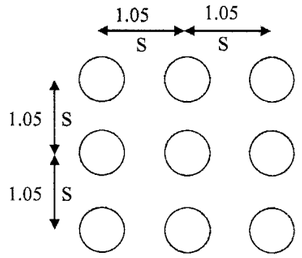
Question No. (6) (17 point)

(a) Discuss what is meant by group action and define the group efficiency illustrating how to estimate it **(2 point)**

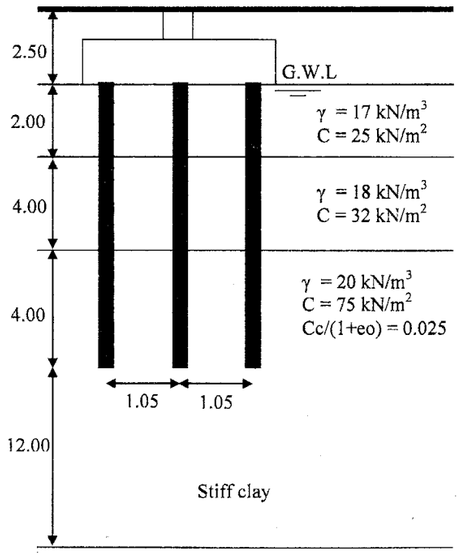
(b) The figure shows 9 piles group constructed in a clayey soil. The column load is 1100 kN and the pile diameter is 35 cm. You are required to:

(i) Estimate the expected settlement of this cap. **(3 point)**

(ii) Estimate the group efficiency. **(4 point)**

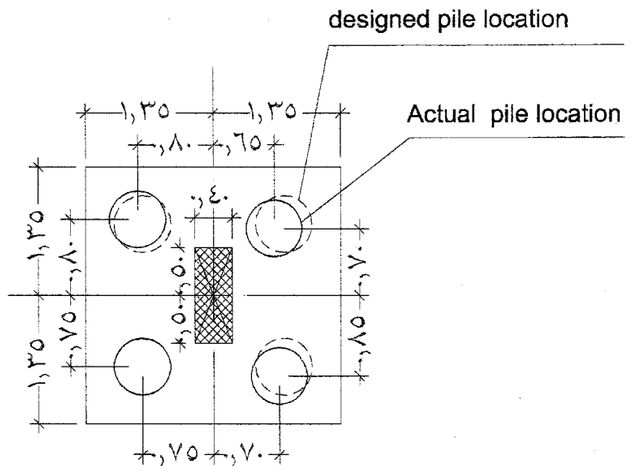


Plan of group

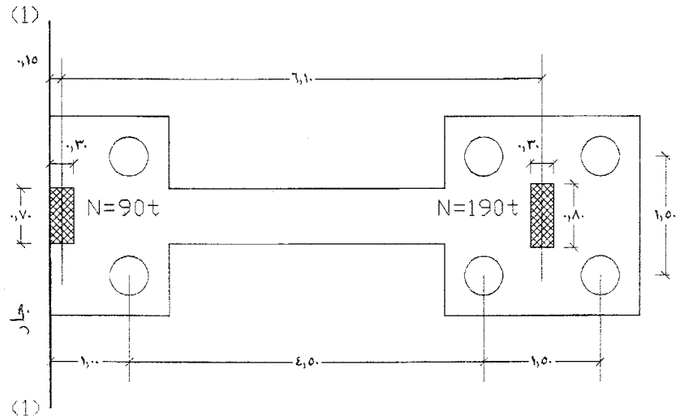


(c) For the shown pile cap, the column load is 280 ton, the safe pile load is 75 ton and the pile diameter is 50 cm.

Check the safety for this pile cap according to the actual piles location. **(5 point)**



(d) Draw <u>without any calculations</u> clear sketches of longitudinal section into the strap showing its reinforcement **(3 point)**



خالص الأمنيات بالتوفيق والنجاح

أ.د. مصطفى الصواف　　أ.د. أشـــرف نظـــير

Dept.: Structural Engrg.	**Faculty:** Engineering	**University** : Tanta
Time allowed: 3 hr. **Date:** June 2016	**Course:** Design of steel structures (b)	**Course code:** S & C CSE 324

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: (4).

Total: 120 %

Question (1) (20 %)

An industrial factory, covering the area shown in **Fig. 1**, is to be covered. The factory contains of two parts; Parts A and B. Part A contains a crane moving in the direction shown in the figure. The columns are allowed at the outer edges of the covered area as well as the edge between both areas, as shown in the figure. The crane is going to carry the raw materials from outside the factory with an extension of 10m **(the extension part is not covered)**. The cross-sections of the columns in this extension are made from battened beam-column members composed of two channel sections. The clear height of the columns in the covered area should not be less than 10 m. It is required to draw the layout to an appropriate scale, showing all bracing systems, of the suggested steel structure.

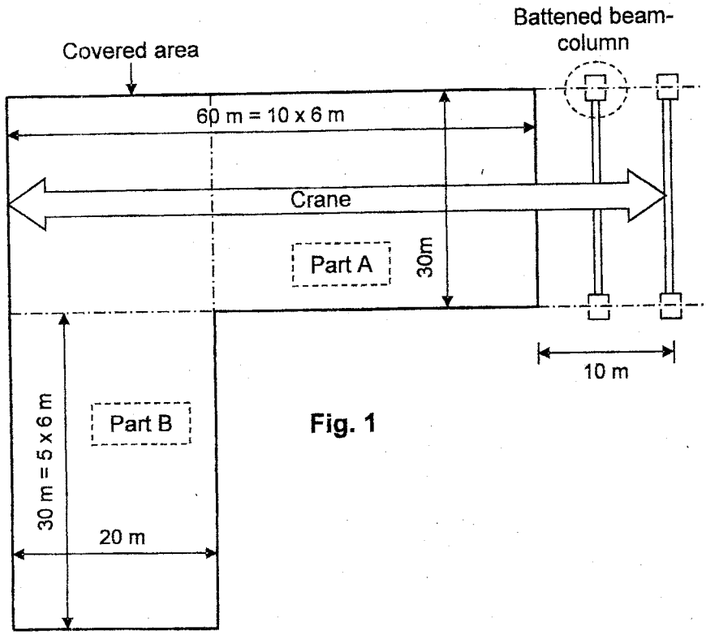


Fig. 1

Question (2) (25 %)

The **battened beam-column members** shown **Fig. 1**, assuming the following side view (S.V.) of **Fig. 2**, is to be built. The straining actions at the critical section of the column (s-s) are $N_u = 35\,t$, $M_u = 15\,t.m$ and $Q_u = 5\,t.m$. The steel used is St 52. It is **only** required to:

(a) Discuss the main difference in **both behaviour and design** between this column and the conventional plain-webbed I-section columns. **(2.5 %)**
(b) Suggest the layout of the column showing the dimensions of the batten plates and the suggested spacing between them. **(5 %)**
(c) Design the column as a built-up column formed from two C-channels with welded batten plates. **(15 %)**
(d) Design the batten plates by finding their thickness. **(2.5 %)**

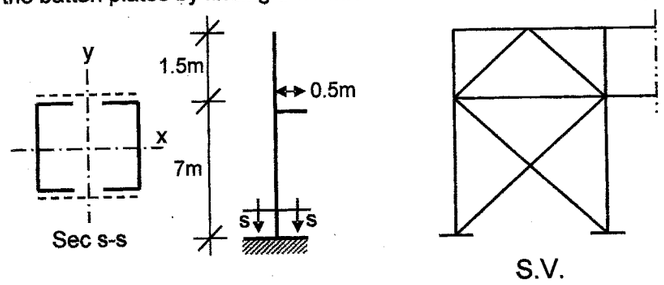


Fig. 2

Question (3) (25 %)

A fixed base connection is to be designed. The cross-section of the column is HEB 500. The column carries an axial load of $P_u = 35\,t$ in addition to a bending moment of $M_u = 15\,t.m$. The horizontal shear force at the base level is $5t$. The concrete cubic strength underneath the base plate is $f_{cu} = 300\ kg/cm^2$. It is required only to:

(a) Discuss the cases where the fixed bases are used. **(2.5 %)**
(b) Find the dimensions of the base plate. **(5 %)**
(c) Design the fillet welds connecting the column with the base plate. **(2.5 %)**
(d) Design the anchor bolts considering them made of ordinary steel St 37. Assume the anchor bolts of the compression side to bear all the shear force of the column. **(10 %)**
(e) Draw to scale 1:10 different views of the base, by assuming the dimensions of the stiffeners of the C-channels by avoiding their local distortion. **(5 %)**

Question (4) (15 %)

The connection shown below is subjected to ultimate bending moment of 20 t.m and ultimate shearing force of 8 t. Assume that the top flange connection resists **(only)** the tension force due to moment and the web connection resists **(only)** the shearing force. Determine **the number of M22 bolts** (N1 and N2) of high-strength friction type (category C according to ECP205) 10.9. Also, estimate **the thickness of the top cover plate.**

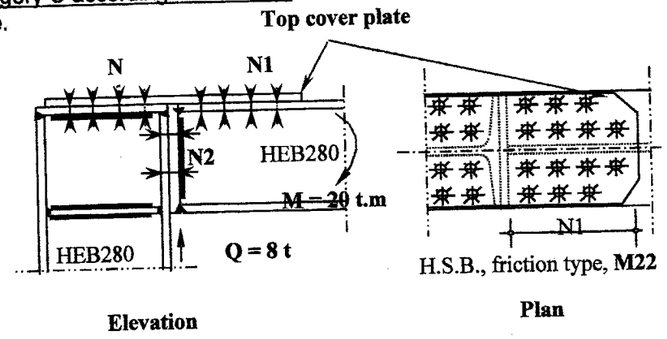


Fig. 3

Question (5) (15 %)

It is required to design a crane track girder (crane beam) as shown in Fig. 1 and Fig. 4. Use the following data:

- Span of the beam is 6.0 m and it is designed as simply support.
- Load on each of the crane wheel acting on the crane beam is 9.0 t.
- Distance between wheels (wheel base) = 2.2 m.
- Neglecting the effect of brake force.

Design aids:

- *Calculate the straining actions: Mx, My, Qx and Qy.*
- *For simplicity, choose **HEB** section and find the classification of the section.*
- *Calculate actual and allowable stresses.*
- *Check of shear.*
- *Check of deflection.*
- *Check of crippling.*

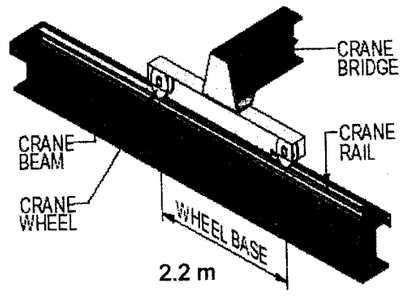


Fig. 4 Crane track girder

Question (6) (12 %)

(a) Draw the different types of composite columns; neat sketches should be appreciated. **(3 %)**

(b) It is required to design a concrete-filled square tubular column. The column is a hinged-hinged column with a height of 5 m. The design axial load of the column is 300t. The steel tube is formed of St 52 and the concrete cubic strength is $400\ kg/cm^2$. **(9 %)**

Question (7) (8 %)

A splice for a simple beam of 14 m span at a distance of 6m from the left support is to be designed. The beam carries an ultimate load of $w_u = 1.5\,t/m$. The compression flange of the beam is laterally supported at the supports and at each distance of $(2.2m)$. The cross-section of the beam is formed from HEB 600. Use bolts of Category (C) of Grade 8.8. The steel used is St 52. Use splice plates for the beam's web and flanges. It is required **only** to:

(a) Assume the thickness of the splice plates for both the web and flanges. **(3 %)**

(b) Find the number and the diameter of bolts for the splice plates for flanges only. **(5 %)**

Best wishes

Prof. Dr. M.A. Dabaon and Examining Committee

Code specifications (ASD) to solve Question (5)

- Tension and compression due to bending of compact sections symmetric about the plane of their minor axis and bent about their major axis:

$F_b = 0.64F_y$

- The member must meet the compact section requirements
- The lateral unsupported length of the compression flange is limited by the smaller of:

$$L_u \le \frac{20b_f}{\sqrt{F_y}}$$

$$L_u \le \frac{1380A_f C_b}{dF_y}$$

- *For other cases:*

$F_t = 0.58F_y$ For *tensile* stresses

The (f_{ltb}) may be calculated more accurately for *compressive* stresses as a resultant of:

$$f_{ltb} = \sqrt{(f_{ltb1})^2 + (f_{ltb2})^2} \le 0.58F_y$$

$$f_{ltb1} = \frac{800A_f}{L_u d} C_b \le 0.58F_y$$

$$f_{ltb2} = 0.58F_y \qquad \text{For } \left(\frac{L_u}{r_t}\right) < 84\sqrt{\frac{C_b}{F_y}}$$

$$f_{ltb2} = \left(0.64 - \frac{(L_u / r_t)^2 F_y}{1.176*10^5 * C_b}\right) F_y \le 0.58F_y \qquad \text{For } 84\sqrt{\frac{C_b}{F_y}} < \left(\frac{L_u}{r_t}\right) < 188\sqrt{\frac{C_b}{F_y}}$$

$$f_{ltb2} = \frac{12000}{(L_u / r_t)^2} C_b \le 0.58F_y \qquad \text{For } \left(\frac{L_u}{r_t}\right) > 188\sqrt{\frac{C_b}{F_y}}$$

٣ مدنى

TANTA UNIVERSITY
FACULTY OF ENGINEERING
DEPARTMENT OF STRUCTURAL ENGINEERING مدنى وإنشاءات لائحة جديدة
EXAMINATION (THIRD YEAR) STUDENTS OF CIVIL AND STRUCTURAL ENGINEERING

COURSE TITLE: DESIGN OF REINFORCED CONCRETE STRUCTURES (2) b			COURSE CODE: CSE3210/3223
DATE: JUNE – 2016	TERM: SECOND	TOTAL ASSESSMENT MARKS: 75	TIME ALLOWED: 4 HOURS

For all problems consider that: f_{cu}=30MPa, St.400/600

Systematic arrangement of calculations and clear neat drawings are essential. Any data not given is to be assumed – Answer as many questions as you can

الإمتحان مكون من ٣ أسئلة فى صفحتين

PROBLEM # ONE (22marks) **TRY ALL PROBLEMS**

A. Fig. (1-a) shows different frames under the given loads. It is required (**without any calculations**) to sketch the B.M.D and the corresponding main tension steel. **(6marks)**

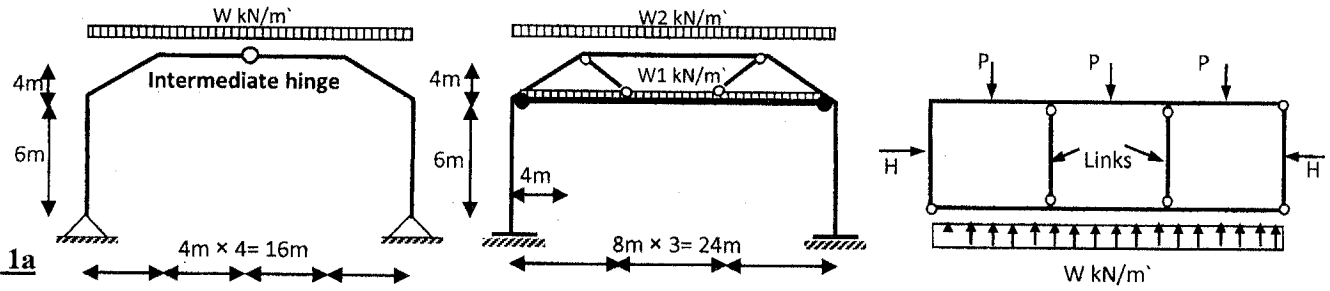


Fig. 1a

B. Fig. (1-b) shows statically determinate frame **ABCDEFGHIJ** of a series frames spaced 5m. The statical system, ultimate loads and concrete dimensions of an intermediate frame is shown in the figure. The frame is hinged at **A** and **B** and two intermediate hinge at **E** and **F** acting as strut **EF** and a link member **IJ**. The vertical component reactions at A and B are equal (**YA = YB**) and the force in the link member **IJ** is compression and equal **235kN**. It is required to make a complete design one of the intermediate frame having breadth 400mm and slab thickness 120mm. Neglect the effect of buckling in out of plane of the frame. For the given factorized (ultimate) loads, determining the following:

i- Draw the B.M., S.F. and N.F. diagrams. **(6marks)**

ii- Design the critical sections and check shear stresses of the frame. **(5marks)**

iii- Draw to reasonable scale the intermediate frame showing clearly the concrete dimensions and the reinforcement details in elevation and in cross sections. **(5marks)**

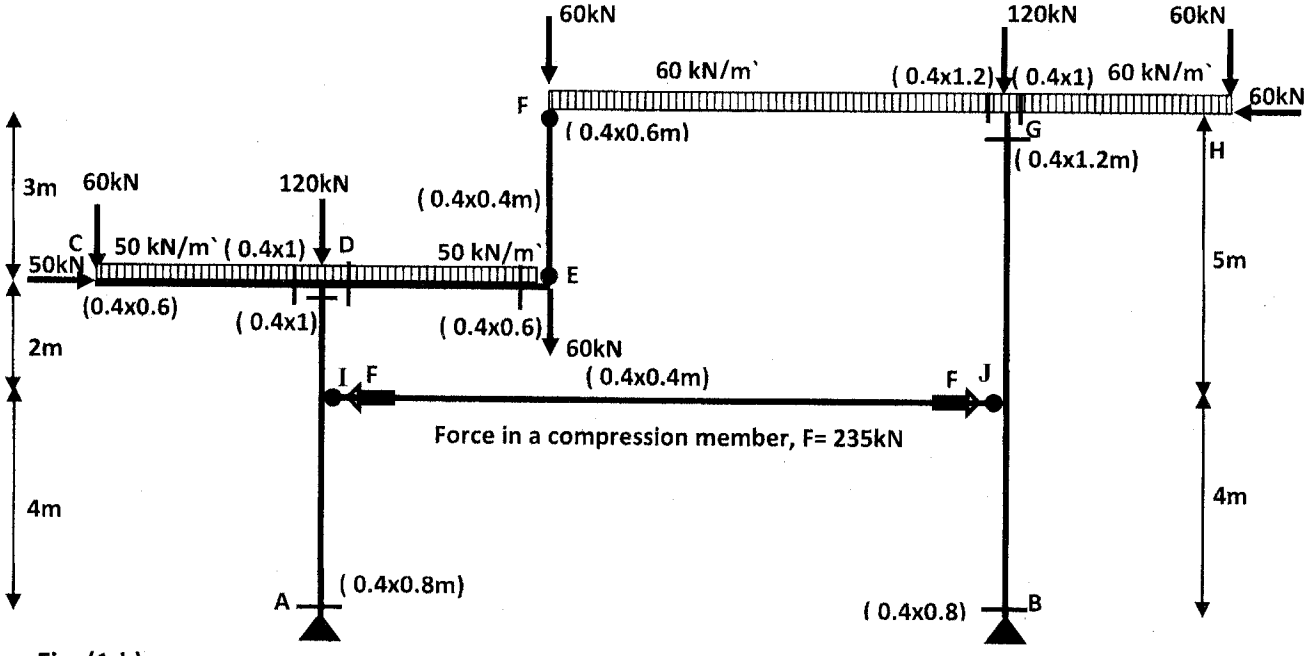


Fig. (1-b)

Statical system, ultimate loads and concrete dimensions

PROBLEM # TWO (39marks)

A. i. What will happen for case of equal arched slab thickness? **(1marks)**

ii. Illustrate the functions of necessary braced beams used in a triangular shed using sketches. **(1mark)**

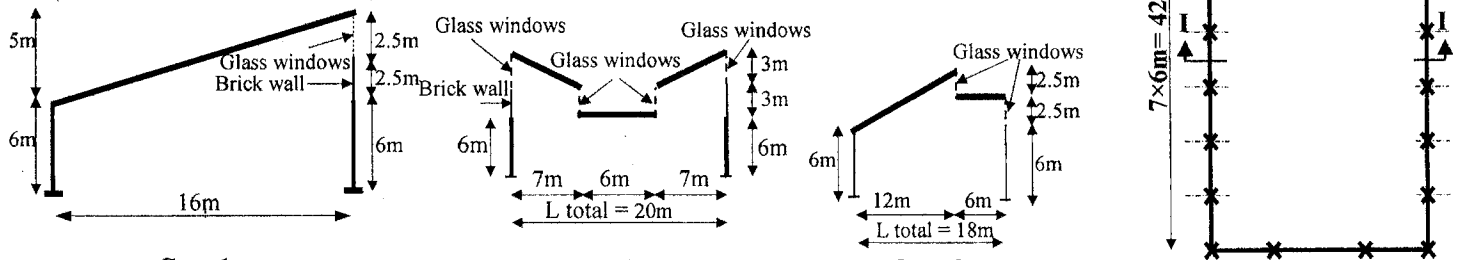
P.T.O

ii. What are the differences between ties and effective spans for each of the arched slab and arched girder? **(1marks)**
iii. Explain effect of the horizontal reaction on analysis of the arches. **(2marks)**

B. Fig. 2 shows plan and sectional elevations of an industrial hall (L×42m). The columns are allowed only in the outer perimeter of the hall. There are **three cases** of roofs may be used to covering this hall as shown in the sectional elevation I-I. It is required to carry out the following:

i. Suggest the **more economic** main supporting elements "MSE" that carry the given roofs and draw to convenient scale the sectional elevations, showing concrete dimensions of all necessary structural elements. Using diagrammatic sketches, **illustrate** the loads transfer up to the footings **for each case**. **(18marks)**

ii. **For the roof of case 2 only: design** the critical sections of the chosen **MSE** and its main elements, if the **average ultimate total loads** on the MSE are **20kN/m²**. The own weight of MSE may be estimated. **Draw** to convenient scale the sectional elevation of MSE showing reinforcement details of all designed elements. **(7marks)**



Case 1 Case 2 Case 3

Fig. 2 **Section elevations I-I for three cases of roofs**

C. An Arched slab with a tie of span 18m and rise 3m supported on columns of spacing, **S= 5m.** The following data are given: ultimate stiffener load, $w_{u,stif}$= **7kN/m`**, total ultimate load of a tie, $T_{total,u}$= **650kN**, ultimate **own weight** of the vertical and horizontal beams= **12kN/m`**, Ultimate moment of arched slab at quarter point= **7kN.m.** It is required to determine the maximum dead and live loads carried by the arch. Design the tie and the arch at crown. Determine the total loads applied on the column. **(9marks)**

PROBLEM # THREE (24marks)

A. Fig. 3 shows a Vierendeel girder of span 30m. B.M.D of a V. G is given. It is required to carry out the following: Draw S.F. and N.F. diagrams of the V.G and find the applied load P. Without any calculations draw the shape of the transverse reinforcement for the joint (**A**). Define the different factors affecting the behavior of beam-column joints. Define with neat sketches the different modes of failure for beam-column joints. **(8marks)**

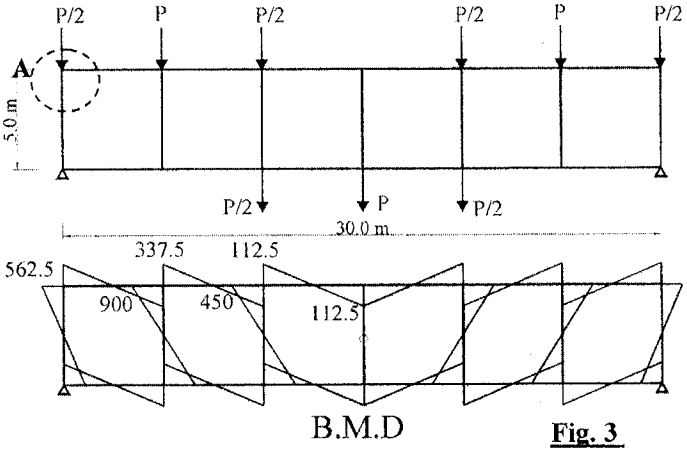
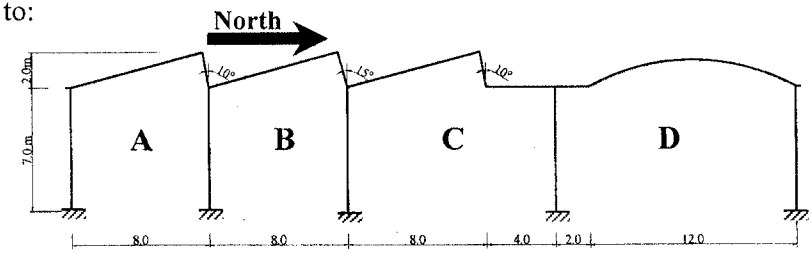


Fig. 3

B. Fig. 4 shows layout of a plan and sectional elevation of an industrial hall of dimensions 16 × 42m. The hall consists of three panels **A, B, C** and **D**. A **north light roof slab** is required for panels A, B and C, whereas the arch roof is required in panel D. Columns are only allowed on the axes 1, 2 and 3 when marked ■ in plan. It is required to:

i- Suggest the suitable main supporting elements needed to carry the roofs. Draw to reasonable scale sectional elevation showing all necessary structural elements and its concrete dimensions. **(7marks)**

ii- Illustrates the load transfers from the roofs to foundations, using diagrammatic sketches **(without any calculations)**. Locate the foundation axes related to column axes and draw its reinforcement with the columns. **(9marks)**



Section Elevation I-I

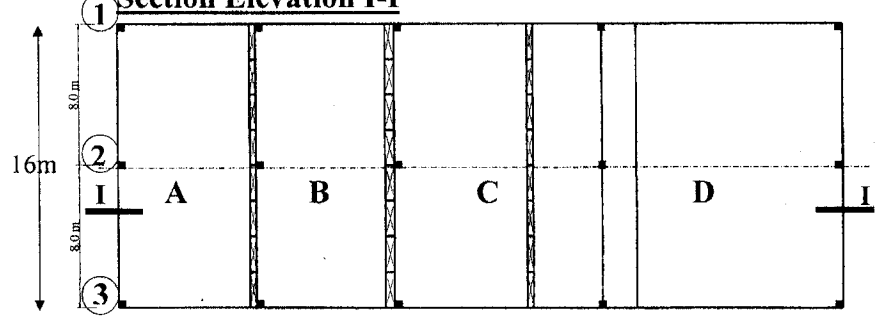


Fig. 4 **plan**

All the best
Prof. Mohamed Ahmed Kasem
Prof. Tarek Faawzy El-Shafiey
Assoc. Prof. Ahmed Mohamed Atta

Tanta University

Faculty of Engineering

Construction Project Management (1)
Code : CSE3213

Structural Eng. Dept. 3rd Year (Structural)
Second Term – Final Exam 2015/2016
Date : 12-06-2016

Question (3) [20 marks] :

A. Determine the Stages of The Construction Project ... **In Details .**

B. In Tender Submition there are (Technical Offer and Financial Offer)
What are the Contents of each Offer ?

C. In the Bidding Stage , Determine the Tenders Types .

D. Estimate the approximate cost for a building with 500m^2 area & 8 floors higth , **if** we have information of another building costing 6 millions LE ,with 1000m^2 area & 5 floors hight and the rate of inflation is 7% .

Question (4) [20 marks] :

A. Define the Types of The Construction Contracts .

B. What about the Project Objective Triangle ? and How to manage these objectives ?

C. In one of the construction projects have been contracted between the owner and the contractor by (Target Cost Contract) in the following conditions :

- ✓ Target Cost of the project = 5 Millions LE .
- ✓ Target Time for the project = 42 Months .
- ✓ The contractor entered 450,000 LE , In case of target cost and time .
- ✓ Delay Penality = 30,000 LE per month .

Requirments : Study the impact of the following on each of the owner & the contractor :

Case	Cost (LE)	Time (Month)
1	5,000,000	42
2	5,400,000	42
3	5,400,000	44
4	5,000,000	36
5	4,700,000	36

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Tanta University

Construction Project Management (1)
Code : CSE3213

Structural Eng. Dept. 3rd Year (Structural)
Second Term – Final Exam 2015/2016
Date : 12-06-2016

Faculty of Engineering

Arrange your answer carefully --- Time allowed: **3** hours

Question (1) [25 marks] :

1- The following data are for a running project in the end of week **7**. The original schedule can be determined using in Table 1. While the updated schedule can be determined using Table 2 (using the end of period concept). Also, actual weekly costs have been recorded in Table 3.

Table 1

Activity	Pred.	Duration (wk)	Budget
A	---	2	30,000
B	---	4	40,000
C	A	4	20,000
D	B	3	24,000
E	C,D	5	50,000
F	C,D	2	40,000
G	E,F	2	8,000

Table 2

Activity	Start date	Finish date
A	0	3
B	1	5
C	3	8
D	5	9
E	9	14
F	9	11
G	14	16

Table 3

Week	1.	2	3	4	5	6	7
Actual Cost	25,000	20,000	15,000	13,000	13,000	14,000	8,000

- It is required to plot the curves of "BCWS" and "ACWP" only.
- Comment on the progress (cost and time) of the project on the updating date (week 7).

Question (2) [20 marks] :

1- Develop a resource schedule for a small project using data below. Consider resource constraints as stated in the end of the following table.

Act.	Duration (days)	Pred.	Resource Rates			Act.	Duration (days)	Pred.	Resource Rates		
			R1	R2	R3				R1	R2	R3
A	5	--	0	0	0	G	10	C	2	2	2
B	5	--	1	1	1	H	10	D	0	0	2
C	10	--	1	2	2	I	5	E,F	1	1	1
D	10	--	2	2	2	J	5	G,H	0	1	2
E	5	A	0	0	0	K	10	I	1	1	4
F	5	B	2	2	2	L	10	J	1	2	3
R1 ≤ 2			**R2 ≤ 4**			**R3 ≤ 6**					

أمنياتنا الطيبة لكم بالتوفيق ، ، ، ، ، ،

Course Title: Structure Analysis (3) (ب) | Course Code: CSE3122 | Year: Third Year (هندسة إنشائية ـ لائحة جديدة)
Date: June, 2016 (Second term) | Allowed time: 3 hrs | No. of Pages: (2)

Remarks: (answer the following questions… assume any missing data…)

1- Problem (1) 15 Marks:

Using the moment distribution method, draw the **B.M.D.** for the given frame of constant I shown in Fig.(1).

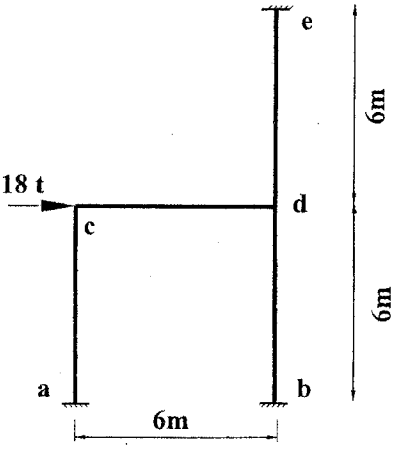
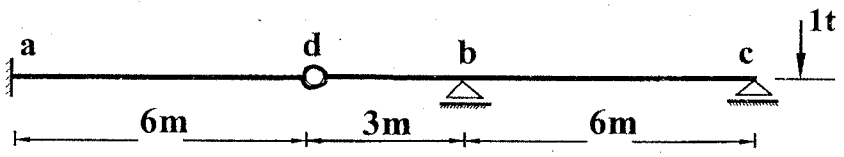


Fig. 1

2 - Problem (2) 12 Marks

For the given continuous beam shown in Fig. 2, construct the influence lines for $\mathbf{Y_a}$ and $\mathbf{M_a}$

Fig. 2



3- Problem (3) 20 Marks:

For the given frame shown in Fig. (3), construct the influence lines for the reactions at **a** and **b**. Also construct the influence lines of the straining actions (**N, Q and M**) at sections **s-s**

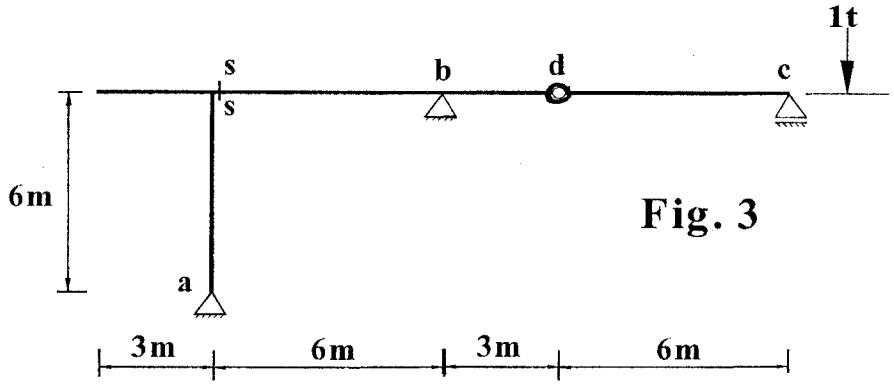


Fig. 3

4- Problem (4) 12 Marks:

Find the plastic modulus and plastic moment of the given section shown in Fig. (4), assuming a yield of stress of 2.5 t/cm^2. What will the plastic moment of this section if it is composed of a material whose yield stresses in tension 2.5 t/cm^2 and in compression 3.0 t/cm^2 and the tip of the web in tension. The bending moment about an axis perpendicular to the web

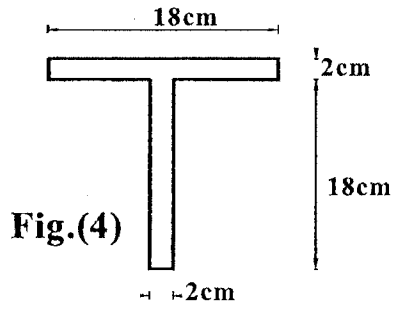


Fig.(4)

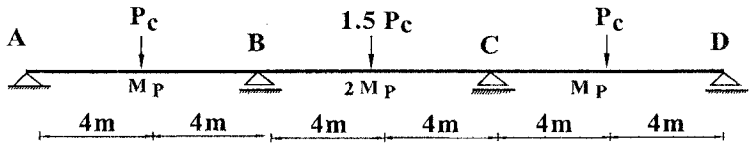


Fig. (5)

5- Problem (5) 10 Marks:

For the given continuous beam ABCD as shown in Fig. (5), each span has different section and thus plastic moment. Determine the collapse load $\mathbf{p_c}$ and draw the corresponding collapse **B.M.D** .If $\mathbf{M_p = 40t.m}$

6- Problem (6) 16 Marks:

For the given frame hinged at **a** and **b** as shown in Fig.(6), the plastic moment is the same in all members equal **80t.m** . Determine collapse load $\mathbf{p_c}$ and draw the collapse **B.M.D**. What will be the collapse load $\mathbf{p_c}$ and the collapse **B.M.D** if the two-hinged supports **a** and **b** replaced by two-fixed supports.

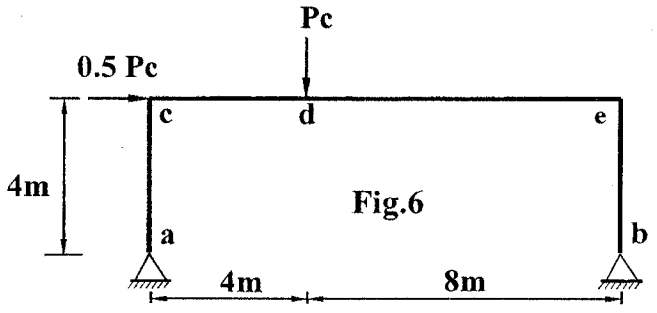


Fig.6

With the best wishes

Course Examination Committee

Prof. Dr. Mohamed A. Kasem

Associate Prof Dr. Mohamed A. Sakr

Dr. Tarek Mohamady Khalifa