جامعـــه طنطـــــا
كليـــه الهندســـــة
قسم هندسة الأشغال العامة

امتحان نهاية الفصل الدراسي الثاني - الزمن:٣ ساعات
مادة: هندسة السكك الحديدية
الصف: الثالث مدني

٢٠٠٩-٢٠١٠

أجب عن الأسئلة الآتية

السؤال الأول:

١- وضح بالرسم ما يلي:
- قطاع سكه حديد مفرد يبين مكونات قطاع السكة موضحا دور كل مكون من المكونات.
- العلاقة البيانية بين (السرعة و المقاومة وقوه الجر)
- أنواع تثبيت القضبان المستخدمة في الفلنكات في سكك حديد مصر.

٢. خط سكة حديد منحني نصف قطرة ٨٠٠ متر والسرعة القصوى المصرح بها للمسير هي ١٢٠ كم/س والمطلوب :
١. تحديد ارتفاع الظهر عن البطن الواجب تنفيذة علي هذا الخط
٢. ارسم مسقط أفقي وقطاع طولي للمنحنيات الانتقالية مع تحديد أطوالها
٣ . احسب أقصي سرعة يمكن المسير بها لضمان عجلة مركزية خارجية تساوي صفر

٣. أحسب الطول المناسب لفلنكة خشبية يراد إستخدامها في خط سكة حديد ذو إتساع قدرة ٦٢٠ مم إذا علم أن عرض تاج القضيب المستخدم ٣٠ مم.

٤. لمح سائق قطار الركاب عائق علي خط السكة الحديد فقام بفرملة القطار وتوقف علي بعد ٥ متر من العائق. المطلوب إيجاد المسافة بين القطار والعائق لحظة اكتشاف السائق للعائق علي الخط إذا علم أن القطار سرعتة ٩٠ كم/س مكون من قاطرة وزنها ١٢٠ قدرتها ٢٠٠٠حصان و جميع محاورها مزودة بالفرامل تجر خلفها ١٠ عربات ركاب وزن العربة وهي محملة ٥٠ طن ووزنها وهي فارغة ٤٠ طن ويسير القطار علي خط منحدر لأسفل بمقدار ٢‰ وعلي منحني نصف قطره ٦٣٠ متر.

٥. أوجد أقل نصف قطر يمكن تنفيذة علي خط سكه حديد انحداره ٤ ‰ تسير علية قطارات الركاب بسرعة ٨٠ كم/س ومكون من قاطرة وزنها ١٢٠ طن وقدرتها ٢٠٠٠ حصان تجر خلفها ١٠ ع٢ربات وزن العربة ٥٠ طن وتسير علية قطارات بضائع بسرعة ٦٠ كم/س مكونة من قاطرة وزنها ١٣٢ طن و قدرتها ٣٢٠٠ حصان تجر خلفها ٤٠ عربة وزن العربة الواحدة ٢٠ طن.

٦. اذكر أهم منابع الضوضاء الناتجة من الحركة علي خطوط السكك الحديدية .

٧. احسب أقصى إجهاد علي سطح أساس السكة نتيجة مرور قطار ركاب بسرعة ١٤٠ كم/س مكون من قاطرة ذات ٦ محاور وزنها ١٢٠ طن وتجر خلفها ٨ عربات وزن العربة ٥٠ طن ذات ٤ محاور . إذا علم أن عمق قطاع التزليط ٤٠ سم والفلنكات المستخدمة مقاس (٢٦٠*٢٥*١٧) سم وتقسيط الفلنكات ٦٠سم.

السؤال الثاني:

١. إشرح مع الرسم فائدة كل من:
المعوجة – جناح التقاطع – الجزء المستقيم قبل التقاطع

٢. عرف مع الرسم كل من:
المفتاح المقابل – الإبرة – فدو كعب المفتاح

٣. أوجد الاجهادات في القضبان وكذلك هبوط السكة والضغط الراسي نتيجة لمرور حمل محوري مقداره ٣٣,٩ طن شاملا التاثير الديناميكي وذلك إذا علم ان I=٢٠٩٠سم^{٤} و Z=٢٥٥سم^{٣} و A=٦٦سم^{٢}. ولقد وجد بالتجربة إن مقدار هبوط الفلنكه عند تحميلها بمقدار ٢٠ طن هو ٢,١٥ سم . تقسيط الفلنكات ٦٠ سم .

٤. خط سكه حديد ملاهي اتساع السكة ٦٢٠ مم وعرض التاج ٣٠ مم يقع علي منحني دائري نصف قطرة ٥٩ متر والمطلوب ليجاد طول وإحداثيات المنحني الانتقالي اذا كانت سرعة القطارات ٢٥ كم/س.

٥. خط سكة حديد منحني نصف قطرة ٨٠٠ متر والسرعة القصوى المصرح بها للمسير هي ١٢٠ كم/س والمطلوب إيجاد قيمة العجلة المركزية ودرجة المسير لقطار بضائع يسير علي الخط بسرعة ٥٠ كم/س.

٦. خط سكه حديد مترو علي شكل منحني مركب متتالي أنصاف أقطارة ١٢٠٠ متر و ٨٠٠ متر. المطلوب إيجاد طول المنحنى الانتقالي بين المنحنيين المتتاليين اذا علم أن سرعة قطارات المترو ٩٠ كم/س

٧.احسب طول التحويلة (في اتجاه السكة الطوالي) والموضحة في الشكل الموضح بين الخط النازل ومخزن التخزين علما بان فدو سكه الطوالي ٢متر والمفاتيح المستخدمة ١:١٠ والإبر مستقيمة بطول ٢متر وفدو كعبها ١٦٠مم وطول الجزء المستقيم عند التقاطع ٢,٥متر.

طوالي نازل

مع أطيب التمنيات بالتوفيق والتفوق

دكتور مهندس : اسلام أبوالنجا

Dept.: Structural Engrg.	**Faculty**: Engineering	**University** : Tanta
Time allowed: 4 hr. **Date**: June 2010	**Course**: Design of steel structures (b)	**Course code**: CSE3211

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: (3).

Question 1: (25 %)

Check of bending stress for the given simply supported pate girder with span 20 m of I- cross-section using the following data.

Data:

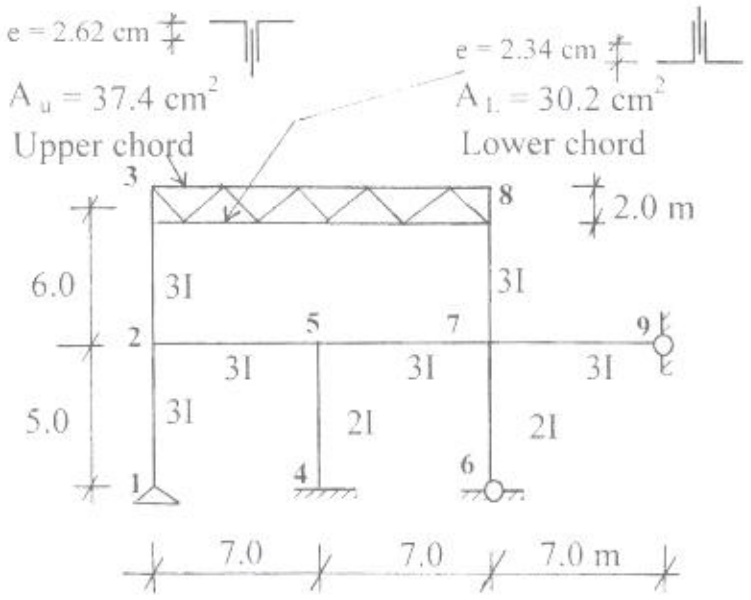
- M_u = 300 t.m
- L_b = 3.5 m
- Upper flange is 30 x 2.4 cm
- Lower flange is 40 x 3.2 cm
- Web is 115 x 1.2
- Use ST52

The followings are considered in the solution:

1. **Classification of section**
2. **Plastic N.A and plastic moment**
3. **Elastic properties of the cross-section**
4. **The nominal flexural strength M_n shall depend on the lateral unbraced length of the member (L_b) then Get M_n or M_n'**
5. **Compare M_n and M_u**

Question 2: (12 %)

Fig. (٢) 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 and 6-7.



$I = 3000\ cm^4$

Fig. (2)

Question 3: **(20 %)**

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**.

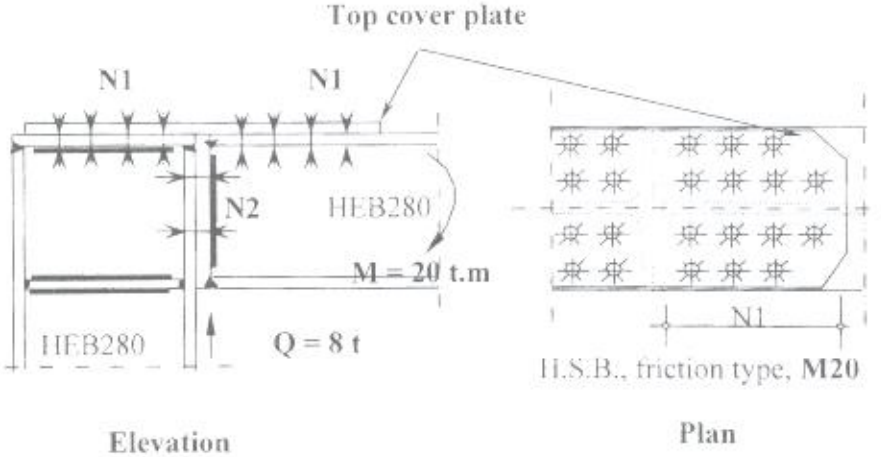


Fig. (3)

Question 4:

4.a. It is required to design the fixed- free column shown in Fig. (4), which represents a part of an industrial building. The column carries an axial ultimate load of **40 t**., in addition to an eccentric ultimate load of **10 t**, as shown. The column may be assumed of constant inertia. **(20 %)**

4.b. Design the fixed base (a) and draw to scale 1:10 elevation, plan and side view to show the detail of the base; Fig. (4). **(20 %)**

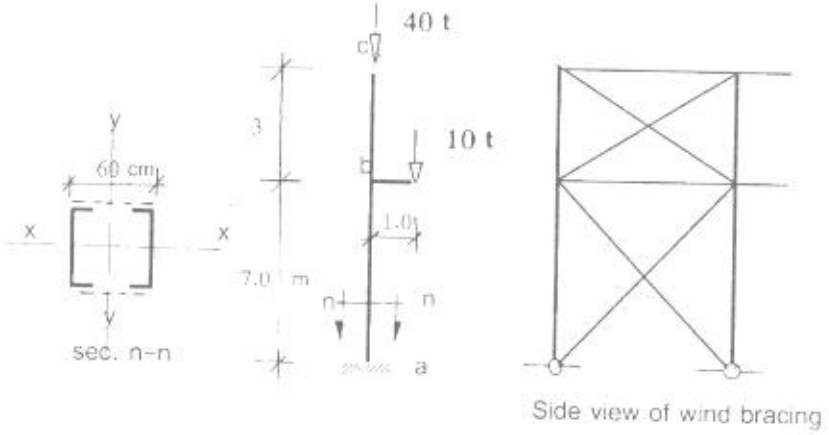


Fig. (4)

Question 5:

(11 %)

There are so many definitions of beams. Express the function of each definition of the following:

Beam, Girder, Header, Trimmer, Spandrel, Joist , Purlin, Girt, Rafter , Lintel, Transfer member.

Question 6:

(10 %)

a. Explain briefly with net sketches the following.

i. Types of composite columns.
ii. Types of shear connectors.
iii. Types of shear connection between the steel beam and the concrete slab.
iv. Types of the cross-sections of crane track girder.

Best wishes
Prof. Dr. Mohamed A. Dabaon
and the Exam. Committee

Question No. (5) (14 point)

(a) Prove a formula to estimate the projected distance of plain concrete beyond the outer face of reinforced concrete footing considering the allowable bearing stress of soil **(3 point)**

(b) If a reinforced concrete combined footing with thickness (T = 70 cm) was design for the two columns shown in figure 3:

(i) Determine the dimensions of the combined footing **(3 point)**

(ii) Determine the maximum negative moment on the footing **(4 point)**

(iii) Using neat sketch determine and draw the reinforcement in the transfer direction under the two columns **(4 point)**

Question No. (6) (14 point)

(a) For the shown plan of ribbed raft footing in figure 4, you are required to discuss in details:

(i) The procedures to calculate the stresses under the raft corners **(3 point)**

(ii) How to design the raft slab and beams. **(3 point)**

Fig. 4

(b) For the two columns shown in figure 3, if there is an obstruction preventing the projecting of the footing beyond the outer face of the right column you are required to:

(i) Determine the dimensions of the suitable footing and draw the contact pressure under the footing. **(4 point)**

(ii) Determine the maximum bending moment on the footing **(4 point)**

Best of luck

أ.د.م: مصطفى الصواف
أ.د.م: أشـــرف نظـــير

(3/3)

Question No. (5) (12 point)

(a) Prove a formula to estimate the projected distance of plain concrete beyond the outer face of reinforced concrete footing considering the allowable bearing stress of soil **(3 point)**

(b) If a reinforced concrete combined footing with thickness (T = 70 cm) was design for the two columns shown in figure 3:

(i) Determine the dimensions of the combined footing **(3 point)**

(ii) Determine the maximum negative moment on the footing **(3 point)**

(iii) Using neat sketch determine and draw the reinforcement in the transfer direction under the two columns **(3 point)**

Question No. (6) (11 point)

(a) For the shown plan of ribbed raft footing in figure 4, you are required to discuss in details:

(i) The procedures to calculate the stresses under the raft corners **(2 point)**

(ii) How to design the raft slab and beams. **(2 point)**

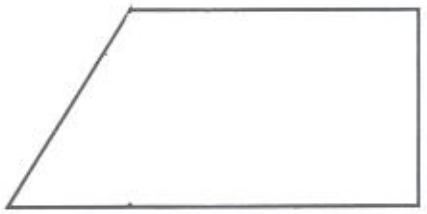


Fig. 4

(b) For the two columns shown in figure 3, if there is an obstruction preventing the projecting of the footing beyond the outer face of the right column you are required to:

(i) Determine the dimensions of the suitable footing and draw the contact pressure under the footing. **(4 point)**

(ii) Determine the maximum bending moment on the footing **(3 point)**

Best of luck

أ.د.م: مصطفى الصواف
أ.د.م: أشـــرف نظـــير

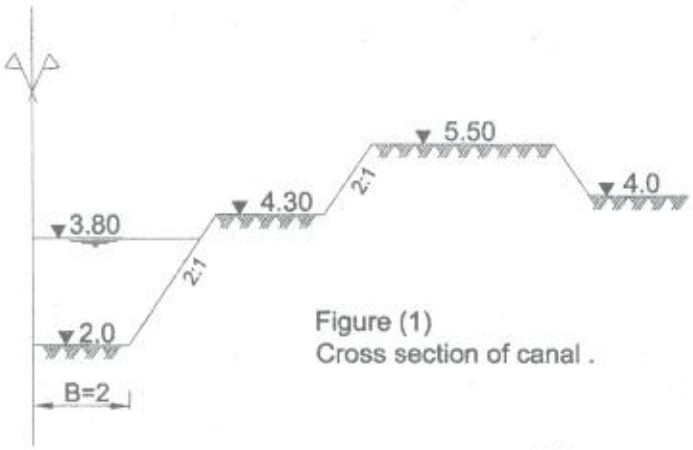


Figure (1)
Cross section of canal .

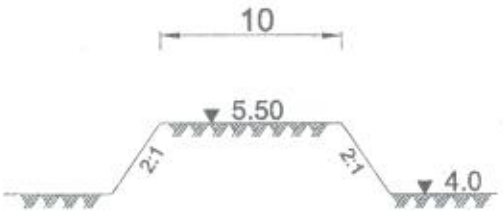


Figure (2) .

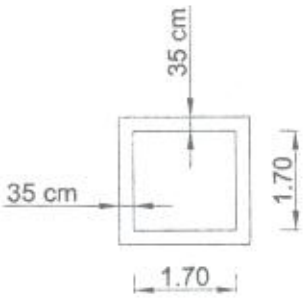


Figure (3) R.C box culvent .

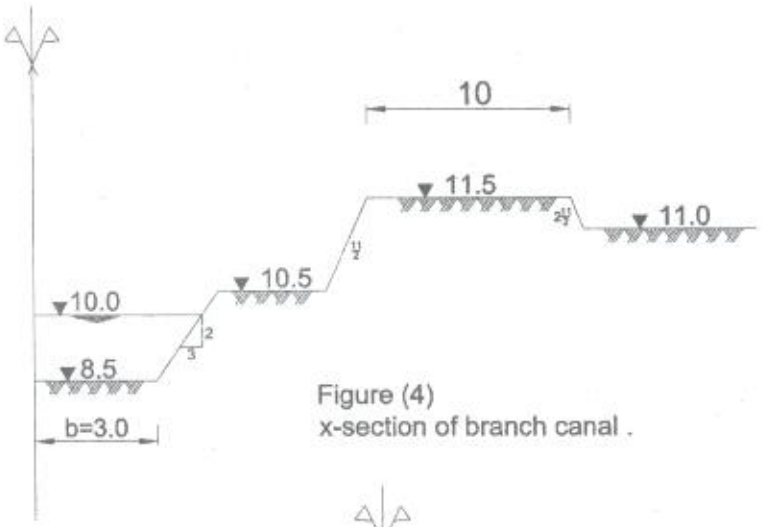


Figure (4)
x-section of branch canal .

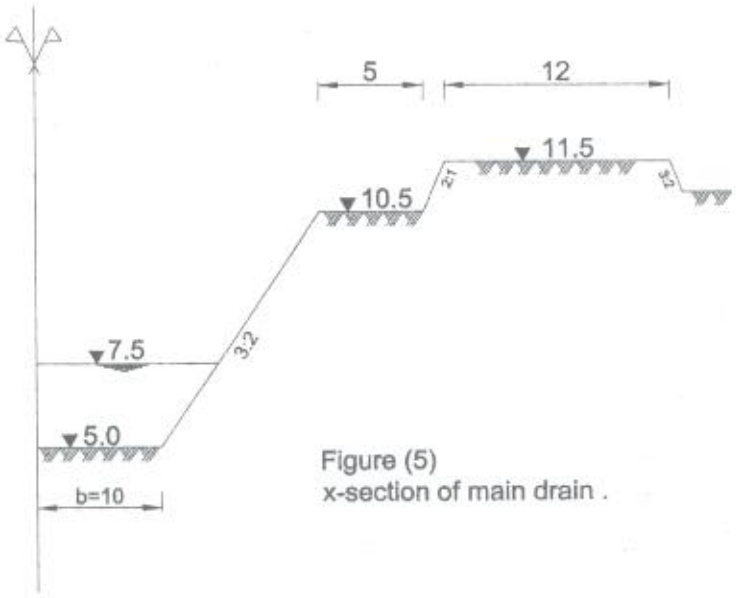


Figure (5)
x-section of main drain .

TANTA UNIVERSITY
FACULTY OF ENGINEERING
DEPARTMENT OF STRUCTURAL ENGINEERING مدنى وانشاءات 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 – 2010	TERM: SECOND	TOTAL ASSESSMENT MARKS: 75	TIME ALLOWED: 4 HOURS

For all problems consider that: f_{cu}=35MPa, 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 3 اسئلة فى ثلاث صفحات

PROBLEM # ONE (28 marks)

A. Fig. 1 shows a sectional elevation and the statical system of an intermediate frame ABCDEFGHIJ of series of a frames spaced 5m. The frame is considered to be braced in the two directions in-and-out of plane of the frame. The frame is hinged at B and link member AC. The frame breadth is **500mm** and the slab thickness is **120mm**. The concrete dimensions of the frame are given on the sectional elevation. For the sake of simplicity the concentrated loads are considered as a uniform loads. The **reactions are given** on the figure and the force of the **tie is 244.96kN**. The B.M.D, S.F.D and N.F.D of the upper part of the frame EFG are given. For the given factorized (ultimate loads), it is required to carry out the following:

i- Complete drawing the B.M.D, S.F.D and N.F.D of the frame. **(6 marks)**
ii- Design the critical sections and check shear stresses of the frame. **(8 marks)**
iii- Draw to a convenient scale the intermediate frame in elevation and in cross sections showing reinforcement details and its arrangement. **(8 marks)**

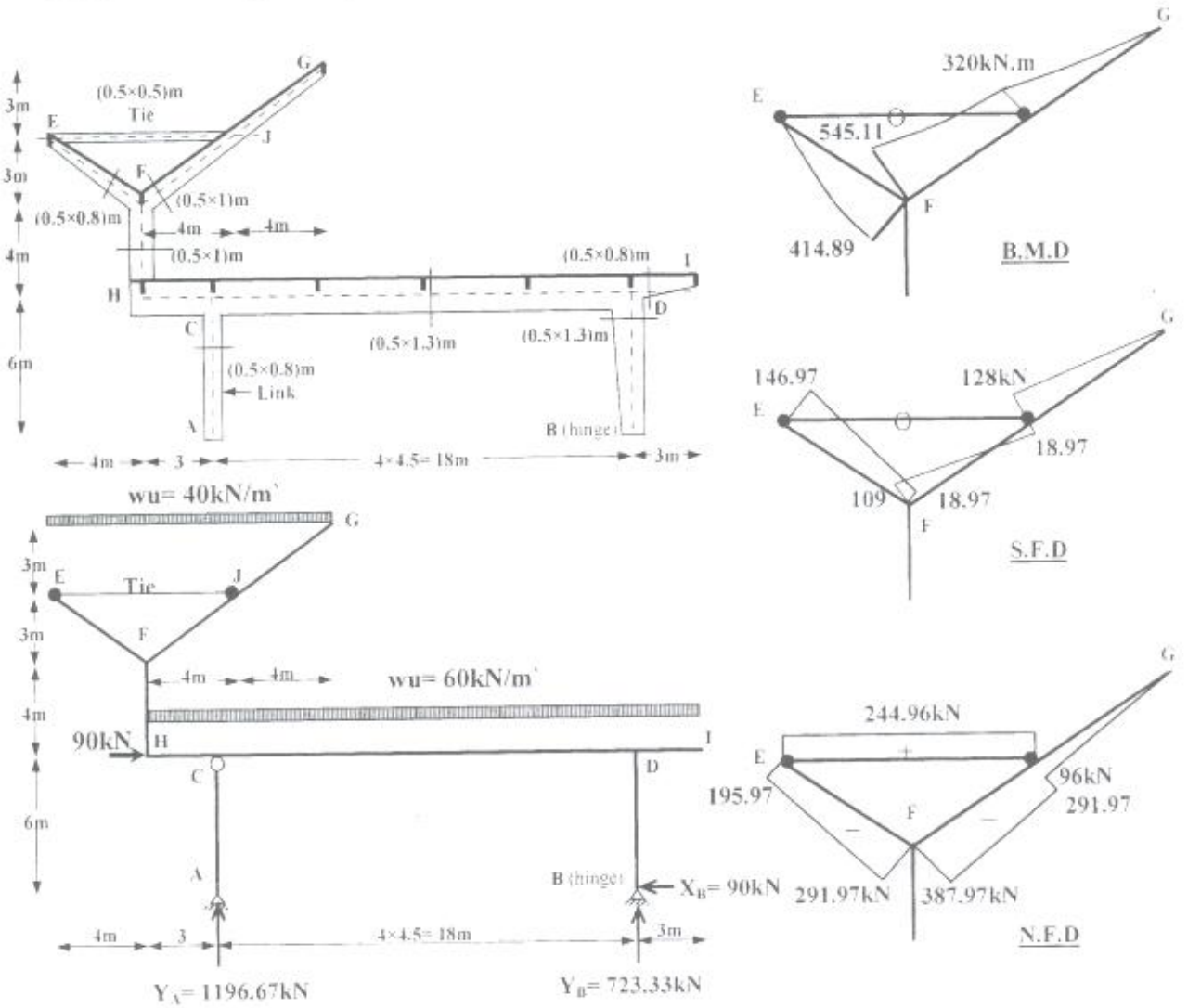


Fig. 1

Please Turn Over ⟶

B. Fig. 2 shows three frames under a given loads. It is required to sketch **(without any calculations)** B.M.D and the corresponding main steel. **(6 marks)**

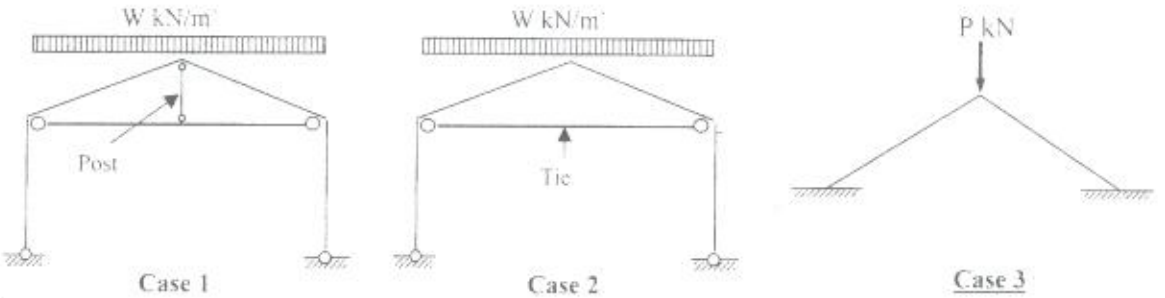


Fig. 2

PROBLEM # TWO (28 marks)

I- What are the conditions must be satisfied in reinforced concrete halls. **(1 mark)**
II- What are the advantages of choosing axes of MSE coincide on line of pressure. **(1 mark)**
III- Explain the effect of tie, hangers and stiffener on analysis of arched slab. **(2 mark)**
IV- State the effect of tie elongation and elastic deformation in analysis of arch girder? **(1 mark)**
V- Sketch the load transfer of the saw-tooth arch girders. **(3 marks)**
VI- Compare, using sketches, between the three types of expansion joints. **(3 marks)**

VII- What are the tension structures? Illustrate using sketches, the load transfer of the suspension bridges. The cable shown in Fig. 3 is pinned to supports at A and B and carry a concentrated load of 30kN at point C. Calculate the tension in each part of the cable and the reactions at the supports. **(6 marks)**

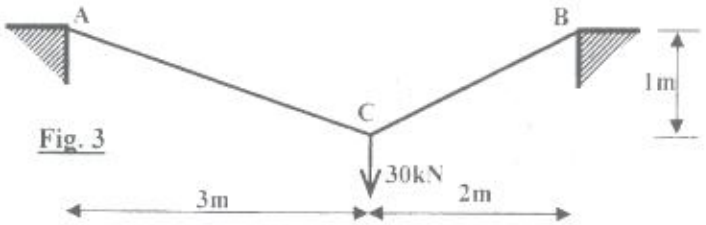


Fig. 3

VIII- Fig. 4 shows a structural plan of stair case of a residential building. It is required to sketch **(without any calculations)** the B.M and the reinforcement details of the stair slabs and its supports. **(5 marks)**

IX- Fig. 5 shows a Vierendeel girder of span 20m. It is required to carry out the following: What are the assumptions to be solving the Vierendeel using the empirical method. Draw the B.M.D, S.F.D and N.F.D diagrams of the Vierendeel girder under the given loads. Draw the shape of reinforcement of part marked (A). **(6 marks)**

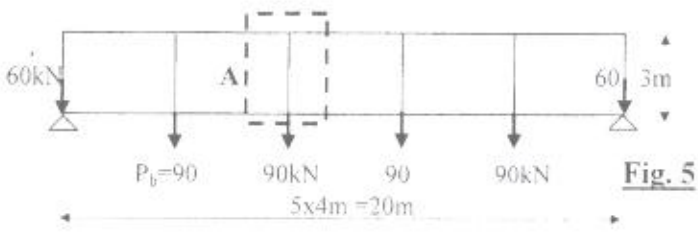


Fig. 5

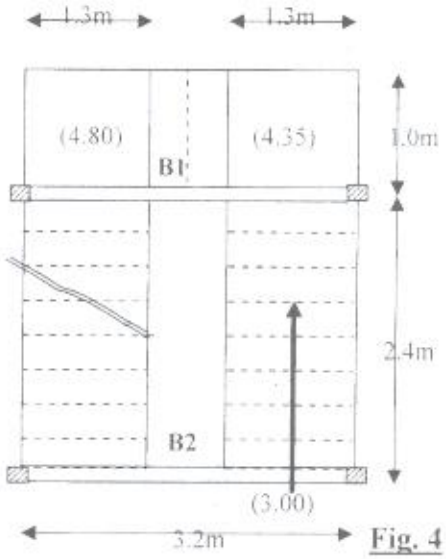


Fig. 4

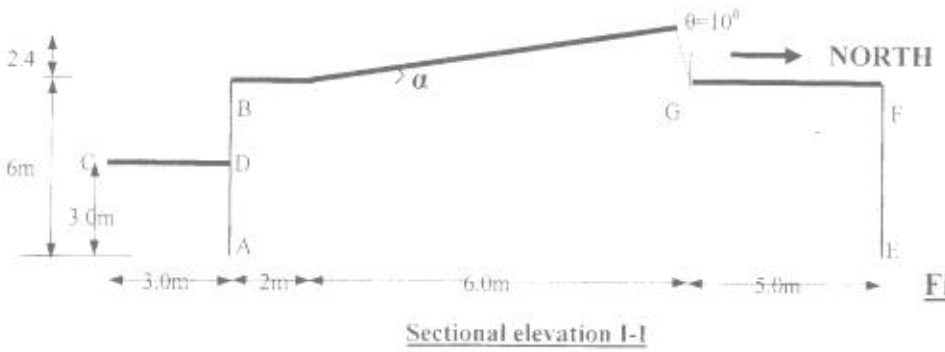
PROBLEM # THREE (33 marks)

A- Fig. 6 shows a plan and sectional elevation I-I of an industrial hall of area 13×20m. A north light roof system is required. The supported columns are allowed only at axes AB and EF. The left side parking CD is required. It is required to carry out the following:

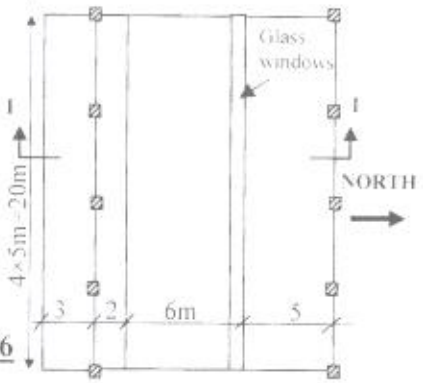
i. Suggest the main supporting elements needed to carry the roofs. **(3 marks)**
ii. Draw to reasonable scale sectional elevation showing all necessary structural elements and its concrete dimensions. **(4 marks)**
iii. Illustrate using sketches **(Without any calculations)** the load transfer from the roofs to a foundations. **(4 marks)**

Please Turn Over ⟶

iv. Illustrate using sketches the effect of increasing post inclination, θ, to 50.2° on the footings A and E. What is your opinion of using tie in this case? State the significance of angle α. **(3 marks)**



Sectional elevation I-I



Plan

Fig. 6

B. Fig. 7 shows plan and sectional elevations I-I of an industrial hall of area 30×35m. The columns where marked X are allowed only at the outer perimeter of the hall. Levels of the covering roofs are shown on plan and in cross-section I-I. It is required to carry out the following:

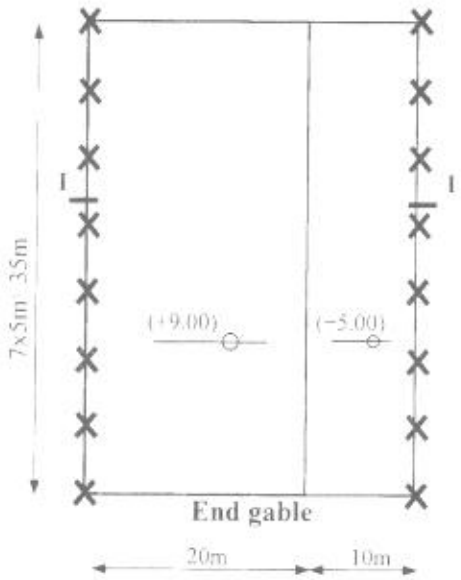
i. Suggest the systems of more economical Main Supporting Elements (MSE) and the roof slabs. Draw to reasonable scale the sectional elevation I-I and part plan showing the concrete dimensions of all structural elements. **(5 marks)**

ii. Calculate the applied loads on the suggested MSE if the average ultimate dead and live loads, (g_u and p_u) of the roof slab not included weight of MSE are **10kN/m²** and **3kN/m²**, respectively. The own weight of MSE may be estimated. **(2 marks)**

iii. Design the MSE of the hall and its components. **(5 marks)**

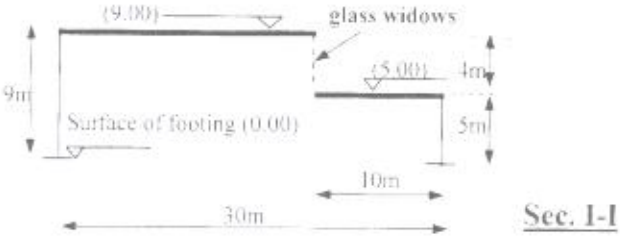
iv. Draw to reasonable scale the sectional elevation I-I of MSE and its components showing the reinforcement details. **(4 marks)**

v. State the conditions should be satisfied at end gable. Draw the elevation at end gable for case of no future extension of a hall (any elements may be added). **(3 marks)**



Plan

Fig. 7



Sec. I-I

أطيب الامنيات بالتوفيق

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

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

Foundations Engineering (1); CSE3214
Term Exam, June. 2010
Sunday; 20 / 6 / 2010
Allowable time: 3 hours

(هندسة مدنيه – لائحة جديدة)

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

Question No. (1) (14 point)

(a) Differentiate between driven and bored piles. **(3 point)**

(b) Show using clear sketches how to use field tests to estimate the safe pile load. **(3 point)**

(c) A group of 4-driven piles 21.0 m long and 40 cm in diameter was driven in clay layer at spacing 1.20 m. The profile consists of a thick layer of medium clay with the following properties: the water table is located at the ground level, the clay extend to 40 m, $C = 30$ kN/m^2, $m_{vc} = 0.00025$ m^2/kN and $\gamma = 18$ kN/m^3.

Estimate the maximum column load and the expected settlement of the group. **(8 point)**

Question No. (2) (14 point)

(a) What is the meaning of negative skin friction; state its effect on the pile resistance. **(4 point)**

(b) For the shown plan of the four pile cap in figure 1, if the thickness of the cap is 0.90 m and the bottom reinforcement in both directions is 7 φ 22 /m (high tensile steel), you are required to:

Find out the safe column load can be supported by this cap. **(10 point)**

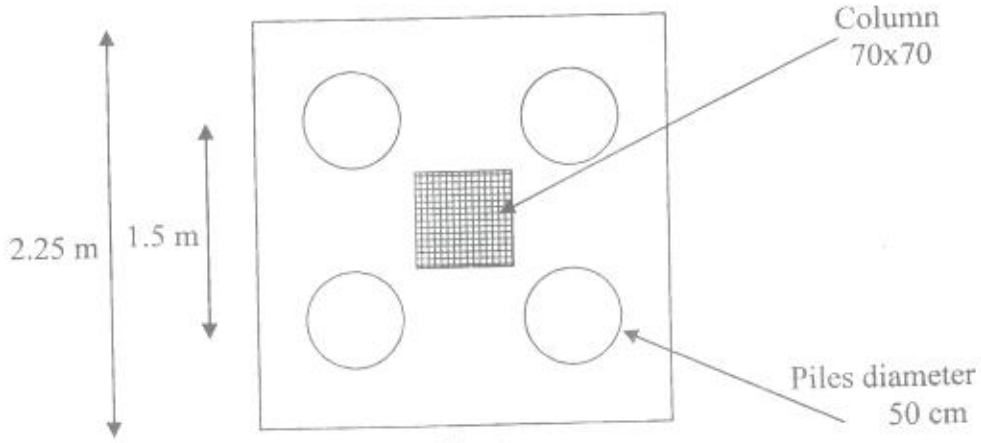


Fig. 1

Question No. (3) (14 point)

(a) Using suitable scale, draw clear sketches for three piles cap and strap beam reinforcement. **(4 point)**

(b) Classify pile according to its material and mode of load transfer **(3 point)**

(c) Fig. 2 shows the results of pile load test performed in single pile with the following properties; pile length = 19.0 m, pile diameter = 0.50 m; working pile load = 50 tons

Find out the safe pile load, and check the settlement **(7 point)**