B- The following data are for a running project actually in the end of week **7**. The original schedule can be determined using data in Table 6-1. While the updated schedule can be determined using Table 6-2 (using the end of period concept).
Also, actual weekly costs have been recorded in Table 6-3. *[15 marks]*

Table 6-1

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 6-2

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 6-3

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 "*budgeted cost of work scheduled*" and "*actual cost of work performed*" only.

♦ Comment on the progress (cost and time) of the project on the updating date (week 7).

Question (4) *[8 marks]*: Write the *most correct* answer in your answer sheet:

1- It is considered a common "priority rule" when scheduling based on resource constraints:
   (a) total float   (b) predecessor
   (c) overlap   (d) either "a" or "c"

2- To shorten duration of repetitive project using line-of balance scheduling method, you can:
   (a) increase production rates of all activities   (b) increase number of crews of particular activities
   (c) increase number of crews of all activities   (d) nothing of the above

3- In LOB scheduling, if an activity has a higher rate of build than its predecessor, this will lead to:
   (a) divergence case   (b) parallel case   (c) convergence case

4- if cost variance is of negative sign, then the project is:
   (a) behind schedule   (b) ahead of schedule   (c) under cost   (d) nothing of the above

5- the "budget" of an activity is the .... money needed by this activity.
   (a) estimated   (b) predicted   (c) actual   (d) answer "a" or "b"

6- the main result(s) of work breakdown structure is (are):
   (a) list of activities   (b) groups of work packages   (c) activities' durations   (d) answer "a" and "b"

7- if an activity is delayed beyond its TF by 4 days, then the:
   (a) project duration will be increased   (b) project duration will be increased by 4 days
   (c) project duration will be increased by 4 days and successors will be delayed by 3 days

8- the free float of an activity equals to:
   (a) early start (predecessor) – early finish (activity) + lag
   (b) early start (predecessor) – early start (activity) + activity duration - lag
   (c) early start (predecessor) – early finish (activity) - overlap
   (d) either "b" or "c"

١. تحدث باختصار شديد عن الفرق بين كل من: الشروط العامة والشروط الخاصة – المواصفات العامة والمواصفات الخاصة – مستندات المناقصة ومستندات التعاقد – المناقصة والممارسة – المناقصة العامة والمناقصة المحدودة – التأمين الإبتدائي والتأمين النهائي.

٢. اشرح كيف يمكن تحويل تكلفة مشروع إلى سعر إجمالي كعطاء موضحا المكونات الأساسية وكيفية تقدير كل منها باختصار.

٣. لماذا يجب زيارة موقع المشروع قبل البدء في تقدير تكلفة هذا المشروع.؟

٤. الجدول الآتي يعطي البنود الرئيسية لمشروع ما والكميات المقدرة وتكلفتها المباشرة. التكلفة غير المباشرة وهامش الربح للمشروع يبلغان 734500 جنيه.

البند	الكمية المقدرة	الوحدة	التكلفة المباشرة (× ١٠٠٠ جنيه)
إزالة مخلفات	٨٥	قيراط	٨٥
حفر في التربة العادية	٢١٠٠٠	م٣	٢١٠
حفر في الصخر	١٢٢٢٠	م٣	٦١١
ردم	١٤٥٥٠	م٣	٥٨٢
رصف	١٠٠٠٠	م٢	١٤٥٠

المطلوب تكوين عطاء متوازن ثم تحويله لغير متوازن لزيادة الدخل المبكر للمقاول بمقدار ١٥٠ ألف جنيه .

٥. عرف "عقد العمل" و "عقد المقاولة". ما هي الفروق الجوهرية بينهما؟ أعط أمثلة لكل منهما .

٦. ما هي اركان عقد المقاولة؟ اشرح اختصار شديد.

٧. أحد إلتزامات رب العمل نحو المقاول هي "تمكين المقاول من انجاز العمل". اشرح متطلبات هذا الإلتزام.

٨. ما هي الحالات التي يعذر فيها المقاول عن "التأخير في إنجاز العمل".

٩. في عقد التكلفة المستهدفة، كانت التكلفة التي إتفق عليها المقاول والمالك (التكلفة المستهدفة) تساوي ١ مليون جنيه. طالب المقاول بربح ٧% أي ٧٠ ألف جنيه. إتفق الطرفان على:

• في حالة أي زيادة في التكلفة الفعلية عن المتفق عليها يتحمل المقاول نصف هذه الزيادة.

• وفي حالة أي توفير يستحق المقاول ٣٠% من هذا التوفير.

قارن في جدول آثار الحالات التالية على: قيمة ربح المقاول – نسبة ربح المقاول – مجمل مصروفات المالك.

(أ) تم تنفيذ المشروع فعليا بتكلفة ١ مليون جنيه.

(ب) تم تنفيذ المشروع فعليا بتكلفة ١١٠٠٠٠٠.

(ج) تم تنفيذ المشروع فعليا بتكلفة ٩٠٠٠٠٠.

أمنياتي الطيبة لكم بالتوفيق ،،،،،،،، د/هيثم سند

Tanta University
3rd year (Civil)
Construction Project Management   Code:CSE3213

Faculty of Engineering

Structural Eng. Dept.
Second Term - Final Exam
Date: 10/6/2012

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

Question (1) [١٢ marks]:

A construction project has the following scheduling data. It is required to:

Activity	Duration	Depends Upon	Lag	Activity	Duration	Depends Upon	Lag
A	2	---		E	4	C	3
B	3	---		F	4	D, C	
C	3	---		H	5	E	-2
D	4	B	2	G	3	A, F	

A- Draw an AON network for the following activities, showing project duration, critical path(s), and float values.

B- What is the effect of increasing the duration of activity A by 2 days?

C- Return to point A, what is the effect of deleting the overlap between activities E and H?

D- Return to point A, what is the effect of adding a new activity Y (duration= 4 days) after activity H?

Question (2) [20 marks]:

The activities of a project along with their durations, predecessors and resource usage are given in the following table.

Activity	Duration (Weeks)	Predecessors	Resource (units/week)	
			R1≤8	R2 ≤1
A	4	-	3	0
B	6	-	6	1
C	2	-	4	0
D	8	A	0	1
E	4	D	4	1
F	10	B	0	1
G	16	B	4	0
H	8	F	2	0
I	6	E, H	4	1
J	6	C	5	1
K	10	G, J	2	0

A- If resource 1 is limited to 8 units and resource 2 is limited to one unit, reschedule the activities so that the weekly resource usage does not exceed the resource limits.

B- What is the effect of increasing the constraints of resources to be R1≤13 and R2≤2?

C- What is the project duration and critical path(s) if no more than one unit of R1 (this means that R1≤1), while still R2≤1? *Hint: no need to use table, the solution is very easy.*

D- Compare between *constrained* and *unconstrained* scheduling for construction resources.
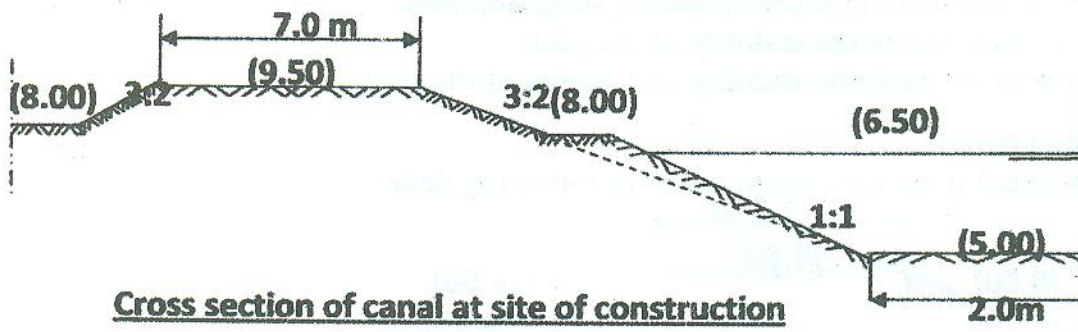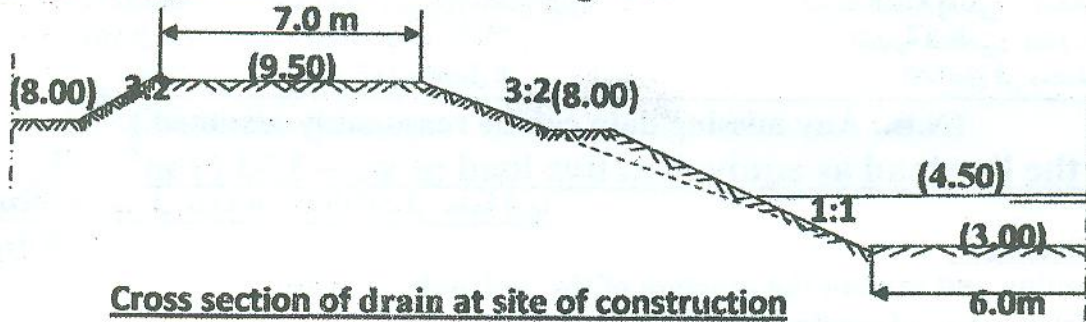
Question (3) [25 marks]:

A- The following table represents the activities involved in the construction of a single house. It is required to construct typical 11 houses. The target rate of build is 0.5 houses per day.
Calculate the number of crews which needed for each activity. Draw the LOB schedule. Consider no buffer time between activities. [10 marks]

Activity	A	B	C	D	E
Predecessors	---	A	B	C	C
Duration (days)	2	4	3	2	3

أمنياتي الطيبة لكم بالتوفيق ،،،،،،   د/هيثم سند

Question No 4:   (30 degrees)
Canal crossing a drain with the following data

7.0 m

(9.50)

(8.00) 3:2   3:2(8.00)

1:1   (4.50)

(3.00)

6.0m

Cross section of drain at site of construction

7.0 m

(9.50)

(8.00) 3:2   3:2(8.00)

(6.50)

1:1   (5.00)

2.0m

Cross section of canal at site of construction

The discharge through canal is 12 m³/sec.

It is required to :

1. Check the head loss due to R.C. Box aqueduct tacking the velocity of approaching in consideration.
2. Give complete design of the aqueduct and culvert parts.
3. Draw neat sketch sec. elevation of the aqueduct.

| For Soil | $\gamma_{soil} = 1.65$ t/m³ | | $K_a = 0.3$ | |
| For Screen | $t = 2.5$ cm | $S = 15.0$ cm | $Ks = 2.0$ | $\theta = 60°$ |

<div dir="rtl">انتهت الاسئلة</div>

(N.B.: Any missing data can be reasonably assumed.)

Tack the live load as equivalent live load as $w_e = 3.33 \ t / m^2$.

استخدم المعلومات التى فى نهاية الاسئلة اذا كنت فى حاجة اليها

Question No 1: (20 degrees)

A. Mention and explain the function of the hydraulic structures.
B. Explain cases of loading of the hydraulic structures.
C. Define the main types of retaining walls according to materials, site and design.
D. Show how check the stability of the pier.
E. Show how check the stability and design of the gravity wall.

Question No 2: (25 degrees)

A main canal crossing a drain with the following data

Cross section of canal at site of construction

Cross section of drain at site of construction
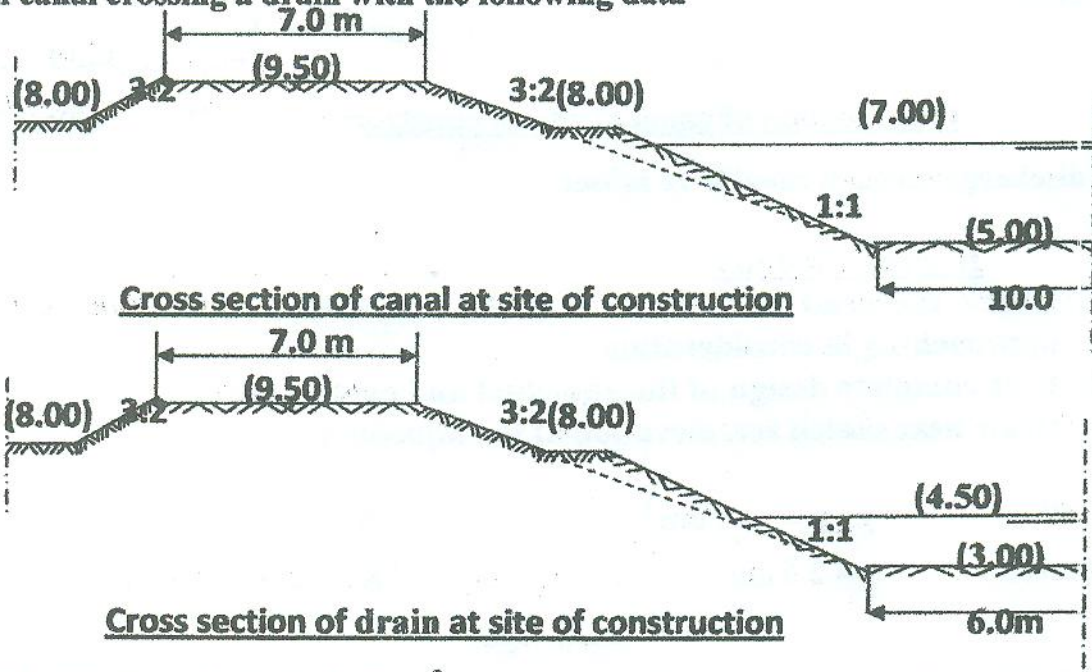
The discharge through drain is 12 m³/sec.

It is required to :

1. Check the head loss due to syphon.
2. Design the syphon and culvert parts of a syphon.
3. Draw neat sketch sec. elevation of the syphon.

Question No 3: (25 degrees)

R.C. slab bridge need to be constructed at the previous drain with width 8.0 m and tow side walks 1.5 m each.

1. Show the hydraulic design of the bridge
2. Show the complete structural design of the all parts of bridg with neat sketches for steel details
3. Draw neat sketch sec. elevation of the bridge.

C.L.L   10t   10t
For Slab   0.6m   0.10m
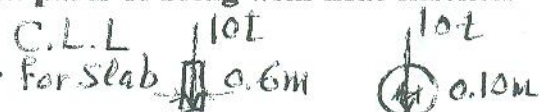
C. Fig. 3 shows a structural plan and sectional elevation of stair case. The stair elements are strip footing, two walls W1 and W2 and beam B that supported on columns C1 and C2. The **slab thickness is 220mm** and the step dimensions are 300mm going and 150mm rise. It is required to carry out the following:

a. **Without any calculations,** sketch the B.M and the reinforcement details of the critical strips. **(5marks)**
b. Calculate the design loads of critical strips of the stair slabs; consider the flooring cover is 1.5kN/m². Calculate the walls loads W1 and W2. **(5 marks)**

Fig. 3

Sectional elevation I-I

Structural plan
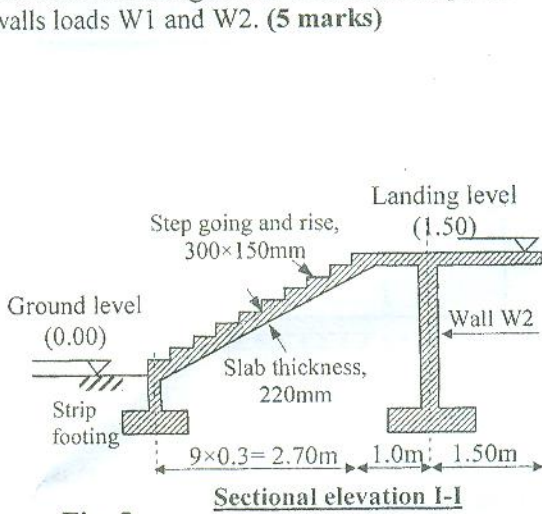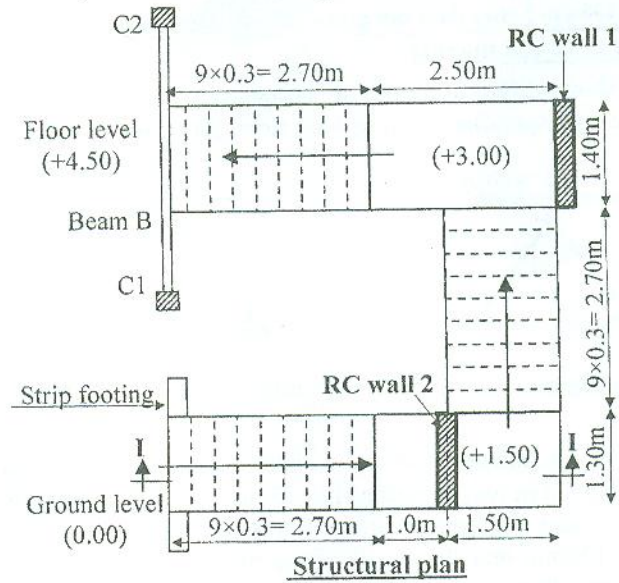
PROBLEM # THREE (32marks)

Fig. 4 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 five cases of a roofs may be used to covering this hall as shown in the sectional elevation 1-1. It is required to carry out the following:

a. Suggest the **more economic** main supporting elements "MSE" (as possible as you can) that carry the given roofs. **(5marks)**
b. **For the three roofs of cases 1, 3 and 4 only: draw** to suitable scale the sectional elevations, showing the concrete dimensions of all necessary structural elements. Using diagrammatic sketches, **illustrate** the loads transfer up to the footings. **(12marks)**
c. **For the roof of case 5 only: design** the critical sections of **MSE** and its main elements, if the average ultimate total loads on the MSE are 18kN/m². The own weight of MSE may be estimated. **Draw** to convenient scale the sectional elevation of the MSE showing the reinforcement details of the MSE and its elements. **(15marks)**
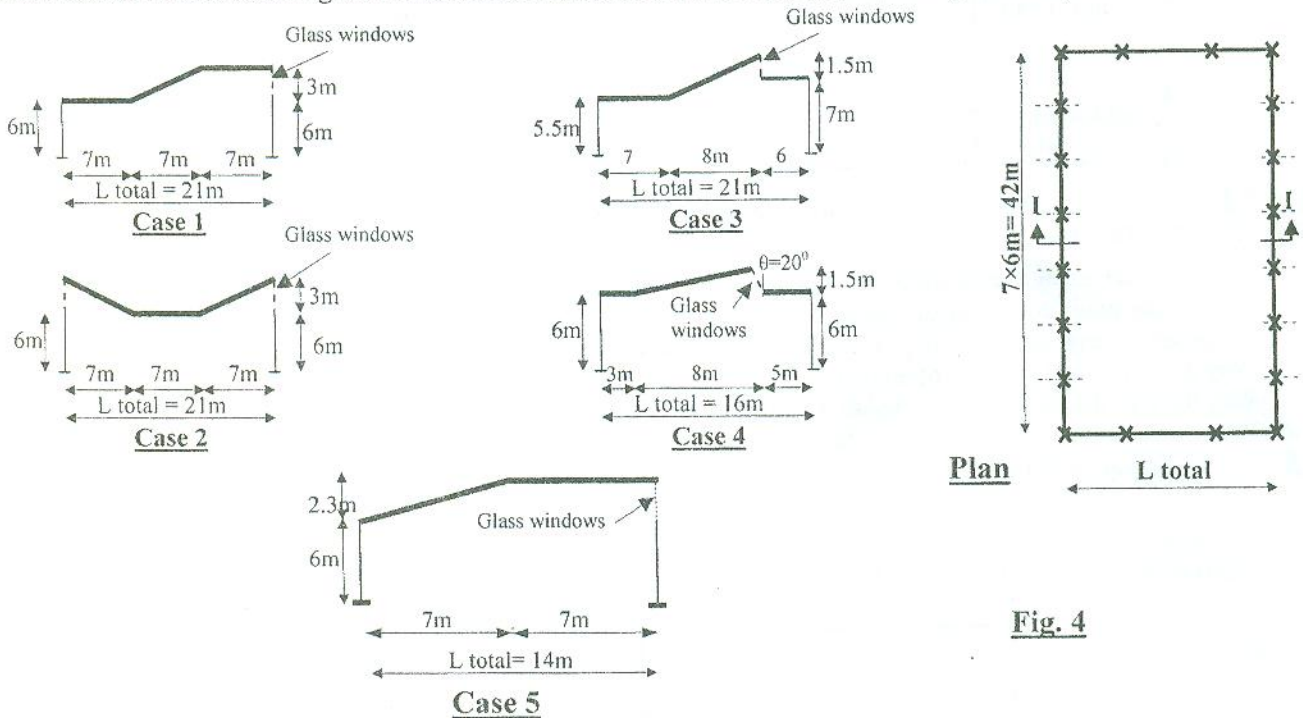

Case 1

Case 2

Case 3

Case 4

Case 5

Plan   L total

Fig. 4

Sectional Elevations I-I for five cases of a roofs

COURSE TITLE: DESIGN OF REINFORCED CONCRETE STRUCTURES (2) b		COURSE CODE: CSE3210/3223
DATE: JUNE-2012	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 3 أسئلة فى صفحتين

PROBLEM # ONE (28 marks)

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**)
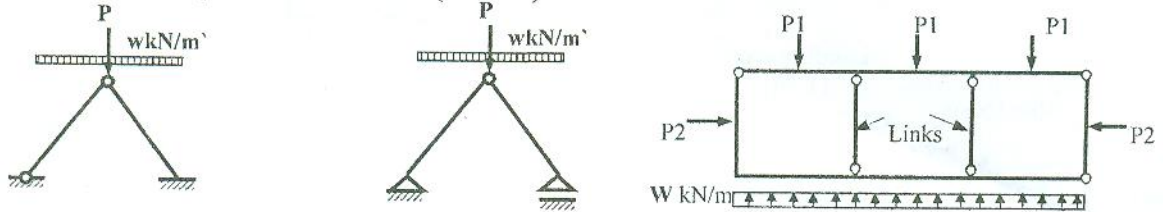
Fig. 1-*a*

B. Which is dangerous: opening corner joints or closing corner joints and why? Sketch crack pattern in each joint. (**4marks**)

C. Fig. (1-b) shows statical system of an intermediate frame ABCDEFG of a series frames spaced 5m. The frame is to be considered braced in two directions in-and-out of plane of the frame. The frame is hinged at A and a link support DC. It is required to make a complete ultimate strength design one of the intermediate frame having breadth 400mm and the slab thickness 120mm and the depth of the main girder 1.2m and depth of the cantilevers (0.6/0.8m) for the given ultimate loads including own weights and the vertical reaction at A equals (YA= 900kN). Determining the following:
a) B.M., S.F. and N.F. diagrams. (**6marks**)
b) Design the critical sections and check shear stresses of the frame. (**6marks**)
c) Draw to convenient scale the intermediate frame showing clearly the concrete dimensions and the reinforcement details in elevation and in cross sections. (**6marks**)
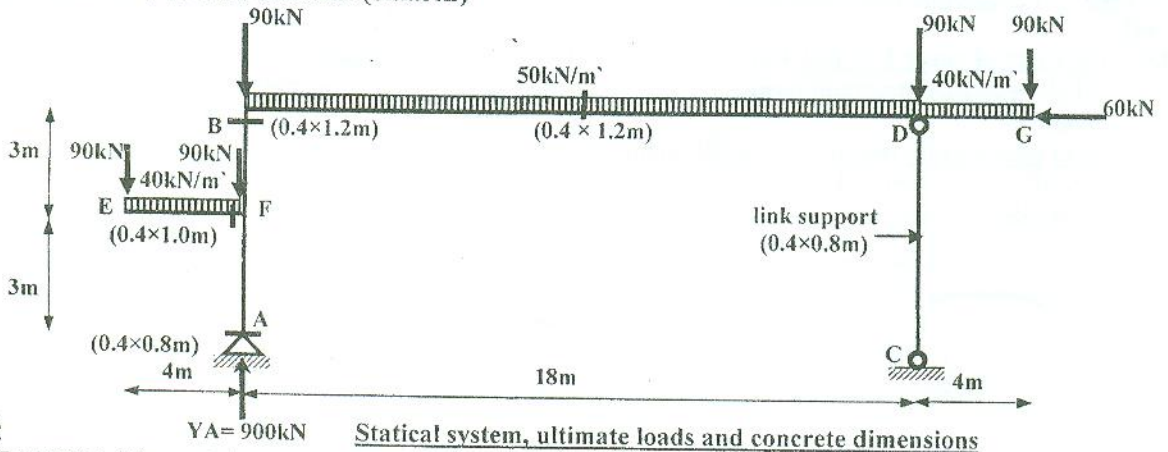

Fig. 1-b   YA= 900kN   Statical system, ultimate loads and concrete dimensions

PROBLEM # TWO (32 marks)

A. *a-* What are the advantages and disadvantages of a tension and compression structures? (**4marks**)
  b. What is the main condition to ensure coinciding line of pressure on the following main supporting elements: arched girder - triangular shed - trapezoidal shed. (**2marks**)
  c. Why the horizontal reaction of arched slab is increased by 5% than that of arched girder? (**2mark**)
  d. Why the foot thickness in arched slab is greater than that at crown? (**2marks**)
  e. How do you ensure uniform distribution of light inside halls in a saw – tooth roof structures? (**1mark**)
  f. What will happen if the tie reinforcement splits in the arches? (**2mark**)

B. Fig. 2 shows a Vierendeel girder of span 20m. It is required to carry out the following: Draw B.M., S.F. and N.F. diagrams of the V.G under the given loads. Draw the shape of reinforcement of the part marked (A). (**9 marks**)
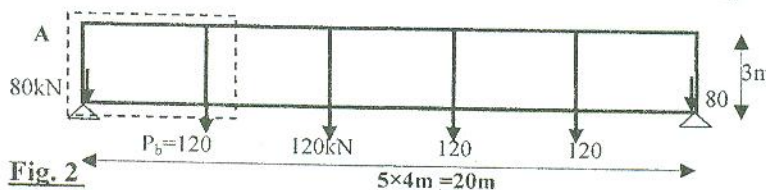

Fig. 2

a- Draw to scale 1:100 full plan, elevation and side view showing the bracing system.
(15 %)

b- Calculate the applied loads assuming 2.0 meters between each two purlins. **(3 %)**

c- Tabulate the **factored** design **normal force, shearing force** and **bending moment** for the critical sections at a and b. **(15 %)**

d- Design a hinged base at support (a) which can carry a maximum load $N_u = 20t$ and shearing force of 12 t. Draw to scale 1: 10 the different details of the base.
(10 %)

Note: Live load and wind load are to be taken according to Egyptian Code

Question 3:

a. Design the beam column (a-c) of the frame shown in Fig. (3). The straining actions neglecting the **effect of wind** loads are as follows: **(15 %)**

- At section (a) $M_u = 0$, $P_u = 12$ t compression, and $Q_u = 3.5$ t
- At section (c) $M_u = 20$ t.m $P_u = 12$ t compression, and $Q_u = 3.5$ t
- (second order effect is already included)

- Use the end relative stiffness of the columns as: $G_a = 10$ (hinge) and $G_c = 1.85$ to calculate the effective buckling length.

- Try cross section of the column is initially assumed HEB300mm.
- Use St52 ($F_y = 3.6$ t/cm^2 and $F_u = 5.2$ t/cm^2)

b. For the typical beam - column connection at (c) designed as **Category C** and subjected to:
(25 %)

$M_u = 20$ t.m.
$P_u = 3.5$ t. (comp.)
$Q_u = V_u = 12$ t,

It is required the following:

1- Number of used high strength bolts of type **10.9**.
2- Check of weld between the end plate and the rafter of the frame.
3- Thickness of end plate connecting the rafter and the frame column.
4- Check of panel-zone web shear (Refer to page 10-7, 10-8 and 10.9) of ECP2008 LRFD, first edition.
5- Do you need additional stiffeners at the corner? (Refer to page 10-10 and 10.11 of ECP2008 LRFD, first edition)
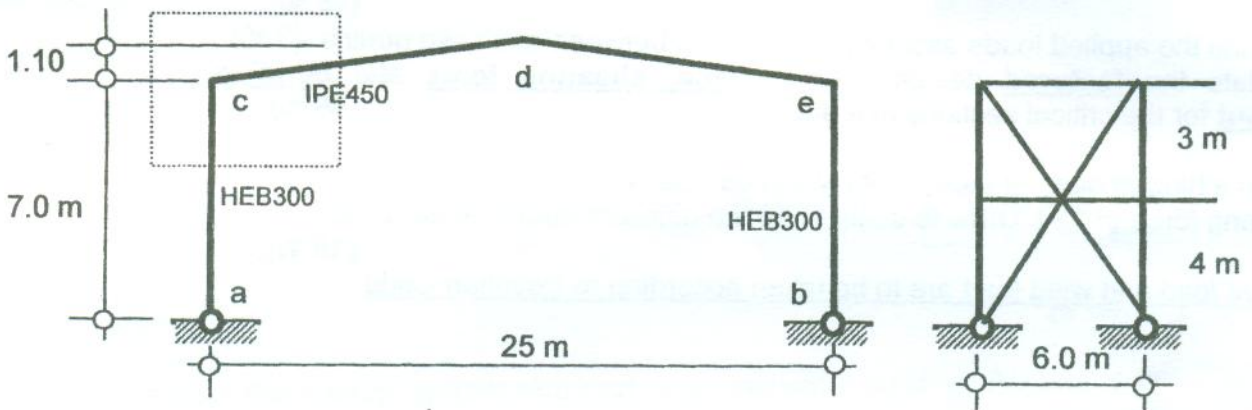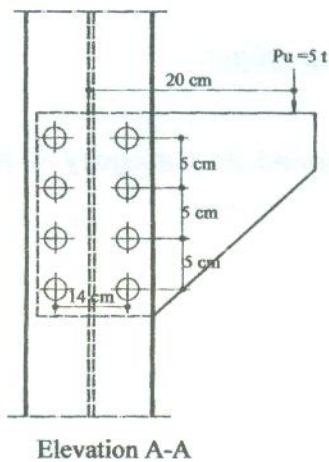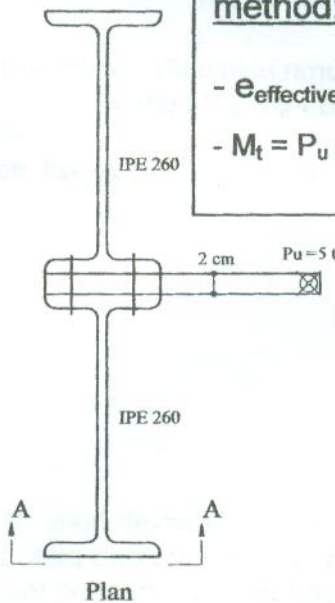6- **Draw** the part enclosed by dotted rectangle to scale **1:10**.

Fig. (3)

Question 4: (12 %)

Check the stresses for the bolts in the following bracket by using high strength bolts of grade 10.9 as bearing type (ϕ = 16 mm) and use steel plate of grade St 52.

Use reduced eccentricity method:

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

- $M_t = P_u \times e_{effective}$

Elevation A-A

Plan

Question 5:

5.a) Discuss briefly with neat sketches the different types of composite columns and its advantages against reinforced concrete ones. **(05%)**

5. b) If the calculated design ultimate axial load (P_u) and ultimate moment (M_{ux}) about the major axis are 550 t and 10 t.m, respectively. Check the given cross-section of composite column (concrete encased section). **(9% & 8%)**
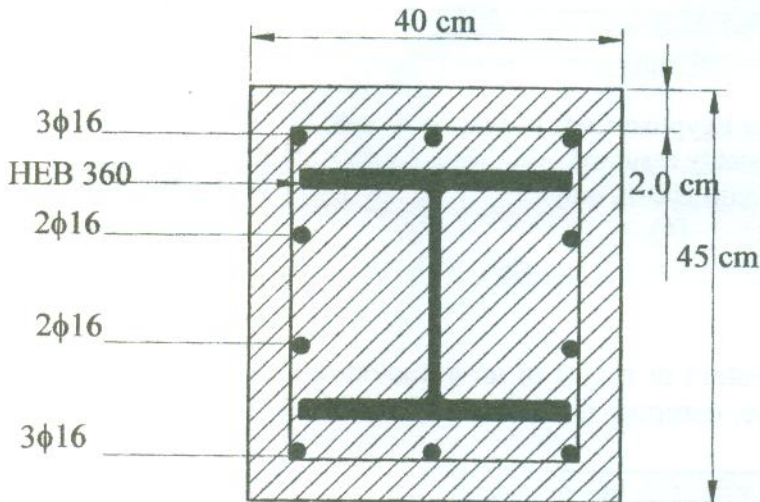
Given data:

- Steel grade ST52 ($F_u = 52$ kN/cm^2 and $F_y = 36$ kN/cm^2)
- Steel reinforcement of grade 36/52
- F_{cu} of concrete is 4.0 kN/cm^2
- Column effective length in both sides is (5.0 m)
- Full shear connection between the steel column and the concrete is assumed by means of using stud shear connectors of diameter 25 mm and 140 kN capacity for each.

  - **Use the following equations for axial effect**

$P_u = \phi_c\, P_n$ ....

$\quad = \phi_c\, A_s\, F_{cr}$ ....

For inelastic buckling, $\lambda_m \leq 1.1$ $F_{cr} = (1 - 0.348\, \lambda_m^2)\, F_{ym}$

For elastic buckling, $\lambda_m \geq 1.1$ $F_c = 0.648\, F_{ym} / \lambda_m^2$

Where:

$F_{ym} = F_y + c_1 F_{yr} (A_r/A_s) + c_2 F_{cu} (A_c/A_s)$ ....

$E_m = E_s + c_3 E_c (A_c/A_s)$ ....

λ_m = Slenderness parameter = $L_b (F_{ym}/E_m)^{1/2} / \pi\, r_m$ ....

  - **Use the following equations for bending and combined effect**

For $P_u/((\phi_c P_n) \geq 0.20$

$P_u/(\phi_c P_n) + (8/9)\{ M_{ux}/(\phi_b M_{nx}) + M_{uy}/(\phi_b M_{ny}) \} \leq 1.0$

For $P_u/(\phi_c P_n) < 0.20$

$P_u/(2\phi_c P_n) + \{ M_{ux}/(\phi_b M_{nx}) + M_{uy}/(\phi_b M_{ny}) \} \leq 1.0$

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

Note:

- Open book examination.
- It is allowed to use any tables or Egyptian Code of Practice books.
- Any missing data may be reasonably assumed.
- <u>Attempt all questions.</u> Max. Credit 100 % only.
- Number of examination pages: (4).

$$\boxed{125 \%}$$

Question 1: (8 %)

Fig. (1) 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, 3-4, 5-6 and 6-7.
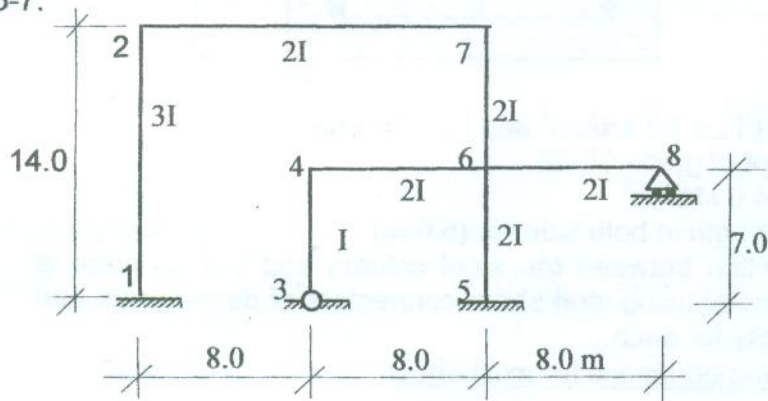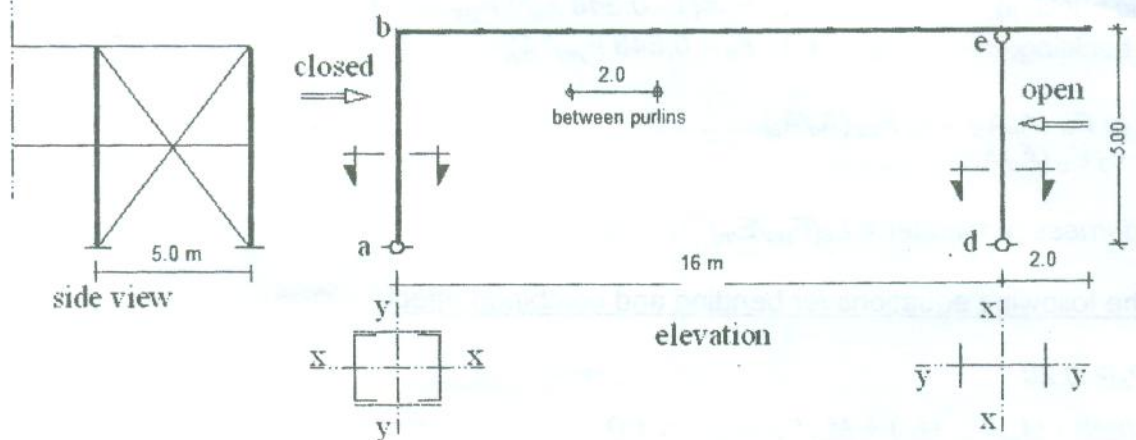

Fig. (1)

Question 2:

Fig. (2) Statical system of an intermediate frame

Fig. (2) shows an intermediate main system of a covered area 18m x 25m. The weight of the steel sheet cover is assumed to be **8 kg/m²**. For the shown intermediate main system of Fig.(2), it is required the following:

Question No. (3) (14 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 and the thickness of plain concrete layer = 20 cm. Due to site conditions, the maximum projection of the combined footing is 0.85 m from the centerline of right column as shown in the figure. Assuming the thickness of the R.C footing = 80 cm, you are required to calculate the values of F_1 and F_2 and:
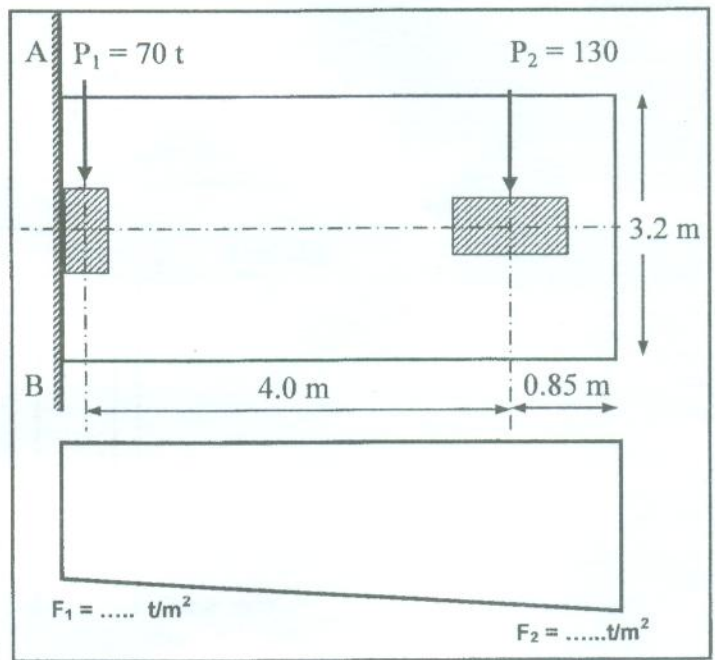
(i) Determine the maximum negative moment (6 point)
(ii) Check the shear stress adjacent to the left column (4 point)
(iii) Determine the reinforcement in the transfer direction (4 point)

Question No. (4) (15 point)

(a) Discuss the concept of negative skin friction of piles. (4 point)

(b) A rectangular column (30 x 100) cm carries vertical load = 215 t and bending moment, M=25 t.m . If the available piles are 50 cm in diameter and 17.0 m in length with safe pile load = 75 t. you are required to:

(i) Design the pile cap (8 point)
(ii) Give detailed drawing of the footing reinforcement (3 point)

Question No. (5) (12 point)

(a) Discuss by neat sketches the using of field tests in the design of the piles (4 point)

(b) A pile load test was performed on a pile with the following properties:

Pile length = 17.00 m   Pile diameter = 0.60 m

Modulus of elasticity of pile material = 140 t/cm^2

The piles were designed to carry safe load = 100 t

The results of the pile load test are given in the following table

Load, tons	0	25	50	75	100	120	150
Settlement , mm	0.0	0.25	0.66	0.90	1.50	2.08	2.85

Find out the safe pile load (8 point)

(a) A square pile cap of four driven piles group carries a column load of (P) kN at ground level.

The pile diameter is 50 cm, pile spacing (center to center) is 1.50 m and $N_q = 150$.

Find the safe pile load **(8 point)**

P

2.00 m

G.W.L   Med. clay

13.00

3.00 m

Dense sand
$\gamma_{sat} = 20$ kN/m³
$\phi = 40°$

10.00 m
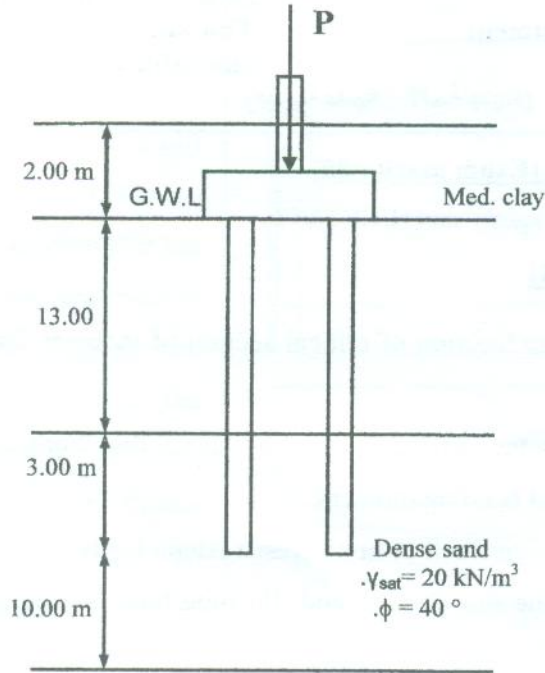
(b) Using clear sketches show how to predict the settlement of pile group in different soil condisions. **(4 point)**

(c) Draw the details of strap beam connecting edge 2 piles cap with internal three piles cap, (the details of strap only) **(3 point)**

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

Foundations Engineering (1); CSE3214
Term Exam, June. 2012
Thursday 7/ 6 / 2012
Allowable time: 3 hours

(هندسة مدنيه – لائحة جديدة)

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) (15 point)

(a) Using clear sketch, show the location of critical section of moment for different types of wall footing. **(3 point)**

(b) Using clear sketch discus the different cases of stress distribution under isolated footing subjected to vertical load and bending moment. **(3 point)**

(c) Discuss in details how to design smell beams to resist lateral loads. **(3 point)**

(d) Using clear sketch define the ring footing and illustrate how to determine its dimensions and reinforcement. **(3 point)**

(e) Using clear sketch illustrate the different types of strip footing showing when each type is used.
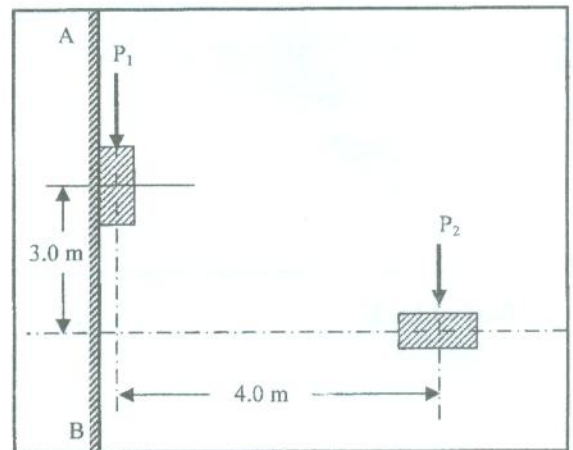
(3 point)

Question No. (2) (14 point)

(a) A square column (40 x 40) cm carries vertical load = 81.0 t and is subjected to M_y = 18.0 t m. The allowable net bearing capacity $q_{all\ net}$ = 1.40 kg/cm^2 and the thickness of the plain concrete is 50 cm. A square plain concrete footing (300 x 300) cm is suggested. You are required to:

(i) Check the stresses between the plain concrete footing and soil. **(4 point)**

(ii) Design the reinforced concrete footing. **(4 point)**

(b) The shown two columns are 40 x 70 cm. The line AB is the property line. The allowable net soil pressure is 1.35 kg/cm^2 and the thickness of plain concrete = 20 cm.

You are required to suggest the suitable footing and give the dimensions of suggested system (only length and width (don't design)) for the following two cases:

(i) p_1 = 90 t and p_2 = 135 t **(3 point)**
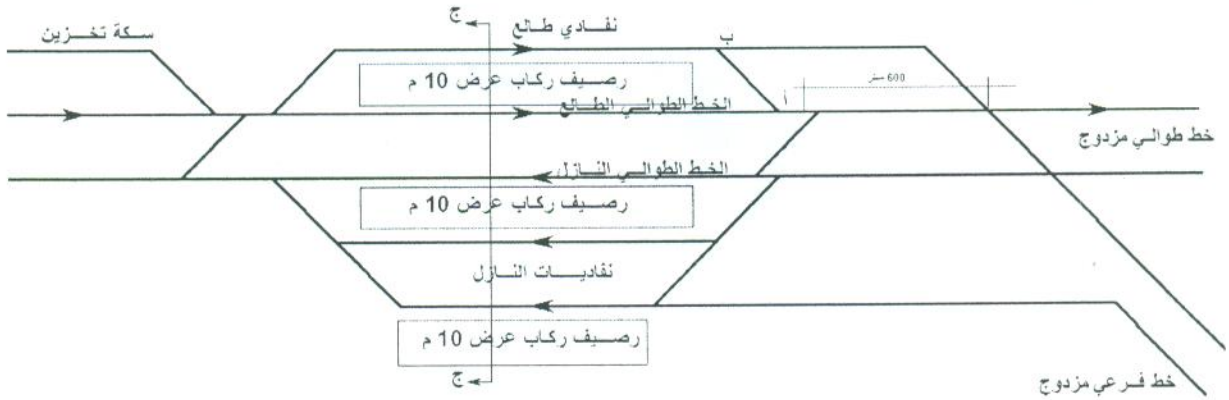
(ii) p_1 = 80 t and p_2 = 70 t **(3 point)**

المسموح به للفلنكات الخشبية 90 كجم/ سم^2 والاجهاد الاقصي المسموح به لسطح أساس السكة هو 1,25 كجم/ سم^2 كما ان درجة المسير المسموح بها في ساعات الذروة هي 0,3 م / ث^2

السؤال الرابع(25 درجة):-

1. أحسب طول التفريعة (أب) من نقطة أ سن ابرة المفتاح المساير علي الخط الطوالي الطالع الي نقطة ب سن ابرة المفتاح المقابل علي النفادي الطالع كما هو موضح بالرسم اذا علم ان طول الابرة 5,00 متر و فدو كعبها 160 مم وطول الجزء المستقيم قبل التقاطع 1,50 متر وزاوية المفتاح 10 :1

2. ارسم كروكي متقن للتفريعة (أب) عند خروج القطار من الخط النفادي الطالع الي الخط الفرعي المزدوج

3. أوجد أقصي عدد من القطارات يمكن أن تخدمها المحطة السابقة في نفس الوقت و بين أنواع هذه القطارات

4. أحسب أبعاد أرصفة المحطة السابقة اذا علم ان طول عربات القطار 300 متر و طول القاطرة 25 متر وعدد ركاب القطار 1200 راكب

5. وقع الاشارات الاساسية والثانوية وأوجد أبعاد أكشاك البلوك علي المحطة السابقة

قوانين هامة

م س+مد قاطرة = (250/و) * ((س+Δس)/(100))^2

م س+مد عربة= 2,5 + (س+Δس)^2 ك

μ= ((9000)/ (س+42) (116+س)) /1000

(ل ن) = (4,2) (و + ق)(س ن^2 - س ب^2)) / ق ن

ق ن = (و + ق)(م س+مد متوسطة ± م ح + م م) + 1000 η (و ن + ق ن غ) *e_f

ض =((122- ص)/ 56)*(ض/ط)*(α+ جا α جتا β2)

ض = (52,8 ض/ن ص)*(10)^{1,25} -6,13 *(س/2ص)^{2,5}

س$_1$=(ط/4)*((μ)/(EI4))$^{1/4}$ سم

ع٬ = 0,318 و س$_1$ كجم. سم

ص٬ = (0,393 و)/ (μ س$_1$) سم

جامعة طنطا
كلية الهندسة
المادة : هندسة السكك الحديدية

الفصل الدراسي الثاني 2011-2012
الفرقة : الثالثة مدني
الزمن: ثلاث ساعات

السؤال الاول (15 درجة):-

1. علل الاتي:- عند بدء الحركة لا يمكن الاستفادة بكامل القوة الناتجة من الات الجر

2. ارسم العلاقة بين القوة من الات الجر والقوة من حد التماسك مع السرعة

3. قطار ركاب مكون من 7 عربات وزن كل منها 50 طن تجره قاطرة ديزل كهربائي طراز جـ - جـ وزنها 132 طن فاذا كانت السرعة المقررة علي الخط 90 كم/ س والنحدار الحاكم 6% احسب قدرة القاطرة السابقة واذا وضعت كبسولة لايقاف القطار من سرعته القصوي علي بعد 470 مترا من موقع عائق – وضح في اي الحالات التالية يحدث تصادم واحسب السرعة عند التصادم في هذه الحالة

أ- السكة مستوية ومستقيمة

ب-السكة منحدرة لأعلي بمقدار 5% ومستقيمة

ج- السكة منحدرة لأسفل بمقدار 5% و منحنية بنصف قطر 600 متر

هذا اذا علم أن الوزن الفارغ للعربة 42 طن وجميع محاور القاطرة والعربات مزودة بالفرامل

السؤال الثاني (15 درجة):-

1. علل الاتي:- في خطوط السكك الحديدية المنحنية تتلاشي العجلة المركزية الخارجية عند وقوف القطار في حين تظهر العجلة المركزية الداخلية عند بدء الحركة

2. ارسم كروكي متقن للطرق المختلفة لتنفيذ ارتفاع الظهر عن البطن

3. خط سكة حديد مخصص للقطارات المتجانسة ذات السرعات العالية يقع عليه منحني نصف قطره 1500 متر فاذا كانت قيمة ارتفاع الظهر عن البطن المنفذة تحقق عجلة مركزية داخلية قدرها 1,0 م/ ث^2 عند توقف القطار علي المنحني المطلوب ايجاد أقصي سرعة يمكن للقطارات ان تسير بها علي الخط السابق عند عجلة مركزية خارجية مقدارها 0,4 م/ ث^2

4. خط سكة حديد مترو يقع عليه المنحنيات الأفقية التالية ر$_1$ = 800 متر , ر$_2$ = 1200 متر , ر$_3$ = 500 متر تسير عليه القطارات بسرعة قصوي 80 كم/ س والمطلوب ايجاد أطوال المنحنيات الانتقالية لكل منحني أفقي و جدول احداثيات توقيع هذه المنحنيات ثم ارسم المسقط الافقي والقطاع الطولي لأحد هذه المنحنيات ثم احسب العجلة المركزية و درجة المسير علي كل منحني قبل وبعد تنفيذ ارتفاع الظهر عن البطن.

السؤال الثالث (15 درجة):-

1. علل الاتي:- يستخدم قطاع من الزلط أسفل الفلنكات في خطوط السكك الحديدية

2. ارسم كروكي متقن يوضح انواع البلنجات

3. خط سكة حديد مترو يقع عليه منحني نصف قطره 800 متر تسير عليه القطارات بسرعة 60 كم / س وكانت الفلنكات المستخدمة خشبية مقاس 17*25*260 سم وعمق قطاع التزليط المنفذ 40 سم و رغبة في زيادة تتابع القطارات في أوقات الذروة تم اقتراح زيادة سرعة القطارات الي 100 كم/ س والمطلوب التحقق من درجة المسير والاجهادات بالفلنكات وقطاع التزليط عند تطبيق اقتراح زيادة السرعة. اذا علم أن أقصي وزن واقع علي المحور بالقطار 15 طن والاجهاد الأقصي

With best of luck: Dr. Ragaa and the Examining Committee