٣ مدني فرقة جديد

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

Final Exam
2008-2009
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. 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 100 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)**

c. 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 actusl green times for each phase of this intersection. **(5Marks)**

d. 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)**

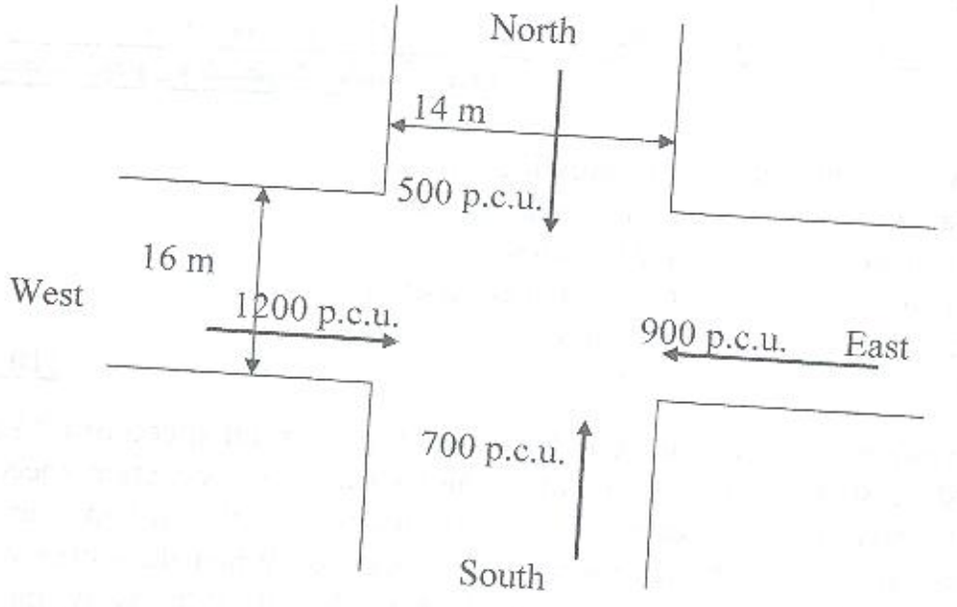
Question (2)

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)



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.

(16 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

السؤال الرابع (15 درجة)

1. تكلم باختصار عن الآتي:
مكونات نظام النقل – مراحل تخطيط النقل – طرق جمع البيانات اللازمة لعملية تخطيط النقل
خصائص الرحلات داخل المدن

2. تم رصد أحجام المرور عند قطاع عرضي بطريق سريع وذلك لمدة عام كامل فوجد أن المتوسط الحسابي 5277 وحده سير/ يوم والانحراف المعياري ± 699 وحدة سير/ يوم. إحسب عدد الأيام التي يمكن أن تكون كافية للرصد فيها للتعرف علي أحجام المرور اليومية عند السماح بخطأ نسبي 5% وباحتمال قدره 95.5 %.

3. 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

GOOD LUCK

Dr. Islam Abu El-Naga

Dept.: Structural Engrg.	**Faculty:** Engineering	**University** : Tanta
Time allowed: 3 hr. **Date:** January 2009	**Course:** Design of steel structures (a)	**Course code:**

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).

Q1) Fig. (1) gives the general layout and the main dimensions of a workshop which is a part of an industrial building. The columns of the hall a-b-c-d-d'-b'-c'-a' are allowed **only at the outer sides (no internal columns are allowed)**.

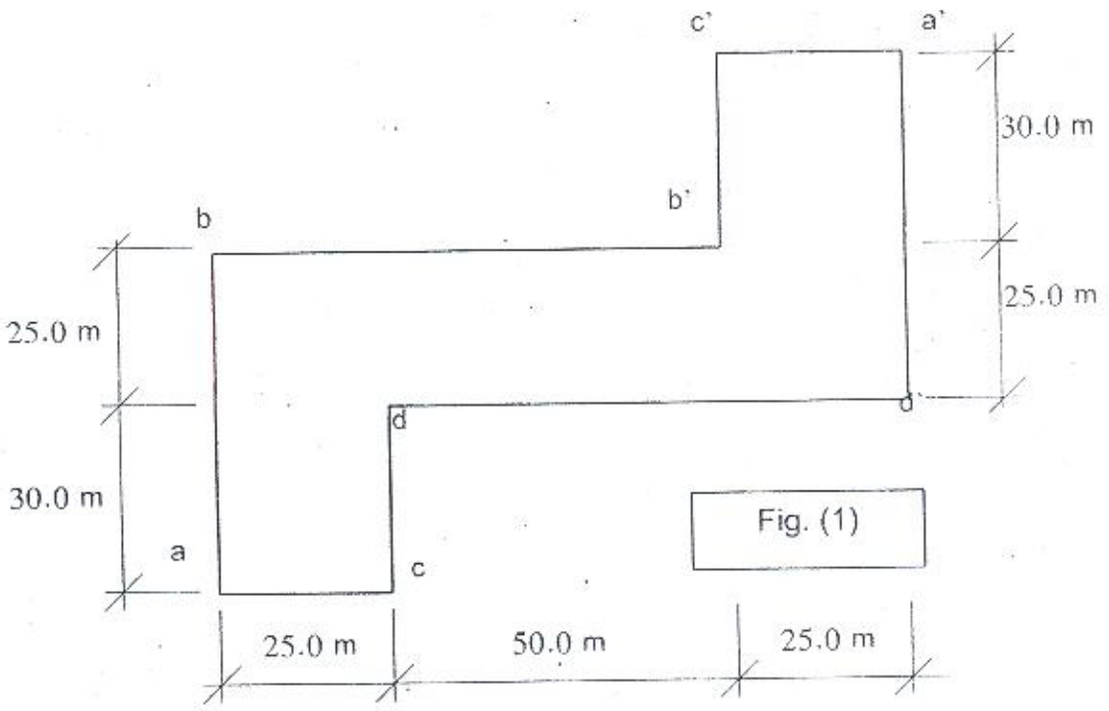


Fig. (1)

It is required to give convenient systems to cover this area. By using suitable scale, draw plan, elevation and different views to show the main systems and the arrangement of the bracing system. **(25 %)**

Q2) The following truss, Fig. (2), is used to cover an area of 24x36 m^2 with spacing between trusses of **6.0** m. The cover is a corrugated steel sheet of weight 10 kg/m^2. The own weight of steel **and** the live load may be assumed 40 and 80 kg/m^2 **of the covered area**, **respectively**. **Neglecting Wind** pressure and using steel 52 (F_y = ? and F_u = ?), answer the following:

a. Calculate D.L., and L.L. acting on the upper chord joints. (8 %)

b. Calculate **only** the design ultimate forces in marked members 1, 2 & 3. (6 %)

c. Design an intermediate purlin as C- rolled steel section. (15 %)

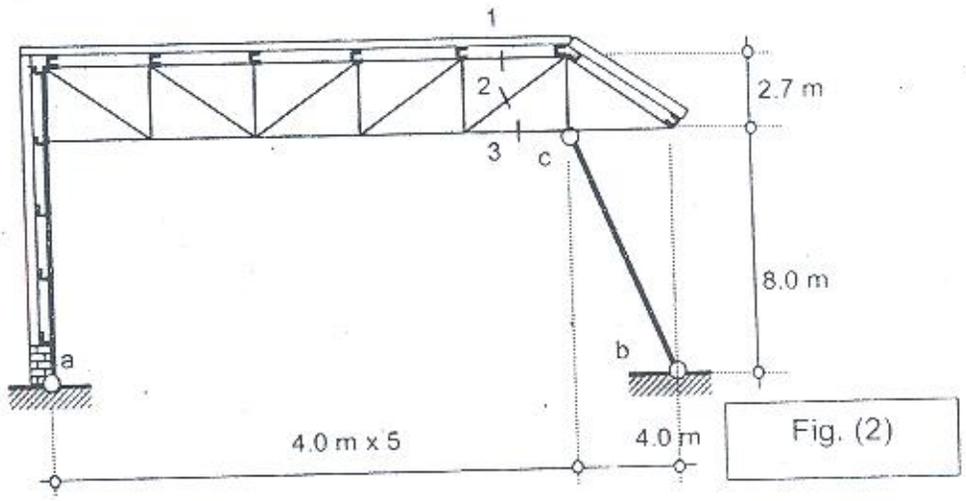


Fig. (2)

Q3) 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 of Grade 6.8** (F_y = ? and F_u = ?). **Calculate, also, the number** of bolts required for connecting the following separated members with their gusset plates (Use category A).

(21%)

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	2.0 (tension)	9.0 (tension)	5.0 (tension)	7.0	--	--	Vertical
3	Zero	Zero	Zero	4.0	?!	?!	----

Q4) The **150 x 12 mm** plate shown in Fig. (3) is connected to **200 x 12 mm** plate with longitudinal fillet welds to support a tensile load. By Using LRFD, determine the design strength P_u of the member if $F_y = 3.6$ t/cm^2 and $F_u = 5.2$ t/cm^2.

(6 %)

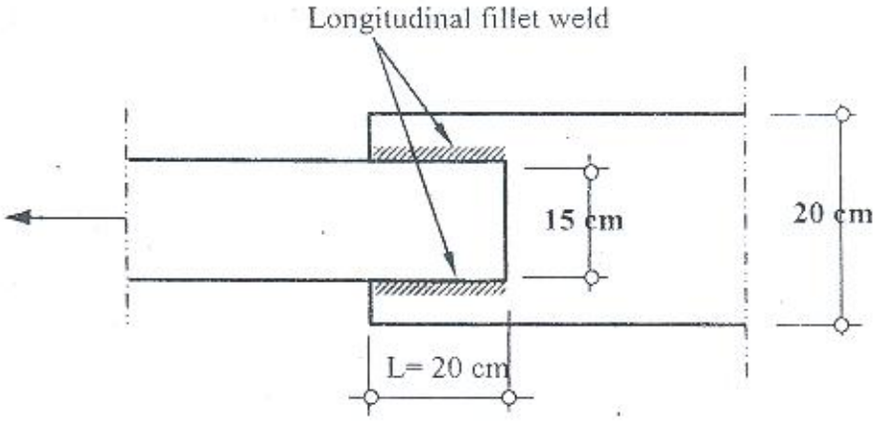


Fig. (3)

Q5) By using steel grade ST52 (F_y = ?? , t/cm^2 and F_u = ?? t/cm^2) and welded connections of Fig. (4), it is required the following:

(1) Design the following individual truss members,
(2) Design the **required welds**
(3) To scale 1:10, draw the given joint.

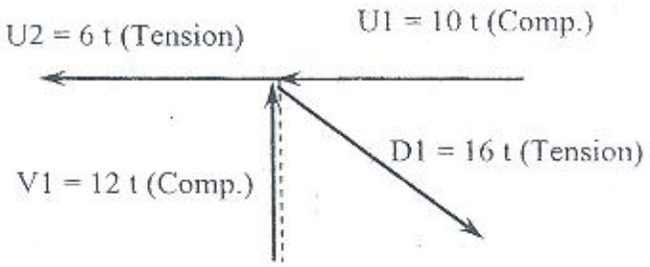


Fig. (4)

Member	Type of member	Design force F_u	Length or buckling length
U1	Upper chord (Use **2- unequal angles**)	10 t (compression)	L_{bx} = 3.0 m L_{by} = 6.0 m
U2	Upper chord (Use **2- equal angles**)	6 t (tension)	L = 3.0 m L_h = 3.0 m
D1	Diagonal (Use …..?).	16 t (tension)	L = 5.0 m L_h = 4.0 m
V1	Vertical member used also for **connecting vertical bracing** (Use…..?).	12 t (compression)	L_{bx} = 3.0 m L_{by} = 3.0 m

(30 %)

Best wishes
Prof. Dr. Mohamed A. Dabaon

مدني حديث التربه

Tanta University
Faculty of Engineering
Structural Engineering Department

Soil Mechanics
First Term Exam 2008-2009
Third Year Civil

- **Time allowed: 3 hours.**
- **Any missing data to be reasonably assumed.**

Question No. (1): (15 Points)

Show if the following expressions are true or false and why;

a. Penetration tests are the only means of supplying information about cohesionless soils in the field.
b. The bearing capacity of shallow footings is independent of footing size in case of cohesive soil; while it is proportional to the footing size in case of cohesionless soil.
c. The ultimate bearing capacity of shallow footings increases by increasing the foundation depth regardless to the soil type.
d. The measured values of (N) from standard penetration test should be corrected. Show what and why the different corrections; if any.
e. When a shallow footing is located on or near a slope, its stability will be reduced; in this case the bearing capacity can be obtained by using reduced B. C. factors.
f. The plate loading test does not give a satisfactory value of the ultimate settlement in the case of cohesive soil.

Question No. (2): (15 Points)

a. What and Why the Factor of safety in Bearing Capacity calculations.
b. What are the different methods to find out the bearing capacity of shallow footings?
c. Using clear sketches show the different causes of foundation failures.
d. A soil supporting a square foundation of 1.5 x 1.5 m in plan has a friction angle of 20 and cohesion of 15 kN/m^2. If the unit weight of the soil is 18 kN/m^3, determine the allowable bearing capacity and the allowable gross load using a factor of safety of 3, assuming that the depth of foundation is 1.0m. (Nc=17.7, Nq=7.4, and Nγ=5).

Question No. (3): (15 Points)

a. Outline in details, using clear sketches, how to perform the modified Proctor compaction test on a sample of sand in the laboratory.
b. State the main differences between the standard and the modified proctor tests.
c. The following results were obtained from a Proctor test:

Wc %	4	5	6	8	10	12
γ t/m^3	1.77	1.79	1.88	1.95	1.91	1.85

It is required to:

- Plot the moisture-dry density curve, and then determine the optimum moisture content "O.M.C", if the specific gravity of the tested soil equals 2.65.
- Comment on the curve behavior using the interpretation of the compaction theory.
- On the same axes, plot the curves of 80% and 90% degrees of saturation.

d. For the previous problem predict the expected field density of a sub-base layer of the same soil if the supplied field water content is 18% and the required compaction efficiency must not be less than 96%.

Question No. (4): (15 Points)

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, and use this to find the maximum stable slope where c' = 0, φ' = 20° and γ = 19 kN/m^3 assuming that the water table can rise to the ground surface.

b. Fig. (1) 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 G. The density of the soil is 1.92 t/m^3 and its cohesion is 43 N/m^2. Assuming φ = 0°, find the factor of safety against a slip along the surface ABC. Allow for the tension crack being filled with water after heavy rain.

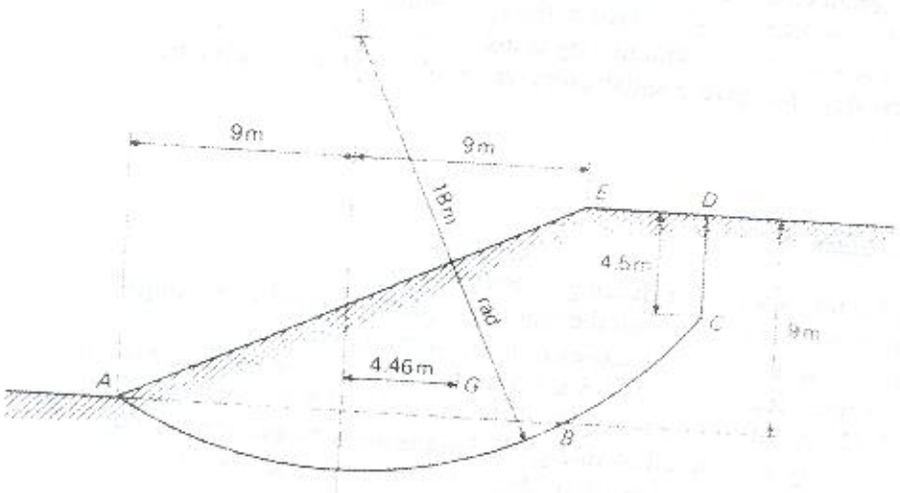


Figure (1)

Question No. 5: (15 Points)

a) Figure (2) shows two cases of retaining walls that are retaining approach fill of a bridge. The Approach fill is sand with γ = 2.0 t/m^3 and φ' of 33°. Calculate the earth pressures distributions on vertical line AB in cases 1 and 2.

b) For the given retaining wall channel (Figure 3), **calculate:**

(I) Factor of Safety against sliding in case of the channel is empty
(II) Factor of safety against overturning in case the channel is full of water
(III) The stress under the base in case the channel is full of water.

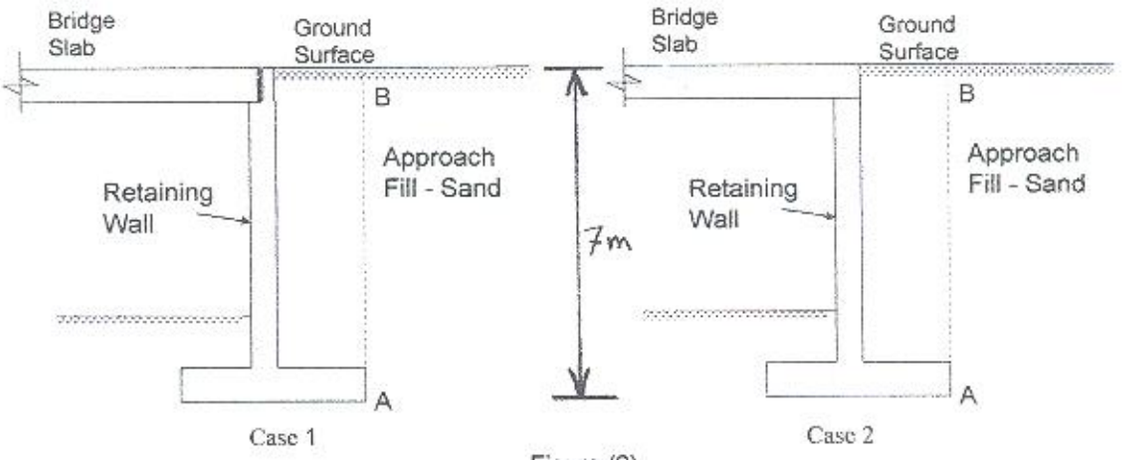


Figure (2)

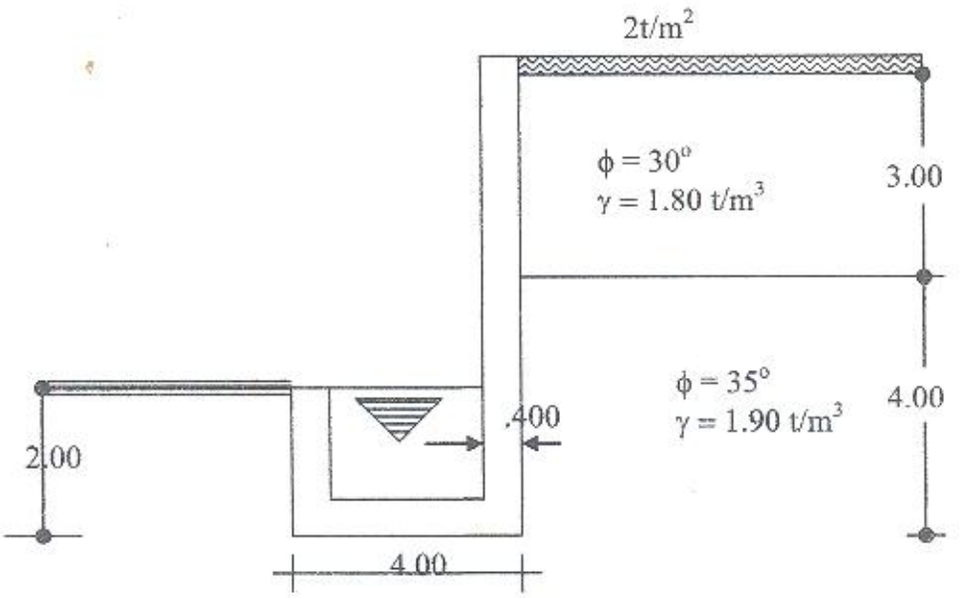


Figure (3)

Best Wishes.....

Tanta University
Faculty of Engineering
Structural Engineering Dept. **Time: 4hours**

Theory of Structure(CSE3109)
Third Year (هندسة مدنية – لائحة جديدة)
1st Term Ex. Jan 2009

Solve the following problems:

1- Using the force methd, draw the B.M., S.F., N.F. diagrams for the shown composite beam in Fig. 1. For beam EI= 40000 t.m^2 and for links L/A= 10 cm^{-1}, E = 2000 t/cm^2. (15%)

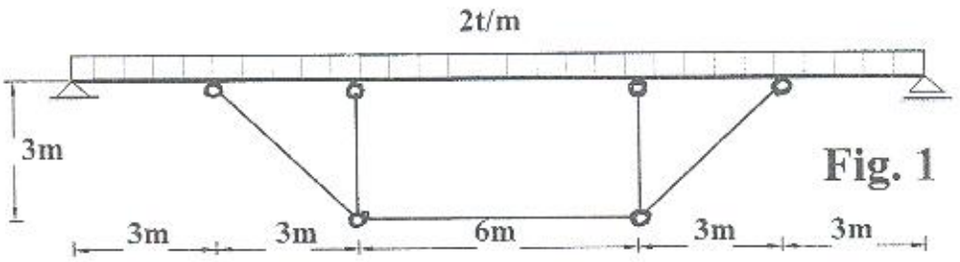


Fig. 1

2- For the fram shown in Fig. 2, using the force method (20%):

a. draw the B.M.D. due to the applied loads.

b. compute the horizontal displacement at joint (c), EI= 10000 t.m^2.

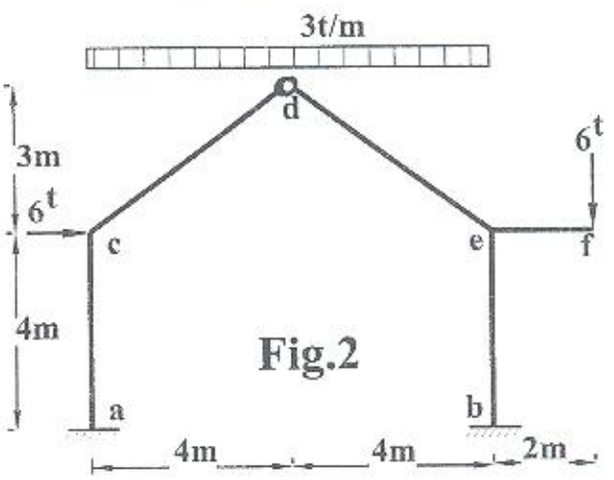


Fig.2

3- Using the slope-deflection method, draw the bending moment and shear force diagrams for the frame shown in Fig. 3. EI is constant for all members. (15%)

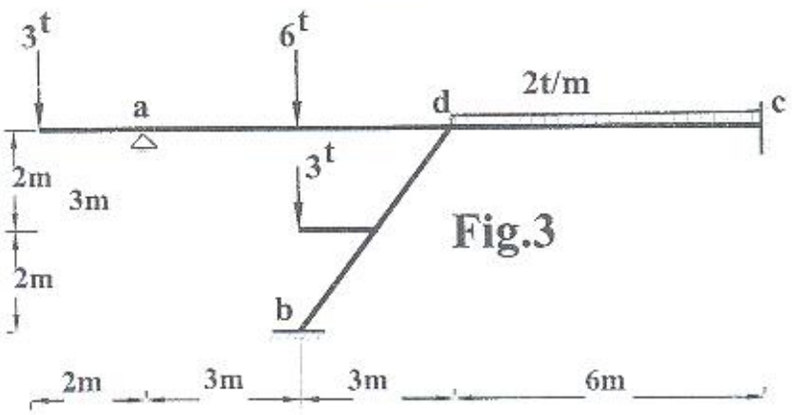


Fig.3

1/2 →

4- Using the slope-deflection method, draw only the bending moment diagram for the frame shown in Fig. 4. EI is constant for all members. (15%)

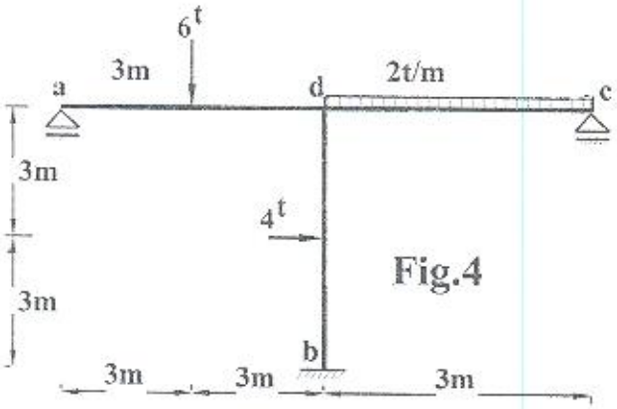


Fig.4

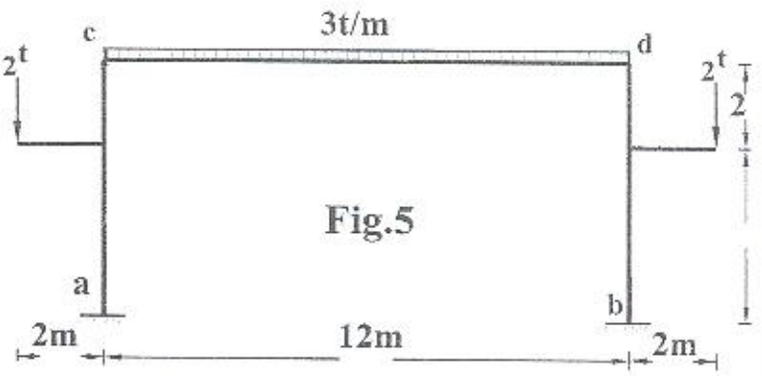


Fig.5

5- Using the moment distribution method, draw only the bending moment diagram for the frame shown Fig. 5. EI is constant for all members.(15%)

6- **a.** Draw clear sketches for the mathematical models of free damped and free undamped one-degree of freedom system for dynamic analysis. (3%)

b. Write the differential equation of undamped free body motion and solve this equation to find the undamped free vibration response (u) with initial displacement u_0 and velocity v_0. (7%)

c. For the frame shown in Fig. 6, (10%)

i. Calculate the natural frequency considering the horizontal girder to be infinity rigid.

ii. If the initial displacement and the initial velocity are 2 cm and 40 cm/sec, respectively find displacement, velocity, and acceleration after 2 seconds. (I= 0.04 m^4, E=200t/cm^2).

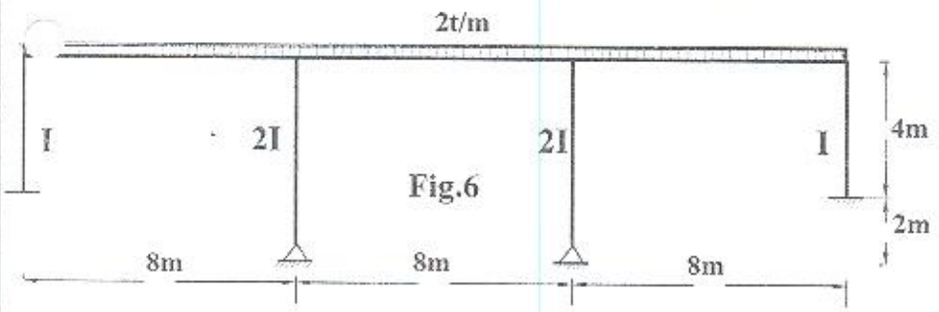


Fig.6

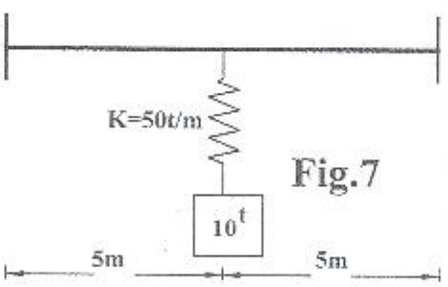


Fig.7

7- For the structure shown in Fig. 7, determine the equivalent spring constant Keq and the damping coefficient in the mathematical model. Assume the damping ratio = 10%, E = 2000 t/cm^2, I= 0.06 m^4, and the stiffness of spring = 50 t/m. (10%).

٣ مدنية - هيدرولك

OPEN CHANNEL HYDRAULICS
Third year/Civil Eng.
First Term (2008/2009)

TANTA UNIVERSITY
FACULTY OF ENGINEERING
DEPARTMENT OF WATER ENGINEERING

FINAL EXAM

Question 1: [10]

A trapezoidal channel has a bed width (b = 5 m), side slope (z = 1.5), and carries a discharge (Q = 60 m^3/s).

a) Find the critical depth y_c.

b) If manning (n = 0.015), determine the bed slope to maintain the critical depth at y_n ($y_c = y_n$).

Question 2 [20]

A trapezoidal channel has a bed width (b = 6 m), side slope (z = 1), and carries a discharge (Q = 25 m^3/s). **Plot the specific force and specific energy curves**, and form the curves **find the following:**

a) The conjugate depth (y_2) for a hydraulic jump with initial depth of y_1 = 0.6 m.

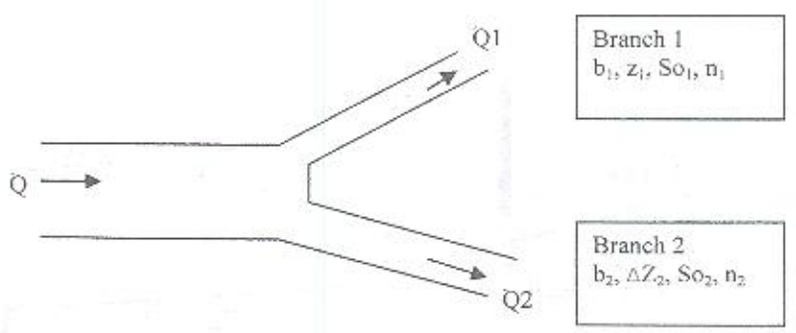
b) The height of the jump.

c) Energy losses due to the jump.

d) Horse power loss in the jump.

Question 3 [10]

A reservoir is feeding a main rectangular channel with bed width (b1 = 10 m), branching into two branches as shown. If the water height in the reservoir (H = 4 m) and the entrance losses coefficient (K_1 = 0.1), and $H_1 = K_1 \times V^2/2g$
Given the following for each branch, **write the unknowns and the Equations used to solve for them**.



OPEN CHANNEL HYDRAULICS
Third year/Civil Eng.
First Term (2008/2009)

TANTA UNIVERSITY
FACULTY OF ENGINEERING
DEPARTMENT OF WATER ENGINEERING

Branch 1

Trapezoidal section

$b_1 = 5$ m, $z_1 = 2$

$n_1 = 0.02$, $S_{o1} = 0.0002$

Branch 2

Rectangular section

$b_2 = 6$ m,

with a bed rise ($\Delta Z_2 = 0.5$m)

$n_2 = 0.02$, $S_{o2} = 0.0001$

Question 4 [20]

4.1) From the Energy Equation, prove that the GVF Equation can be written in the following Form:

$$\frac{dy}{dx} = \frac{S_o - S_f}{1 - F_r 2}$$

4.2) A rectangular channel has a bed width (b = 10 m), it carries a discharge (Q = 30 m^3/s), with bed Slope (S_o = 0.0001) and Manning (n = 0.015). Find the following:

a) Critical depth and critical slope.

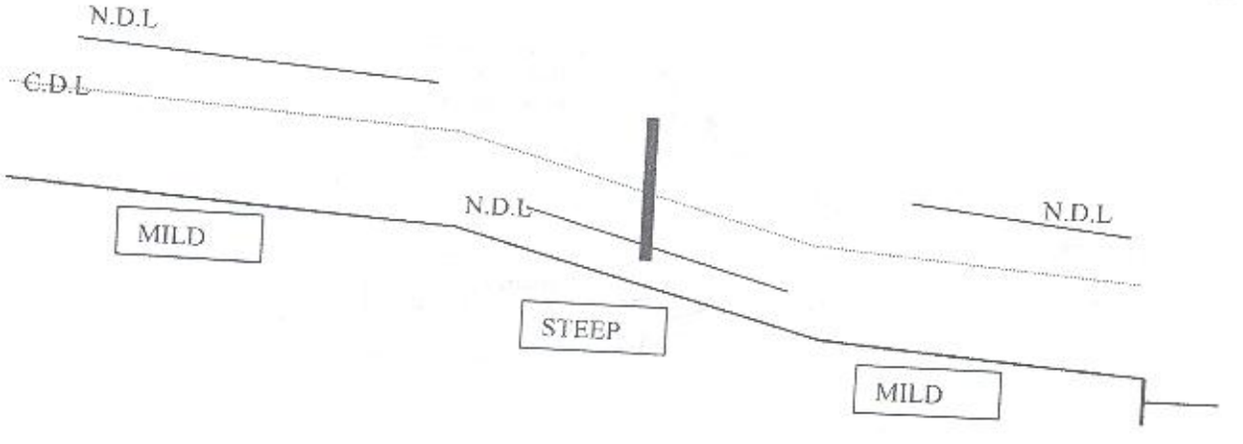
b) The distance between two sections having: y_1 =1.2 m and y_2 = 1.6 m. (use Δy = 0.2 m), and

c) What is the type of backwater curve between the two sections?

$$\frac{dx}{dy} = \frac{[1-(y_c/y)\text{^}3]}{S_o[1-(y_n/y)\text{^}10/3]}$$

Question 5 [15]

Draw the water profile and put the appropriate curve number along with the sign of (dy/dx), showing whether rising (+) or falling (-).



ثالثة - هـ مدنية (أ) (ب) 1/10

TANTA UNIVERSITY
FACULTY OF ENGINEERING
DEPARTMENT OF STRUCTURAL ENGINEERING
EXAMINATION (THIRD YEAR) STUDENTS OF CIVIL ENGINEERING هـ مدنية – لائحة جديدة

COURSE TITLE: DESIGN OF REINFORCED CONCRETE STRUCTURES (2) a		COURSE CODE: CSE3110
DATE: January - 2009	TERM: FIRST	TOTAL ASSESSMENT MARKS: 85	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 FOUR questions in two pages.

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

Problem # One (20 mark)

TRY ALL QUESTIONS

1. In design of beams subjected to torsion, why the solid section is assumed to be thin-walled tube? Proof the code equation $q_{tu}= M_{tu}/2A_o*t_e$ for the nominal ultimate torsional shear stress.
2. Differentiate by sketches only between open and closed stirrups recommended by Egyptian Code and ACI.
3. Figures 1-*a* shows an isometric of cantilever AB of length 6m carries a cantilever slab of thickness 150mm. The cantilever slab carries a half-brick wall 1.5m height at its end of density γ_{brick}= 12kN/m^3. The beam cross section (b×t) = 400×800mm. Consider the following data: cover= 1.5kN/m^2 and L.L= 3kN/m^2. It is required to carry out the following:
   - i- Draw the B.M.D, S.F.D and T.M.D for the cantilever AB.
   - ii- Without any calculations, draw the bending, shear and torsional stresses distribution along the beam height.
   - iii- Draw the expected failure mode of the cantilever AB.
   - iv- Check design the section shown in Fig. 1-*b* subjected to the following straining actions: M_u= 400kN.m, Q_u= 500kN, M_{tu}= 130kN.m.

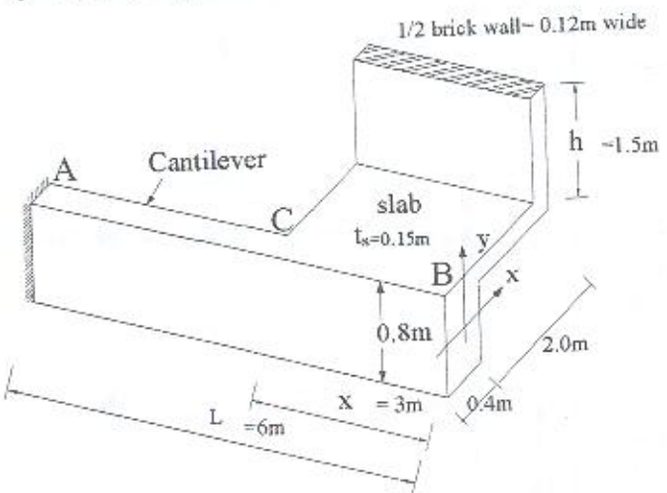


Fig. 1-*a*

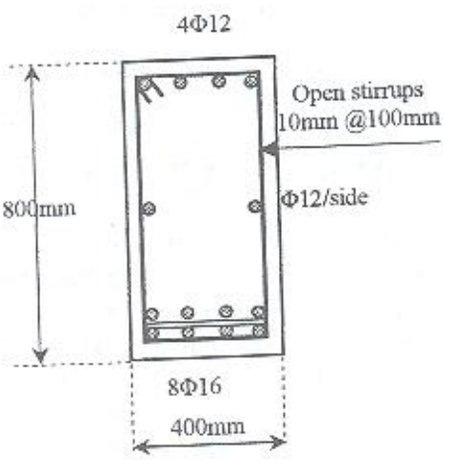


Fig. 1-*b*

Problem # Two (9 mark)

Figure 2 shows the layout of the first floor resting on eight columns with area of 11.2x14.4m. The panelled beams system is required to cover this floor using the beam modules shown in figure. The slab is subjected to L.L= 5kN/m^2 and cover= 1.5kN/m^2. The slab thickness is 100mm. It is required to make a complete design (design + drawing details) of the panelled beam B1 only. Determine the load applied on supported beam B2.

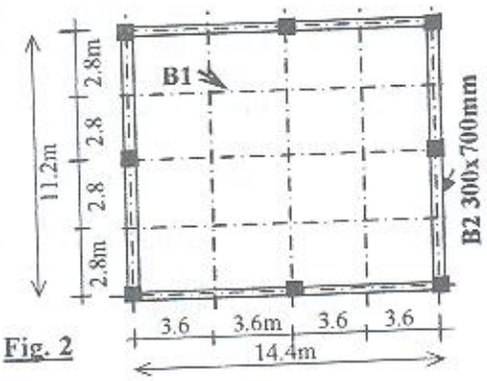


Fig. 2

P.T.O

TANTA UNIVERSITY
FACULTY OF ENGINEERING
DEPARTMENT OF STRUCTURAL ENGINEERING
EXAMINATION (THIRD YEAR) STUDENTS OF CIVIL ENGINEERING هـ مدنية – لائحة جديدة

COURSE TITLE: DESIGN OF REINFORCED CONCRETE STRUCTURES (2) a			COURSE CODE: CSE3110
DATE: January - 2009	TERM: FIRST	TOTAL ASSESSMENT MARKS: 85	TIME ALLOWED: 4 hours

Problem # Three (35 mark)

a- Differentiate between waffle and two-way ribbed slab.

b- Explain with sketches the reason of choosing solid slab as structural system for the cantilevers less than 1.5m in a hollow – block slabs?

c-

Figure 3 shows structural plan of a roof ABCDEF with cantilevers. The roof is rest on four beams that supported on six columns. The system of slabs is to be **two-way ribbed** slabs. Consider that: live load is 4kN/m^2; flooring cover is 1.5kN/m^2. The cross section of all beams is 250*700mm. It is required to carry out the following:

i- Calculate the loads on ribs and on cantilevers.
ii- Draw B.M.D and S.F.D of the critical strips.
iii- Calculate the width of solid part for shear and moment.
iv- Design the slabs (S1, S2, and S3).
v- Draw to scale 1:50 the plan and needed cross sections showing the reinforcement details and the arrangement of ribs.
vi- Calculate the loads carried by the supporting beam AB.

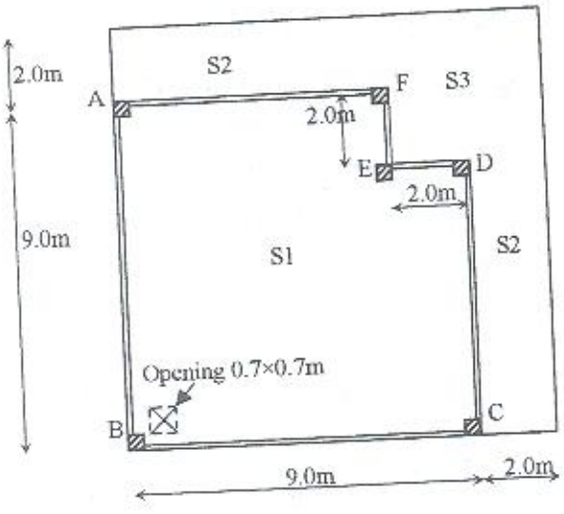


Fig. 3

Problem # Four (30 mark)

Figure 4 shows plan of typical floor of RC flat slab with panel 8m×7.2m and slab thickness 0.25m (t_s= 250mm) without drop panel and with column head 1.85m×1.85m. 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 5kN/m^2 and cover flooring 1.25kN/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.
ii- Design the critical sections due to bending moment of strips in X-direction only.
iii- Check one-way and two-way shear stresses for the interior column C1 considering the case of total loads.
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.
v- Calculate the load acting on the marginal beam in y-direction and calculate Mu, Qu, and Mtu at critical sections.

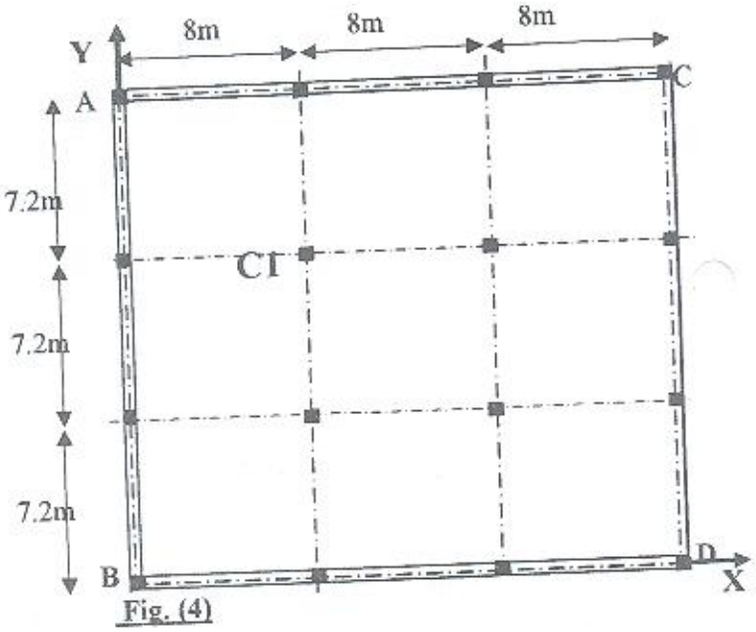


Fig. (4)

أطيب الأمنيات بالتوفيق

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