4- Problem (4) 13 Marks:

Using the slope-deflection method, find the value of the force P such that the B.M. at **a** equals the B. M. at **b** in magnitude and sign ($M_a = M_b$), further draw the B.M.D. for the given beam of constant I shown in Fig. 4.

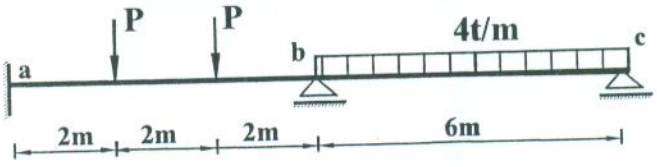


Fig. 4

5- Problem (5) 15 Marks:

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

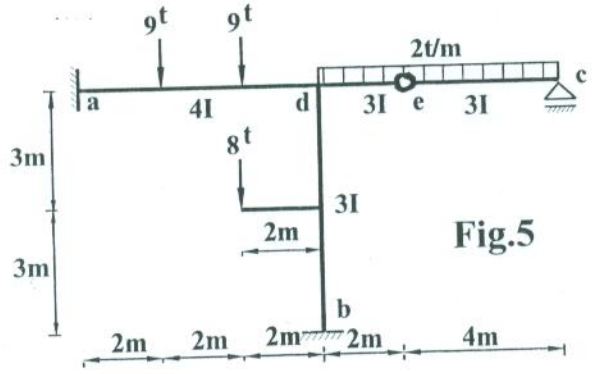


Fig.5

6- Problem (6) 18 Marks:

Using the slope-deflection method, draw the B.M.D. for the given frame of variable I shown in **Fig.(6)**.

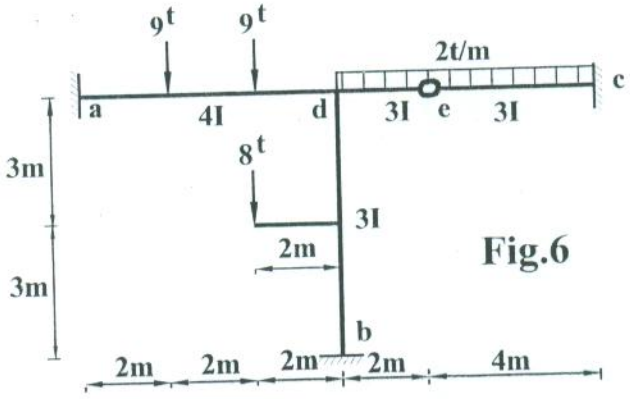


Fig.6

With the best wishes

Course Examination Committee

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

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

Q1) Problem (1) 13 Marks:

For the given statically indeterminate beam of constant I shown in **Fig. (1)**, using the force method draw the B.M.D. and find the vertical deflection of the intermediate hinge **c** if EI= 10000 $t.m^2$

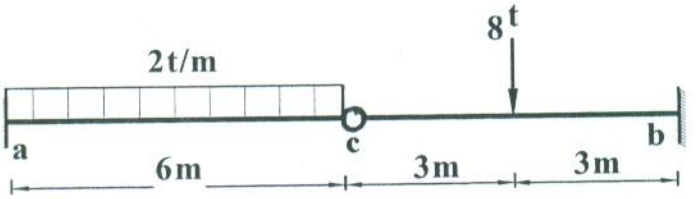


Fig. 1

2- Problem (2) 18 Marks:

Using the force method, draw the B.M.D. and S.F.D. for the statically indeterminate frame hinged at **a** and fixed at **b** given in **Fig. (2)**.

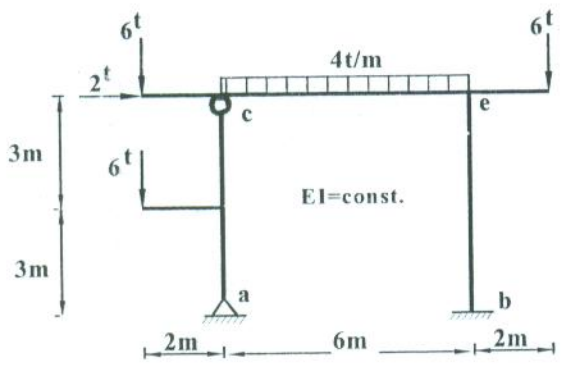


Fig. 2

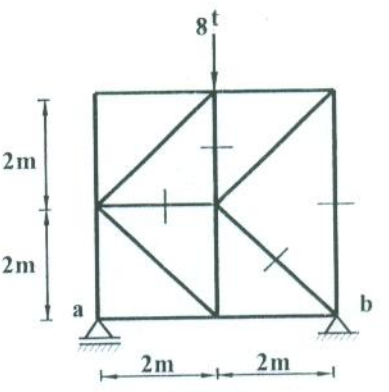


Fig. 3

3- Problem (3) 15 Marks:

For the statically indeterminate truss given in **Fig.(3)**, find the force in the marked members due to the applied loads using the force method, if L/EA constant .

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

COURSE TITLE: DESIGN of REINFORCED CONCRETE STRUCTURES (2) a			COURSE CODE: CSE3123
DATE: January - 2012	TERM: FIRST	TOTAL ASSESSMENT MARKS: 75	TIME ALLOWED: 4 hours

Systematic arrangement of calculations and clear neat drawings are essential. Any missing data can be reasonably assumed. The exam consists of FIVE problems in two pages.

Problem # One (18Marks)

TRY ALL PROBLEMS

a. Why the solid section that subjected to torsional moment is assumed to be thin-walled tube in analysis? Proof the code equation $q_{tu}= M_{tu}/2A_o*t_e$ for the nominal ultimate torsional shear stress. **(2marks)**

b. Figure 1 shows plan of a beam AB with double cantilevers DEC. The cantilevers are carried a total ultimate loads, P_u= 200kN. It is required to carry out the following, (neglect the own weight):

1. Draw the B.M.D, S.F.D and T.M.D (if exist) for the main beam AB and for the cantilevers DEC. **(3marks)**
2. If the plastic hinge occurs at the connection between the cantilever DE and the beam AB; draw the B.M.D, S.F.D and T.M.D (if exist) for the main beam AB. **(4marks)**

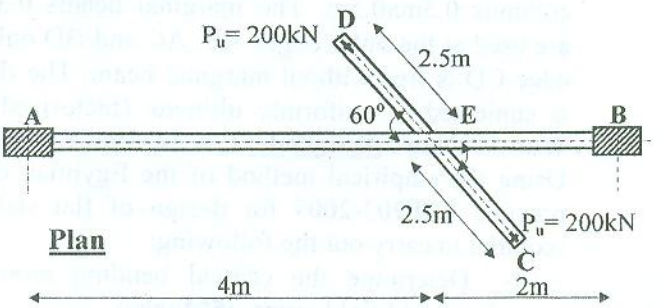


Fig1

c. Fig. 2 shows a critical section of a beam designed to resist the following straining actions, Mu= 140kN.m, Q_u= 450kN and M_{tu}= ?. It is required to carry out the following:

1. Determine the maximum torsional moment; M_{tu} may be carried by the section. **(5Marks)**
2. Determine the missed reinforcement (A_{si} and A_{s2}) needed for the design. **(3Marks)**
3. Draw the final reinforcement details of the section. **(1Marks)**

Given Data: $A_{so}= 1.24S_o$, $f_{cu}= 40MPa$, $f_y= 400MPa$.

* A_{so}/S_o and A_{si}/S_i are the area of one branch of the outer and inner stirrups to its spaces, respectively.

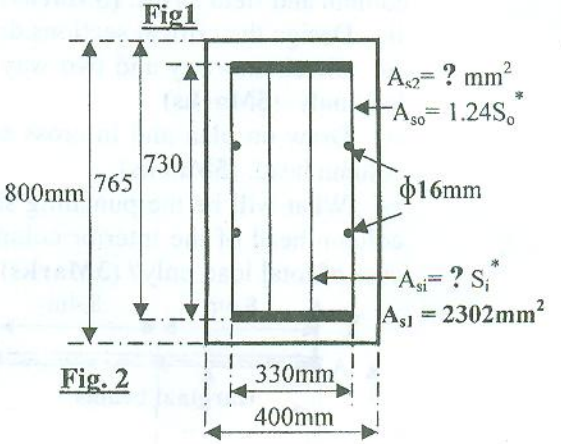


Fig. 2

Problem # Two (5Marks)

Fig. 3 shows the layout of the first floor resting on eight columns with area 9.6×12m. The panelled beams system is required to cover the floor using the beam modules shown in the figure. The slab is subjected to L.L= 6kN/m² and cover= 1.8kN/m². The slab thickness is 100mm. It is required to make a complete design (design + drawing details) of the panelled beam By1 only.

Materials: $f_{cu}= 30MPa$, $f_y= 360MPa$

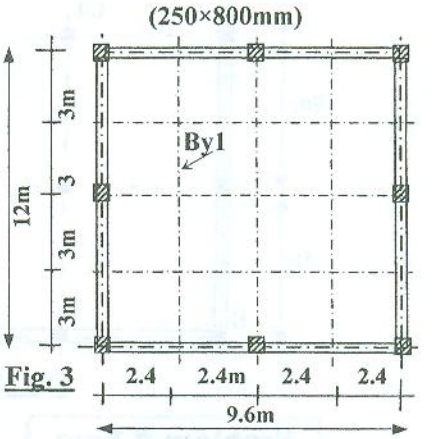


Fig. 3

Problem # Three (24Marks)

a. What is the effect of the live load and span on increasing slab thickness? Whose of them is more significance and why? Explain the reasons of choosing a solid slab system in cantilevers with span < 1.5m for a ribbed slab system. **(4Marks)**

b. Fig. 4 show structural plan and sectional elevation I-I of covering of a hotel entrance. The **ribbed slab system** is required to cover the roof. The roof is resting on two parallel beams B1 and B2. The beam AB is supported on the two columns C1 and C2. The inverted B2 is supported on two ties T. The ties are hanged in the columns. The slabs is subjected to a live load= 5kN/m² and a flooring cover= 1.2kN/m². The cross section of all beams is 250×600mm. **Materials:** $f_{cu}= 30MPa$, $f_y= 360MPa$. It is required to carry out the following:

i- Determine the load carried by ribs and draw the B.M.D and S.F.D of critical strip. **(5Marks)**

ii- Design the ribs at critical sections. Determine the width of solid parts due to the B.M and/or S.F. **(4Marks)**

P.T.O ⟶

ii- Design the ribs at critical sections. Determine the width of solid parts due to the B.M and/or S.F. **(4Marks)**

iii- Draw on plan and in cross-sections the reinforcement details of the slab. **(4Marks)**

iv-Compute the load acting on the supporting beam B1. **(2Marks)**

v- Complete design (design + reinforcement details) of the tie. **(5Marks)**

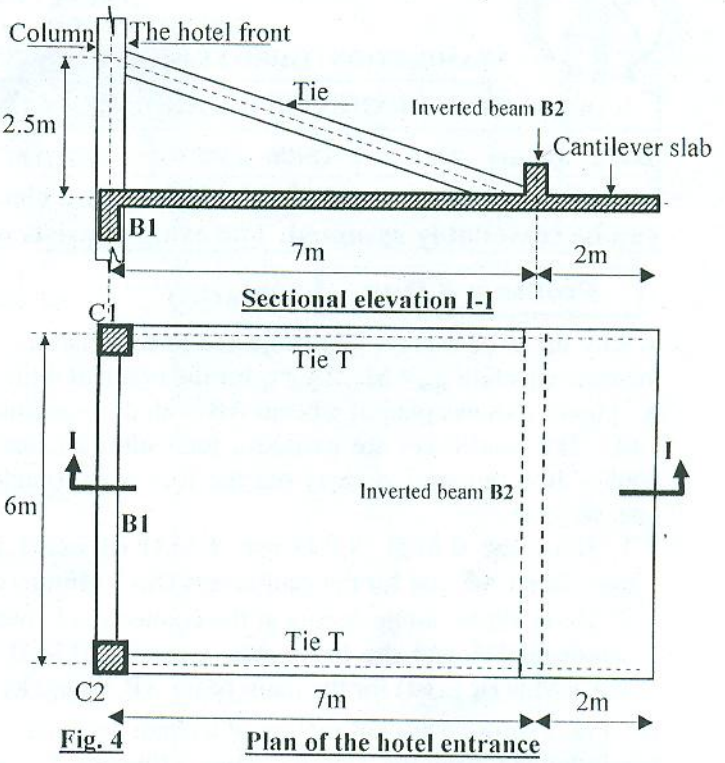


Fig. 4

Problem # Four (27Marks)

Fig. (5-a) shows plan of a typical floor of RC flat slab with panel 8 × 8.4m and slab thickness 0.25m (t_s= 250mm) without drop panel and with column head 1.50m×1.50m. The flat slab is resting on square columns 0.5mx0.5m. The marginal beams 0.3x0.9m are used at the outer edges AB, AC and BD only. The edge CD is free without marginal beam. The flat slab is subjected to uniformly ultimate (factorized) load, Wu= 18kN/m^2. **Materials: f_{cu}= 30MPa, f_y= 360MPa.** Using the empirical method of the Egyptian code of practice ECP203-2007 for design of flat slab, it is required to carry out the following:

i- Determine the critical bending moment in column and field strips. **(6Marks)**

ii- Design the critical sections due to bending moment in strips. **(6Marks)**

iii- Check one-way and two-way shear stresses for the interior column C1, considering the case of the total load only. **(6Marks)**

iv- Draw on plan and in cross sections the reinforcement details of the column and field strips and of the column head. **(6Marks)**

v- What will be the punching shear stresses if the large opening exists at a distance 0.5m from the edge of column head of the interior column C1 in the previous problem, as shown in Fig. (5-b), and considering the case of total load only? **(3Marks)**

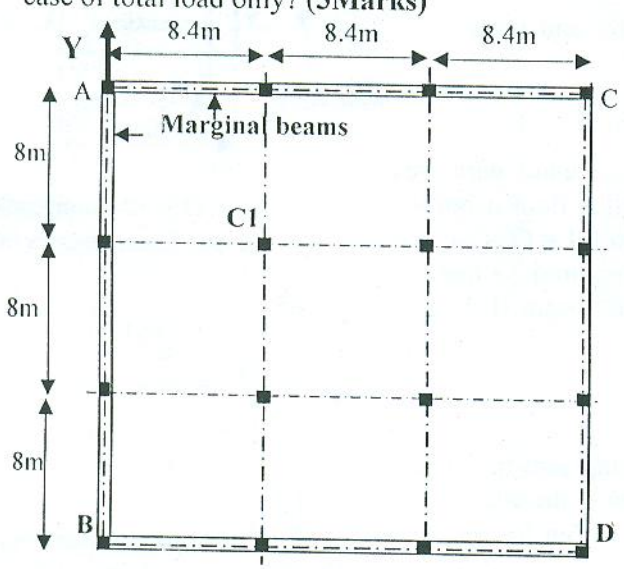


Fig. (5-a)

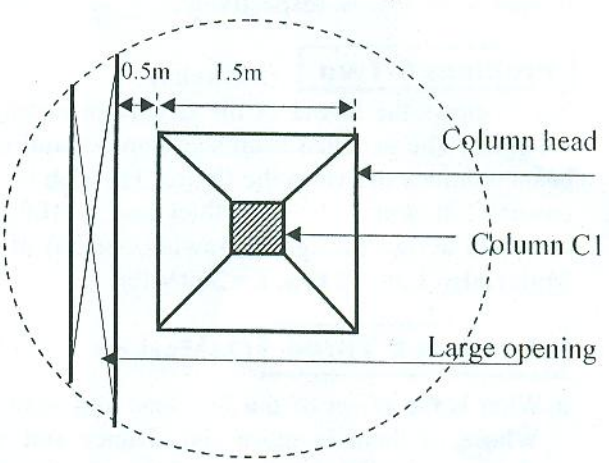


Fig. (5-b)

All the best

Prof. Dr. Mohamed Kasem Prof. Dr. Tarek Mohamed Fawzy

Problem No. 2 (35 Marks)

The circular plate shown in Figure (2) is simply supported at the outer edge and has an opening of radius (b=2m) and is subjected to radial moment Mr = 6 m.t/m acting on the free edge of the opening.

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

2- Draw the distribution of Mr and Mt.

3- Find the maximum deflection of the plate.

Problem No. 3 (15 Marks)

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

1- Write the appropriate expressions for the shearing force Q

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

Notes

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

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

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

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

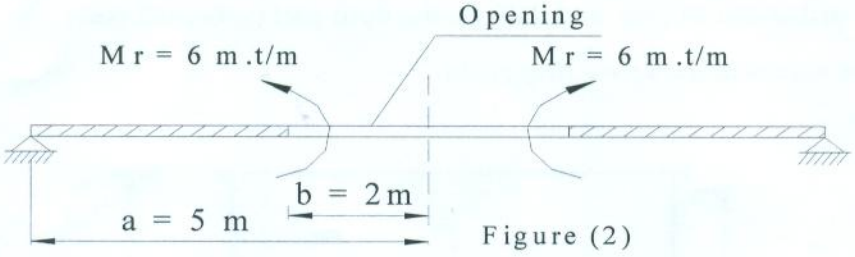


Figure (2)

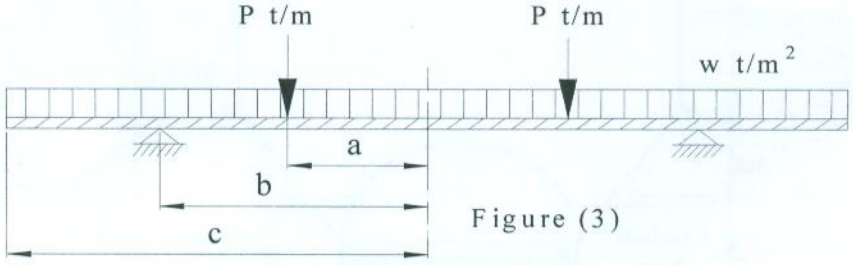


Figure (3)

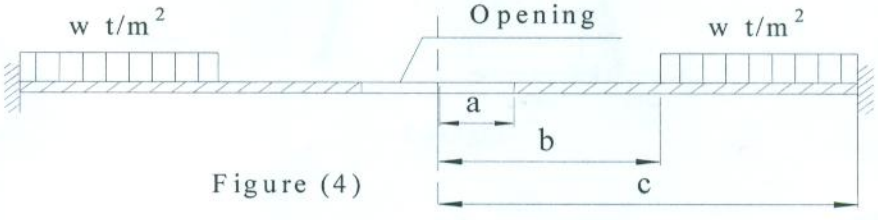


Figure (4)

Tanta University

Department: Structural Engineering
Total Marks: 85 Marks

Faculty of Engineering

Course Title: Theory of Plates and Shells	Course Code: CSE3130	Year: 3rd
Date: Jan. 2012 (First term)	Allowed time: 3 hrs	No. of Pages: (2)

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

Problem No. 1 (40 Marks)

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

b- Figure (1) shows tank of water (Inza tank) which consists of three parts cylindrical, conical and spherical part, all dimensions are describe in the Figure. It is required to

1- calculate and draw the stress resultants in the cylindrical part (Nϕ and Nθ) due to the pressure of water,

2- drive without drawing the expression of (Ns and Nθ) for the conical part due to the pressure of water, and

3- draw the distributions of (Nϕ and Nθ) on the third part (spherical part)

4- calculate the forces in the lower ring beam

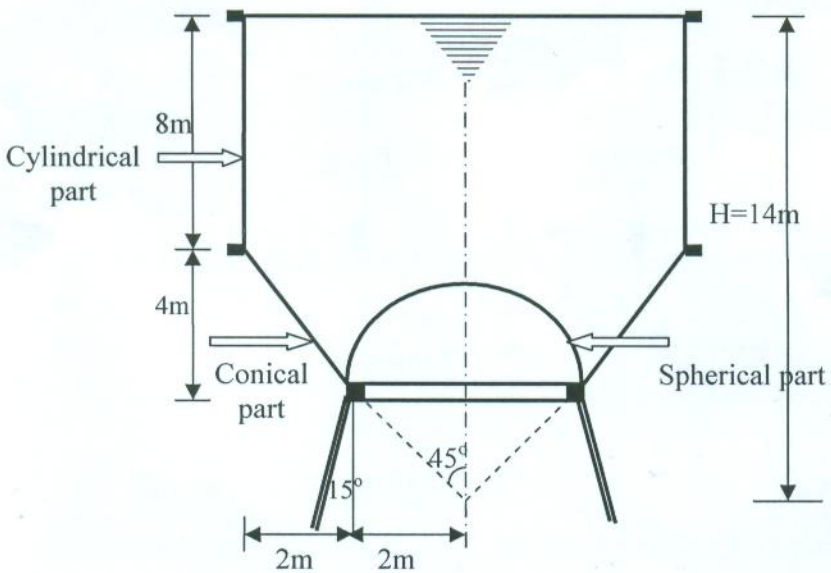


Figure 1

Notes

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

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

P.T.O.

Tanta University **Faculty of Engineering** **Soil-Structure Interaction (CSE3127)**	**3rd Year Civil** **Final Exam** **Time: 3hours (2011/2012)**

Question No.3 *(20 Marks)*

3-a) What are the factors affecting the contact pressure distribution beneath a foundations? *(5 Marks)*

3-b) What are the main assumptions used in the rigid method to solve combined footing? *(5 Marks)*

3-c) Figure 3 represents a foundation beam subjected to the loading shown. It is **required** to obtain the bending moment and shear force diagrams for the beam. The subgrade can be assumed to be stiff clay. Modulus of subgrade reaction from plate load test K_{s1} = 30 MN/m^3. The bean is reinforced concrete and has a constant cross section of 500 mm deep by 700 mm wide. The beam carries a uniform load including its own weight of 16 kN/m. Use E_c = 20000 MN/m^2. (Use four equal sections) *(10 Marks)*

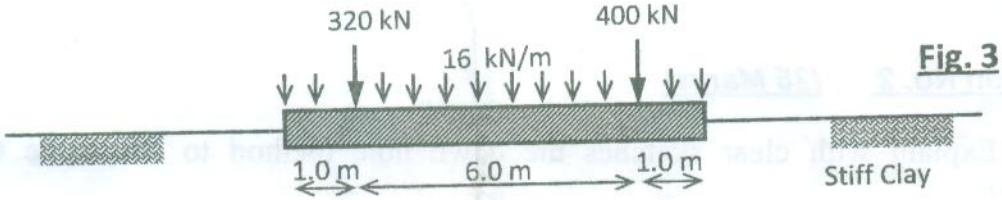
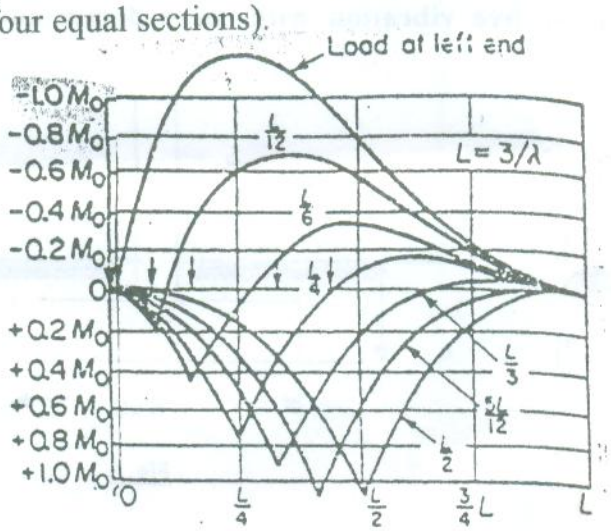


Fig. 3

Question No.4 *(15 Marks)*

4-a) Differentiate between modulus of vertical subgrade reaction (K_s) and modulus of horizontal subgrade reaction (K_h). *(5 Marks)*

4-b) A 3.0 m long concrete pile of square cross section (D= 290 mm) is driven into dense sand. Ground water level occurs at a depth of 1.5 m below the surface of the sand. A horizontal load of 10 kN will act at the top of the pile as shown in figure 4. **Determine** the pile's displacement to depth and its bending moment diagram. E_c = 22100 MN/m^2 (Use four equal sections). *(10 Marks)*



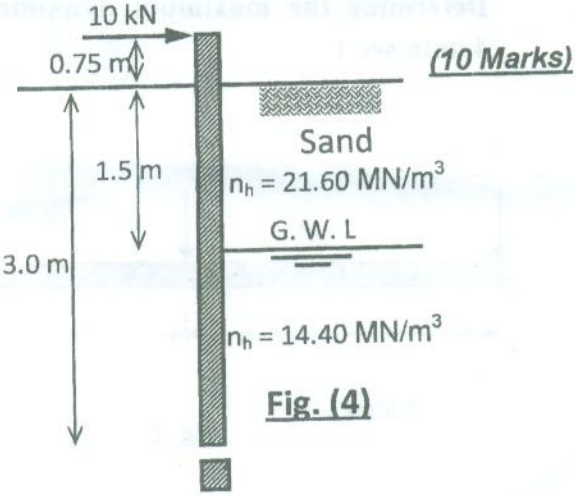


Fig. (4)

Examining committee:
Prof. M. A. Sakr - Dr. W.R. Azzam - Dr. A M. Nasr

Tanta University	**3rd Year Civil**
Faculty of Engineering	**Final Exam**
Soil-Structure Interaction (CSE3127)	**Time: 3hours (2011/2012)**

TRY TO SOLVE ALL QUESTIONS

Question No.1 *(25 Marks)* *Total Marks 85*

1-a) What is the coefficient of subgrade reaction on what factors does it depend.

(5 Marks)

1-b) A square footing with reinforced concrete thickness of 50cm placed at foundation level 2.0 m below the ground level as shown in Fig 1. The properties of the supporting soil are: ($\gamma = 1.8 t/m^3$, $E_f = 2x10^6$ t/m^2 and SPT No. at foundation level N = 25 blows/30cm).
Determine the footing width for flexible condition.

(10 Marks)

1-c) For the shown footing (Fig.2) ***draw the bending moment diagram*** as a beam on elastic foundation The data available are: the coefficient of subgrade reaction K = 2 kg/cm^3, $E_f = 2.5 x10^6$ t/m^2. Footing width, B = 2. 0m , footing thickness t = 50cm. *(10 Marks)*

Question No. 2 *(25 Marks)*

2-a) Explain with clear sketches the dawn hole method to determine the soil shear modulus. *(5 Marks)*

2-b) a machine foundation can be idealized as mass spring model. The total weight of footing and machine is 300kN. The system period T = 0.1 sec. it is required to increase this period by 20% by adding weight. Determine the additional weight in this case.

(10 Marks)

2-c) A machine foundation is 2m in diameter and 1 m in height, modeled as mass-spring-dashpot. The weight of the machine and foundation is 100kN and the spring constant = 15000kN/m and the damping coefficient c = 250kNs/m.

(10 Marks)

Draw the free body diagram and show the equation of motion
Determine the maximum dynamic force (for free vibration with, zo = 3 mm and Vo = 45mm/sec)

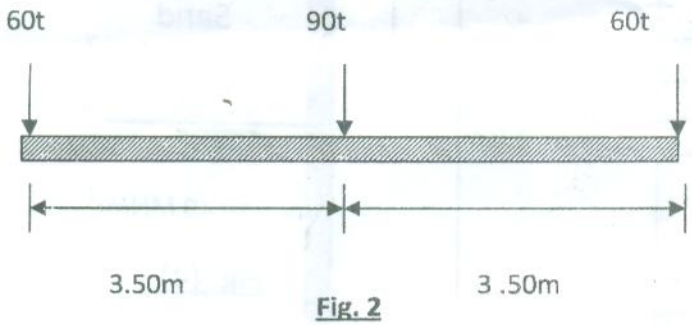


Fig. 2

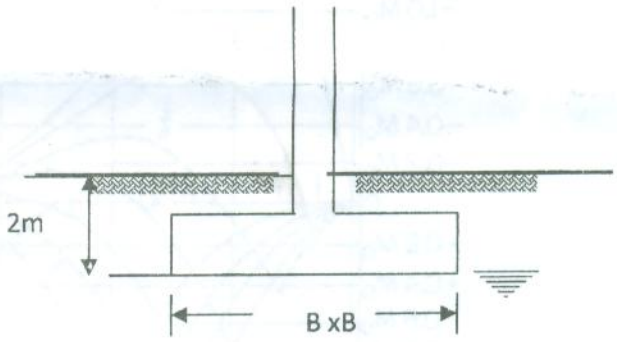


Fig. 1

Determine the modal split ratios and number of future trips in PCUS for using passengers' cars and buses, knowing that (Occupancy rates for passenger car and public bus are 2.5 & 10 respectively, Also, one Public bus = 3 PCU).

b) An urban area is consisting of four zones; the existing (O/D) is given below:

O\D	1	2	3	4	Future Trips
1		100	300	200	**1200**
2	100		200	100	**2000**
3	300	200		300	**2400**
4	200	100	300		**600**
Future Trips	**900**	**1200**	**2600**	**900**	

It is required:

Determine the future interchanges between the four zones using the **Average Growth Factor** method (Two iterations only are required). **[12 Marks]**

c) Assign the (O/D) (existing trips) given above to the same network shown in **Figure (1), Use the All-or-nothing technique** (assume average running speed of 30 Km/hr). **[10Marks]**

↳ **Problem (3):** **(33 Marks)**

a) The total trips produced in and attracted to the three zones X,Y and Z of a survey area in the design year are tabulated as: **[8 Marks]**

Zone	Trips produced	Trips attracted
X	2000	3000
Y	3000	4000
Z	4000	2000

It is known that the trips between two zones are inversely proportional to the second power of the travel time between zones, which is uniformly 20 minutes. If the trip interchange between zones Y and Z is known to be 600, calculate the trip interchange between zones X and Y, X and Z.

b) A fixed time 2-phase signal is to be provided only straight-ahead traffic is permitted. The design hour flows from the various arms and the saturation flows for these arms are given in the following table : **[10 Marks]**

	North	South	East	West
Design hour flow (q) in PCU s/ hour	800	400	750	1000
Saturation flow (s) in PCU s/ hour	2400	2000	3000	3000

Calculate the optimum cycle time and green times for the minimum overall delay. The Inter-green time should be the minimum necessary for efficient operation. The time lost per phase due to starting delays can be assumed to be 2 seconds. Sketch the timing diagram for each phase and calculate the controller settings.

c) A small city consists of four zones **(I, II, III, IV)** as shown in **Figure (2)** where, **the average running speed is 50 Km/hr.** Assume that **DHV = 0.15 A.D.T.** and the lane capacity is 125

PCU/hr./lane. The future interchanges between zones represented as PCUS as resulted from the model split process and after applying the occupancy rate of all available modes of transportation in the city. It is required to find out the number of lanes for each link. **[10 Marks]**

d) An engineer has the following data for a highway segment. **[5 Marks]**

V (mph)	60	52	41	34	22
D (Veh/mi)	11	43	62	80	103

1. Applying Greenshield's assumptions estimate the mean free flow speed and jam density by fitting the above data.
2. What are the maximum flow and corresponding density?

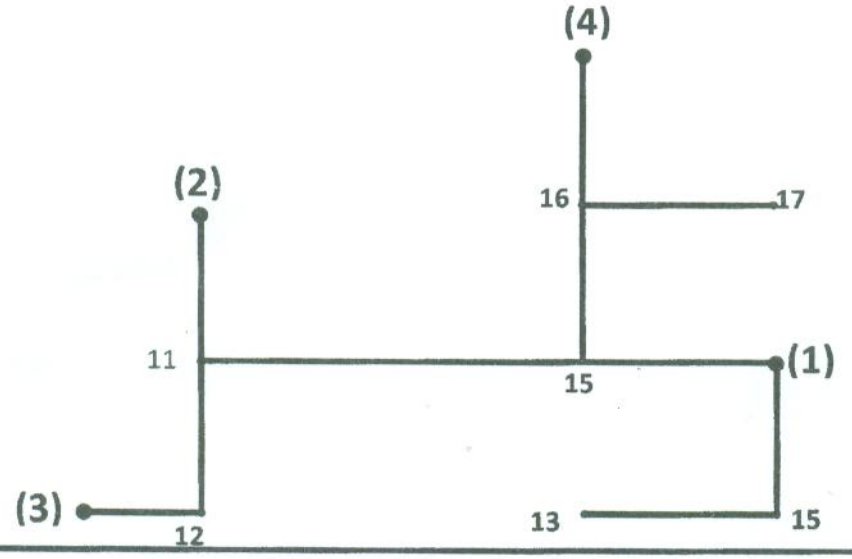
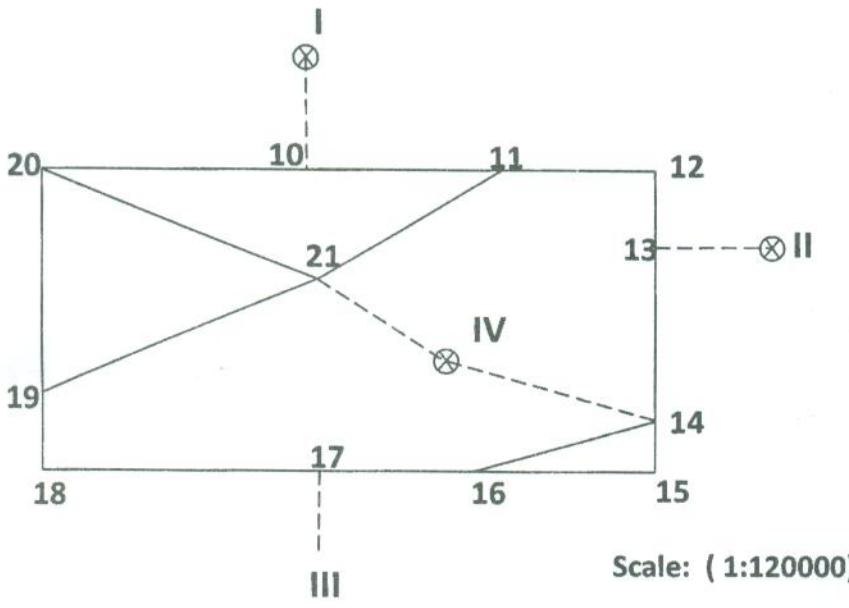
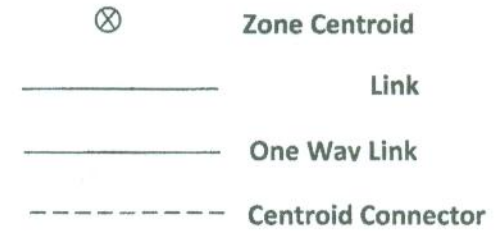


Figure (1)

Scale 1: 100000



Scale: (1:120000)



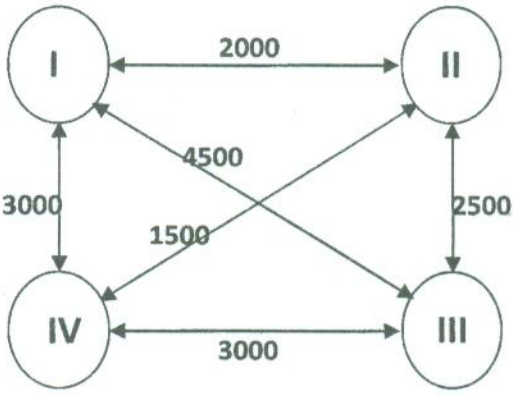


Figure (2)

Tanta University
Faculty of Engineering
Public Works Department
First Term 2011/2012
Course Title: Transportation and Traffic Engineering
Time: 3 hours **Final-Term Exam (70%)**
Course Code: CPW 3103
Date: January 2012

Try All Questions & Assume Reasonably any Missing Data الاسئلة في ثلاثة صفحات

Problem (1): (17 Marks)

a) Define each of the following expressions, use neat sketches as possible: **[5 Marks]**

1. Trip
2. Components of any Transportation System
3. Travel Resistance
4. Base conditions for multilane highway capacity
5. Level of Service
6. Jam density
7. Non Home Based Trips
8. Basics of Choosing Cordon line
9. Desire lines diagrams
10. Saturation flow

b) Draw the flow chart of the comprehensive urban transportation planning. **[3 Marks]**

c) State True or False and Correct the Wrong Sentences: **[5 Marks]**

1. Cordon line is an imaginary line enclosing the study area.
2. The evaluation stage is the last phase in the comprehensive urban transport process.
3. Screen line is an imaginary line dividing the study area into two parts.
4. The trip production equations depend on employment and accessibility.
5. Minimum path tree can represent the shortest existing distance on the network between the OD pairs.
6. The use of trip generation equation is to predict the future trips.
7. Surveys on trip making habits show that the trip generation rate decrease with the increase of car ownership and income levels.
8. Passengers are the object of the pipelines transportation system.
9. The free flow speed condition can be easily achieved under level of service "A".
10. The design volume of a road is based on an hourly basis.

d) Complete the following Sentences: **[4 Marks]**

a) The main disadvantages of the growth factors method are……..&……..&……

b) The factors affecting both trip productions and trip attractions are ……..&……..&……..

c) The future trip productions can be estimated through……technique, however, ……..technique is used for estimation the future attractions.

d) The origin /destination surveys include ……..&……..&……..&……

Problem (2): (30 Marks)

a) The utility function of the model choice is as follows: **[8 Marks]**

$$U_k = a_k - 0.029\,X_1 - 0.03\,X_2 - 0.012\,X_3 + 0.002\,X_4$$

If the future number of trips between zones is 800 trip /person/ day. Considering two users choosing between two modes, passenger car (A) and a public bus (B). Also, considering the following situation:

Variable	X_1	X_2	X_3	X_4	a_k
Passenger car	6	0	20	200	-0.15
Public bus	10	15	40	50	-0.53