(انـمـيـم كـبارى مـدسـيـة)

Course Title	Design of Steel Bridges	Final Exam	Course Code	CSE4217
Date	2016 (Second term)	No. of Pages 2	Allowed time	3 hr

D A T A :

– It is allowed only to use the Code as well as the Tables of the sections.

– Any missing data should be assumed.

A double track open timber floor railway deck bridge whose main girders are plate girders having a theoretical span (L) of 23.5. *The main girders have a flange width of 50cm*. The span is divided into five equal panels. Material of construction is St. 44 having a yield stress of $2.8 t / cm^2$. An elevation of the main girder together with a cross section of the bridge is shown.

0.47

1.0

2.35 m

5 X 4.7 = 23.5 m

Elevation

50

3.6m

2.35 m

HEB 1000

1.0 m

5 X 1.8 = 9.0

Cross Section of Bridge
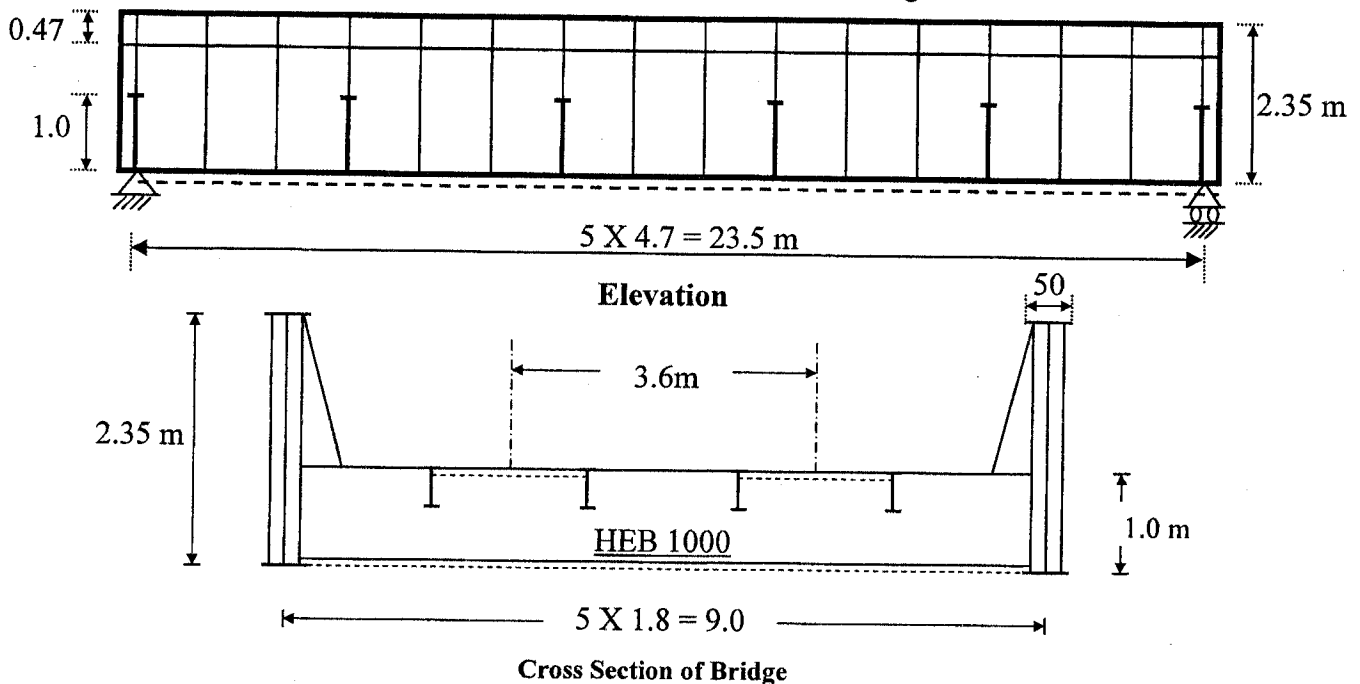
Fig. 1

Q(1) Design the end bracket connection between the stringer and the cross girder and draw it in elevation and plan to scale 1:10. Use M24 H.S. bolts (friction type) of grade 10.9. Assume the cross section of the stringer as IPE 500. Necessary straining actions are to be calculated.

(15%)

Q(2) Draw to scale 1:10 detail 1 and 2, shown in Fig.2. Assume reasonable sections for the members of the bracing system.
   (7%)

XG

Detail 1   Detail 2

XG

Stringer

1.8m

Stringer

4.667m

Fig. 2
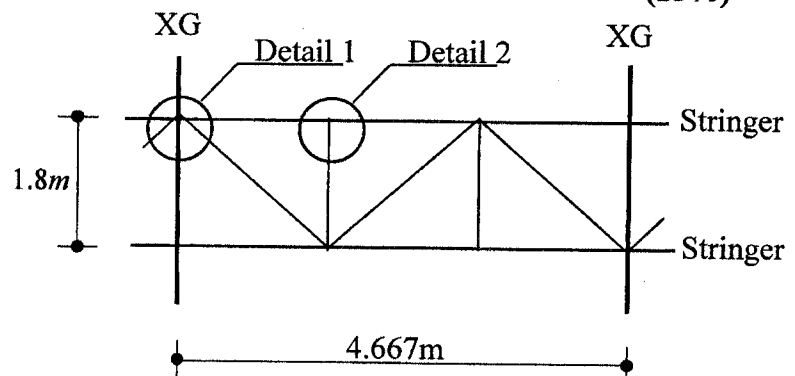
Q(3) Using the influence line method, calculate the max. B.M. and max. S.F. acting on the main girder. **(12%)**

Q(4) If plates of thicknesses from 12 to 40mm are available for the construction of the main girder, design a welded plate girder for the main girder. Check the bending tension stresses by the moment of inertia method. **(12%)**

Q(5) Calculate the flexibility of the U-frame at nearest mid-span due to cross girder deformation (δ_1) only. **(6%)**
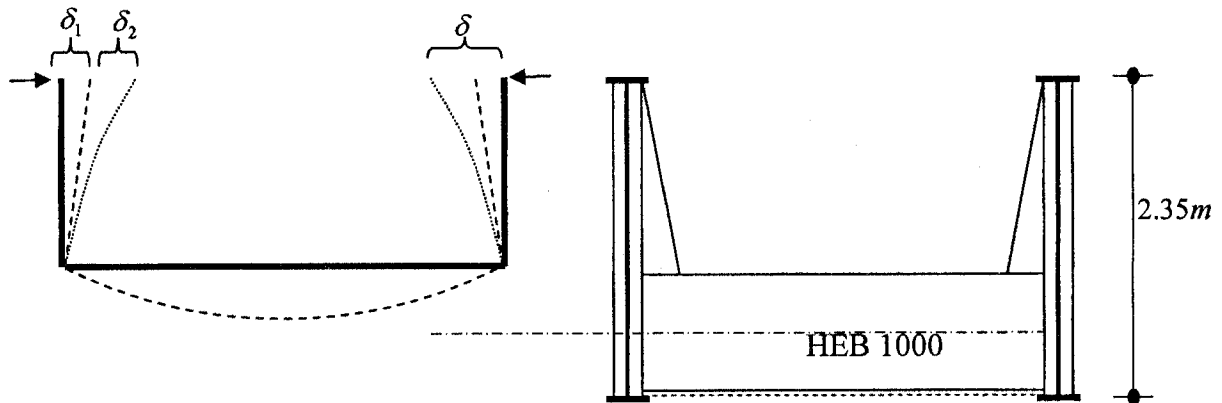

Q(6) Check the critical sub panel only of the web plate against buckling under pure shear. If the buckling is unsafe, suggest how to make it safe. **(10%)**

Q(7) If the area of the flange plate is reduced to 0.63 the value at the center section, find the theoretical length of the center flange plate assuming the B.M diagram to be a 2nd degree parabola. **(10%)**

Q(8) Design a suitable section of the intermediate stability stiffener and the welds required for its connection to the web plate. **(12%)**

Q(9) Design only the upper plate and the cylindrical rollers in the roller bearing of the bridge. The sole plate dimensions are 40x50cm. The steel used are forged steel. **(10%)**

Q(10) Consider three panels of equal area but with three aspect ratios of 0.5, 1.0 and 2.0, determine with simple calculations which one is the worst shape for buckling under pure shear. Use the critical shear buckling stresses as $\left(q_{cr} = k_q (1898)\left(\dfrac{t}{b}\right)^2 \right)$. **(6%)**

Tanta University | Second Term Exam | 4th Year Civil Engineering
Faculty of Engineering | June 2016 | Elective Course (2) CPW4211
Public Works Engineering Dept. | Time: 3 hrs. | Water and Sanitary Networks

Please answer the following questions with neat sketces if it is possible and assume any missing data -   Maximum marks :70 -   No. of pages: 2 -   Date: 1 June 2016

Question (1)   (14 Marks)

1-a) Water has to be pumped from a reservoir with lift pumps, and an elevated storage through a withdrawal point B as shown in the Figure below. Calculate the quantity of flow available at point B from both the high reservoir and the supply pumps if the pumps at A provide a pressure of 75 m head, and the residual pressure at the withdrawal point B is 22 m.   **(7 marks)**
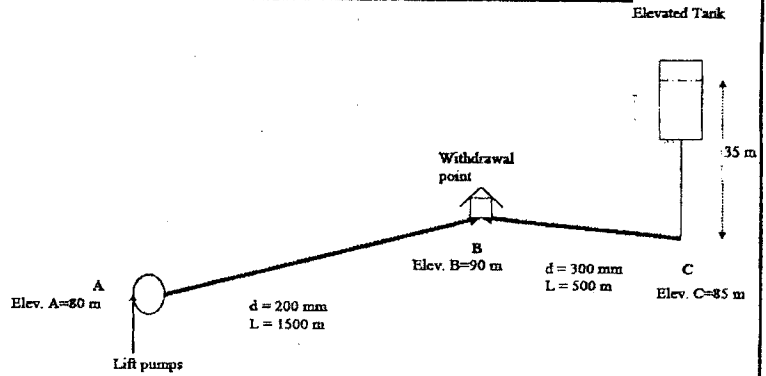
1-b) For the shown network, it's required to determine the diameter of a single pipe line AC, , if the discharge (Q) = 150 l/sec, if the pressure at A = 55m and,   E minimum pressure =30m.   **(7 marks)**
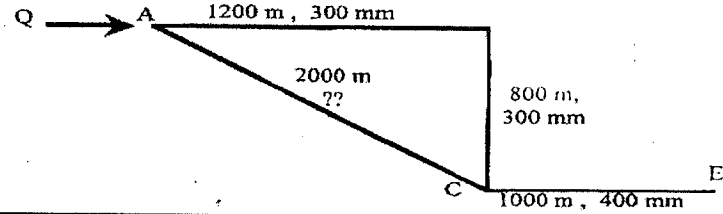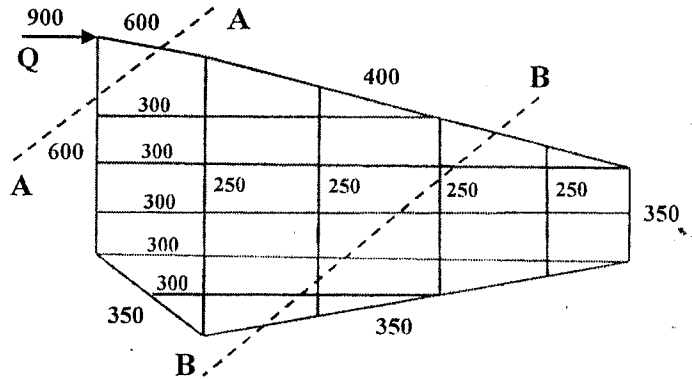
Question (2)   (10 Marks)

2-a) State using sketches :-   **(4 marks)**
- The different types of water distribution systems. Discuss the advantage and disadvantage of each type ?
- The different types of valves used in water distribution system. The location and distribution of each types of valves in water distribution networks

2-b)   Investigate the network shown in figure at section A-A and B-B, given the following data:
- population of city   = 200,000 capita
- fire demand   = 120 l/s
- pop. after section A-A   = 150000 capita
- pop. after section B-B   = 80000 capita
- Rate of water consum.   = 220 l/c/d   **(6 marks)**

Question (3)   (10 Marks)

3-a) State the main different between :-   **(3 marks)**
- a- high lift pumps and low lift pumps
- b- centrifugal pumps and displacement pumps

3-b) A city has population of 180,000 and 145,000 for the years 2010 and 2000 respectively. The raw water source to the city is a very wide canal, with about 5500 m away from the city , H.W.L. at (8.50), L.W.L. at (7.00), Bed level at (2.00), G.L. at (9.50), Road level at (10.50), and water level in the rapid mixing tank at (22.00). The water treatment plant collection works for the city is designed to serve the year 2065. Considering arithmetic growth rate of increase and water consumption of 220 L/cap./day. It is required to:-

a - Estimate the future population and average discharge at year 2065.

b- Choose and design a suitable type of intake and delivery pipes taking into consideration the following : 18 hrs operation period at a day, Number of delivery pipes = 1 , with velocity 1.7 m/s
                                                                                                (7 marks)

Question (4)   (10 Marks)

4) By using Hardy-Cross method with Hazen's William formula. It's required to estimate the head losses and the corrected discharge for the various pipes in the distribution networks. Assume C=100. Compute the corrected flows after two corrections. **(10 marks)**
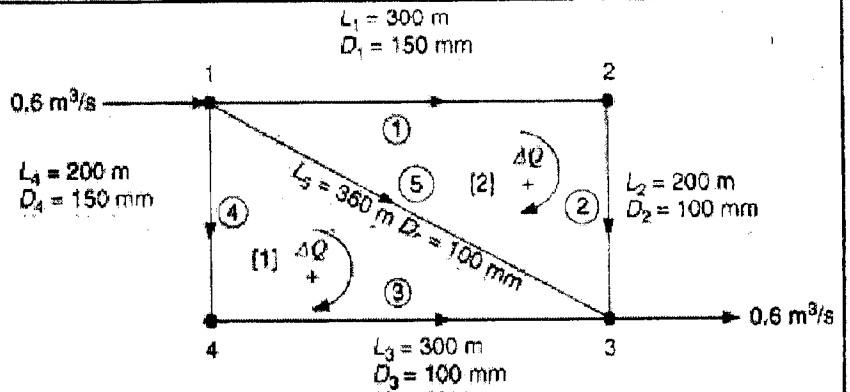
## Question (5)   (11 Marks)

5-a) Write brief notes about the location of manholes in the sewerage system. Draw cross-section in one of chosen manhole.   **(3 marks)**

5-b) A circular lateral sewer 400 mm in diameter carries a maximum flow of 120 L/s at a slope of 0.003, joins a main collector 900 mm in diameter, the main sewer carries a maximum flow of 480 L/s at a slope of 0.001. Determine the critical height above the invert level of the main collector at which the lateral sewer should inter so that there will be no reverse flow of sewage into the lateral sewer from the main collector.   **(4 marks)**

5-c) A circular combined sewer with diameter of 300 mm is required to carry flow of 0.054 m^3/s when running 2/3 full at maximum flow. The minimum flow is 0.037m^3/s. It is required to:
- Determine the velocity and depth of sewage flow in the sewer at maximum and minimum flows.
- Check up the sewer against flooding which may occur due to additional flow of 25 L/s from a new established factory at the time of minimum flow.   **(4 Marks)**

Question (6)   (20 Marks)

6-a) - What is the importance of sewerage system?
- What are the considerations of selecting the site of sewage pumping station?   **(4 Marks)**

6-b) The following figure shows the main sewage collectors for a small village, the maximum and minimum flows can be considered as 15 L/s/ 100 m length and 6 L/s/ 100 m length respectively. It is required to:
- Calculate maximum and minimum flows at each section from sec (1) to sec (5).   **(3 Marks)**
- Design the shown five sections.   **(5 Marks)**
- Draw a longitudinal section for the branch between C and C/7 with all details of manholes numbering, leveling, diameter and slope of the pipe.   **(4 Marks)**
- Determine the dimensions of the pump station as a wet well if (θ) = 20 minutes and depth (d)= 2.5m.   **(4 Marks)**
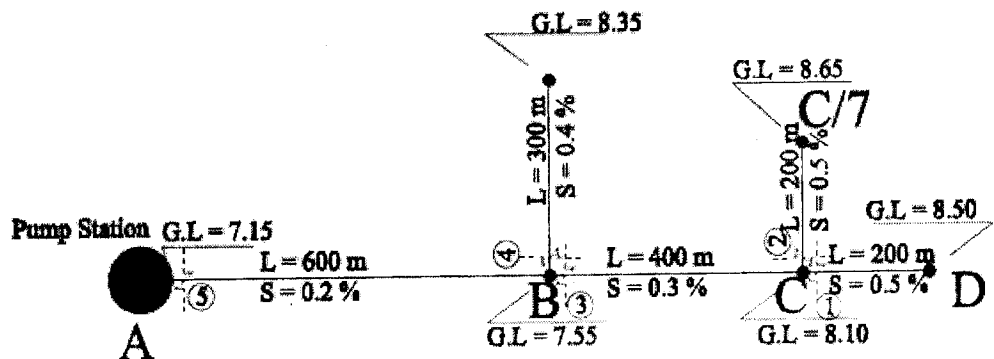
Hints:

$$V = 0.355 \, C \, D^{.63} \, S^{0.54} \qquad HP = \gamma Q H_t / 75 \, \eta_1\eta_2 \qquad \eta_1\eta_2 = 0.8 \qquad Vol. = Q.\theta /4$$
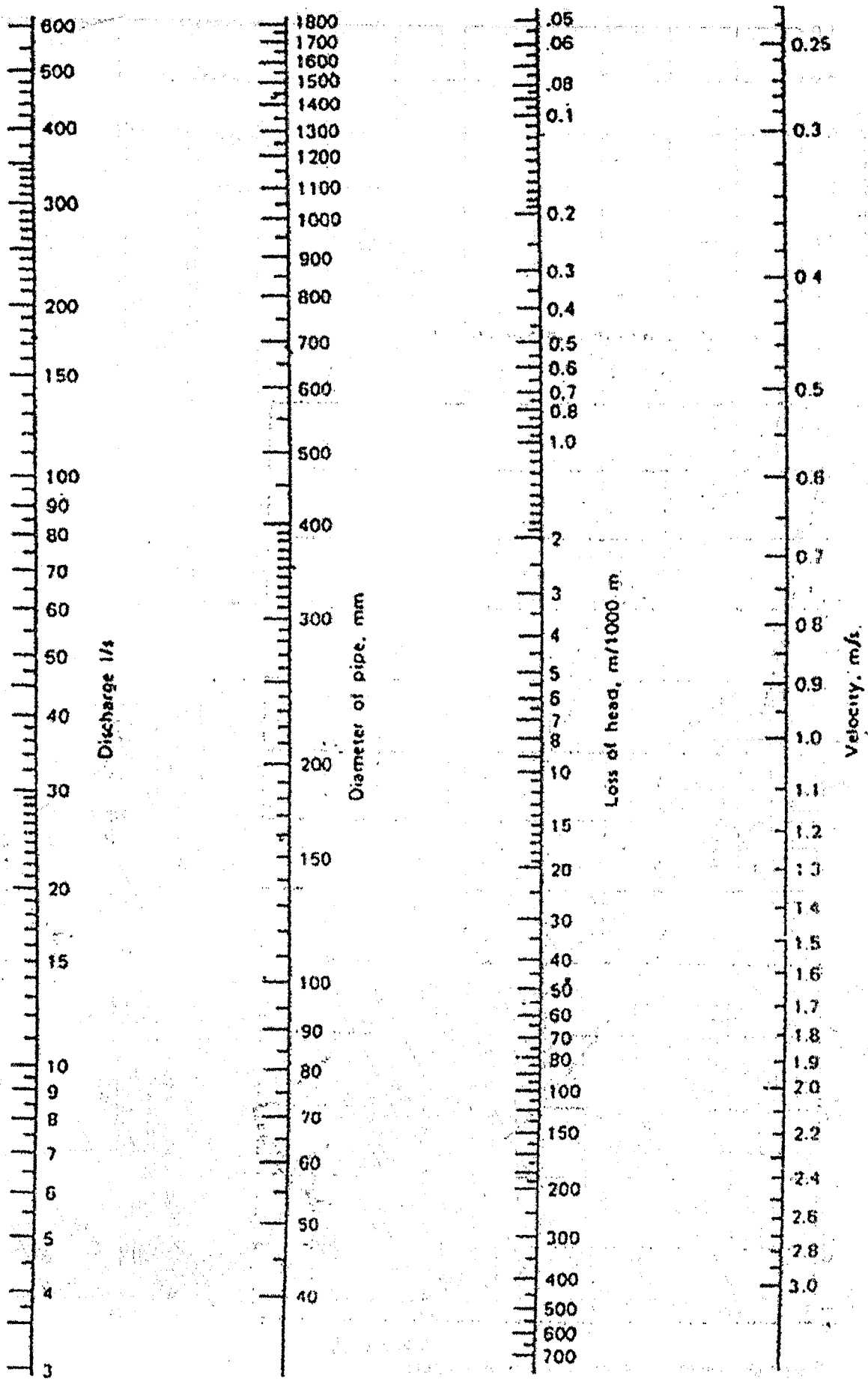
Good luck and best regards,

Dr/ Abdelaziz El-sayed   **Dr/ Mohamed Ayoub**

Nomograph of Hazen - Wiliams equation.

$$\frac{q}{Q} , \frac{v}{V} , \frac{a}{A}$$

Ratio of hydraulic elements, partial flow to full flow,
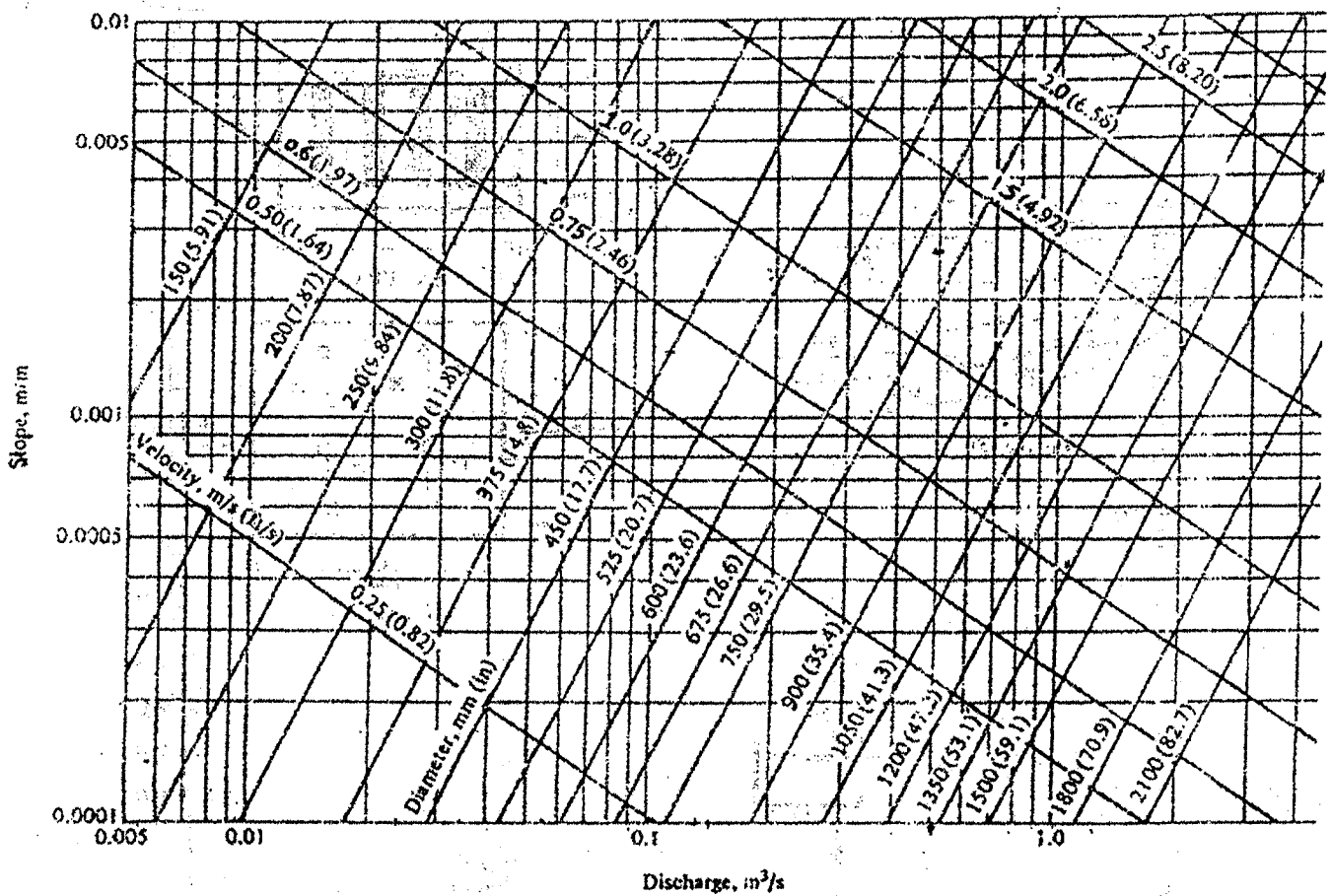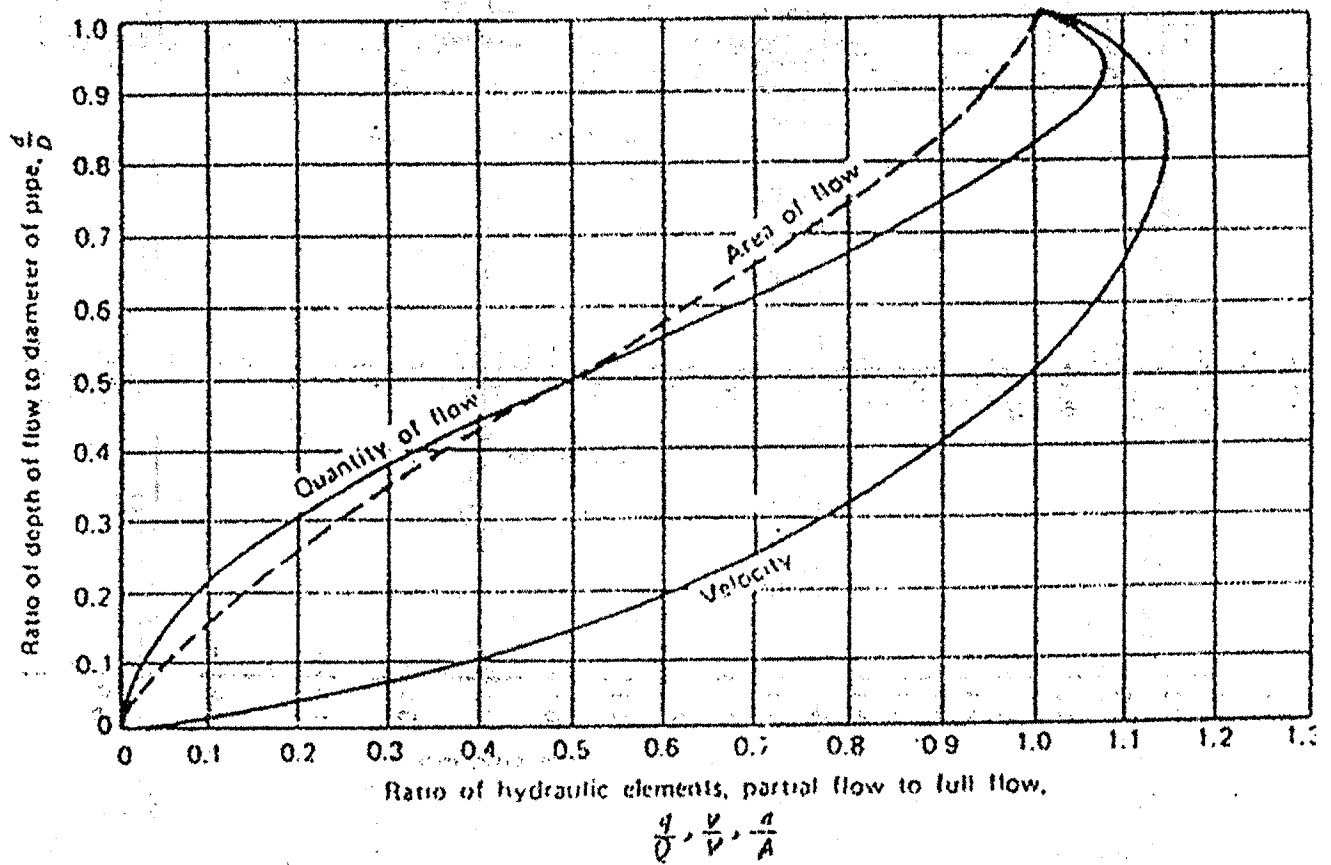
Nomograph for solution of Manning's equation for $n = 0.013$.

Course Title: Airports Engineering	Course Code:CPW4208	Year: 4th
Date: 1st June 2016	Allowed Time: 3 hrs	No of Pages: (2)

Remarks: (Answer all the following questions, assume any missing data), (Answers should be supported by sketches)

Questions No. 1 (15 Degrees):

Define each of the following and the relation between both:

a) Operating empty weight and maximum zero fuel weight.   (3 Marks)

b) Maximum Take-off Weight and Maximum Landing Weight.   (3 Marks)

c) Airport reference number and airport reference code.   (3 Marks)

d) Wind rose and landing direction indicator.   (3 Marks)

e) Runway longitudinal slopes and distance between slope changes.   (3 Marks)

Questions No. 2 (15 Degrees):

Write short notes about each of the following:-

a) Airside facilities in an airport and the operations related to each one of them   (3 Marks)

b) Aircraft characteristics which concerns a civil engineer and why?   (3 Marks)

c) Visibility zone for an airport runway, explain your answer with a neat sketch stating different cases for runway visibility?   (3 Mark)

d) Cross wind component and how it affects airport design?   (3 Mark)

e) Aircraft wheel configuration, explain your answer with a neat sketches.   (3 Marks)

Questions No. 3 (15 Degrees):

a) The profile of uncorrected length of an international airport runway is shown below. The monthly mean of the mean daily temperature and maximum daily temperature of the hottest month in the year are 29°C and 45°C respectively. Adding the correction to the last portion of the runway, compute the runway corrected length.   (10 Marks)
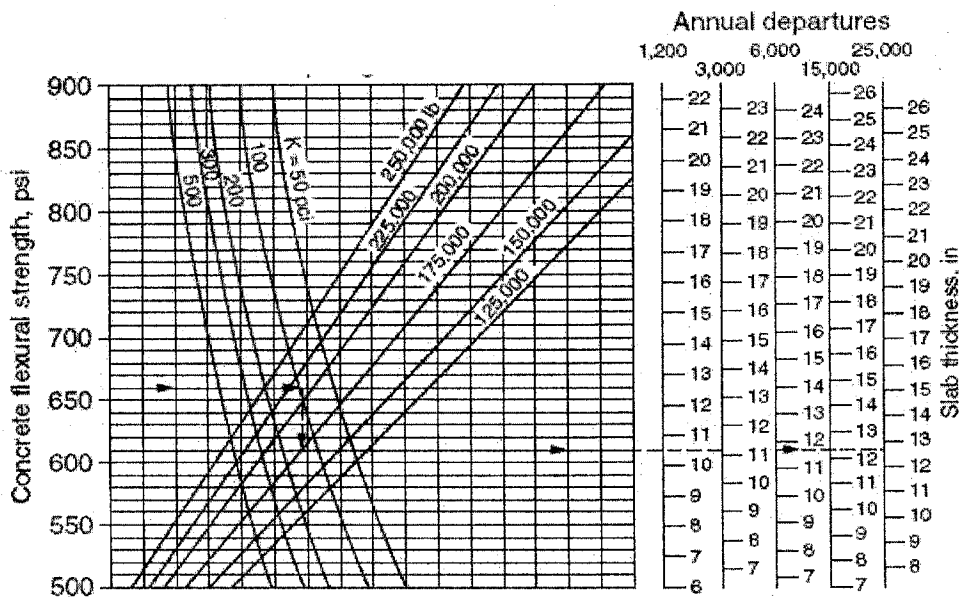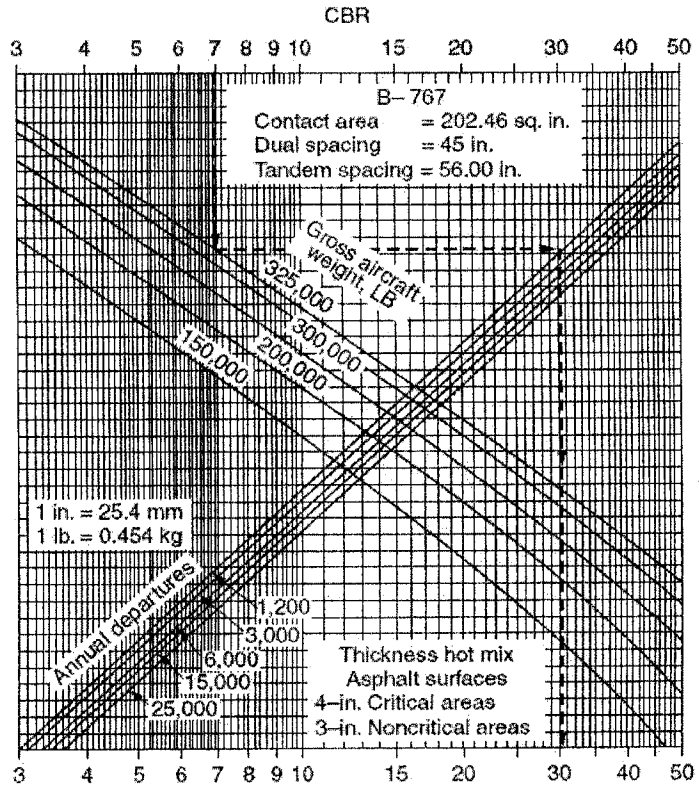

(122.56)   0.76%   1.22%   0.92%   0.62%
742.58   506.83   968.30   590.39
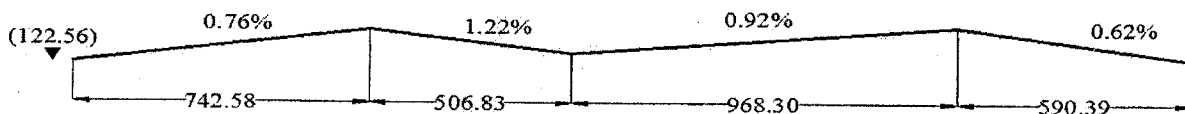
b) What do you understand by the term visual aids in connection with airports? Name the different visual aids. What is the necessity of visual aids?   (5 Marks)

Questions No. 4 (25 Degrees):

i. What are the main factors affecting the layout of taxiway in an airport?   (5 Marks)

ii. What are the factors affecting the runway capacity?   (4 Marks)

iii. Draw the imaginary surfaces. Determine the limiting heights of tower buildings for safe landing, take off and turning zoon. The towers is located at a distance of 4500 m from the middle of the runway (runway length is 2800 m)   (6 Marks)

iv. Using CBR and Westergaard methods, compute the thickness of a runway section for flexible pavement and rigid pavement, if you know that the design aircraft is Boeing 767 with maximum gross weight of 200,000 lb and 6000 annual equivalent departures, CBR value of subgade is 10% and Modulus of subgrade reaction is 100pci. flexural strength of PCC mixture is 600 lb/in^2 (10 Marks)

Important tables and charts

CBR

B-767
Contact area = 202.46 sq. in.
Dual spacing = 45 in.
Tandem spacing = 56.00 in.

Gross aircraft weight, LB
325,000
300,000
200,000
150,000

1 in. = 25.4 mm
1 lb. = 0.454 kg

Annual departures
1,200
3,000
6,000
15,000
25,000

Thickness hot mix
Asphalt surfaces
4-in. Critical areas
3-in. Noncritical areas

Annual departures

Concrete flexural strength, psi

K = 50 pci
100
200
500

250,000 lb
225,000
200,000
175,000
150,000
125,000

Slab thickness, in

	TANTA UNIVERSITY	
معهد احتياري (٢)	FACULTY OF ENGINEERING	
	DEPARTMENT OF CIVIL ENGINEERING	
	EXAMINATION (FOURTH YEAR) STUDENTS OF CIVIL & STRUCTURAL ENGINEERING	
COURSE TITLE: Earthquake Engineering		COURSE CODE: CES4220
DATE: JUNE 2016	TERM: SECOND	TOTAL ASSESSMENT MARKS: 70	TIME ALLOWED: 3 HOURS

NOTE: ANY MISSING DATA SHOULD BE REASONABLY ASSUMED

الإمتحان مكون من 5 أسئلة فى ثلاثة صفحات

1- During the preliminary design of a bridge, two proposals were suggested. Proposal A is a frame with single column and double cantilevers while Proposal B consists of a frame with two columns having double cantilevers as shown in Fig. 1.

If the bridge is to be designed using the 5% damping response spectrum shown in Fig. 1, calculate and draw the shear forces and bending moments acting on the columns in both cases. Calculate also the horizontal displacement at the level of the deck. Based on your calculations choose the better solution giving reasons for your selection. (Young's modulus for concrete = 2×10^6 t/m^2)　　(15 marks)

Fig. (1)
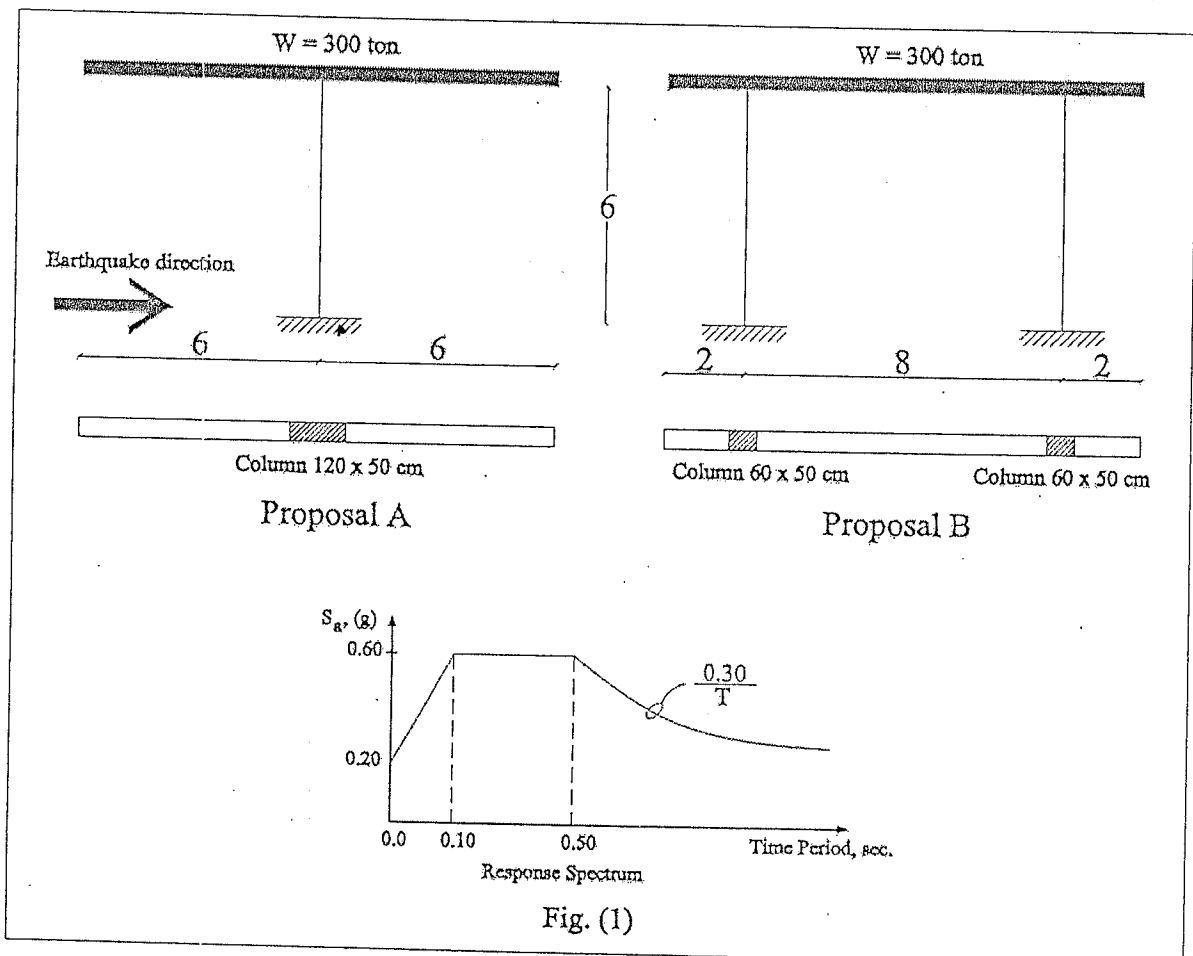
2- Explain the scientific idea behind the following
a) Seismic isolation (5 marks)
b) Seismic energy dissipation (5 marks)
c) Tuned mass damper system (5 marks)

3- Using clear sketches, state what you know about the following:
a) NZ system (2 marks)
b) P waves (2 marks)
c) Soil liquefaction (2 marks)

d) FPS system (2 marks)
e) Strike-slip faults (2 marks)

4-The structure shown in Fig. 2 has three stories. The floors weights and the mode shapes are given in the Figure. The vibration properties of the structure are given in the following table

Mode number	N	1	2	3
Neutral frequency	ω_n	4.58	9.82	14.59

If the structure has 5% damping, Use the response spectrum shown in Fig. 1 to find the floor forces, the story shear forces, the floor displacements and the story drifts. (Put your results in a tabulated form)   (20 marks)

W₁= 50 Kip
K₁= 60 K/in
W₂= 75 Kip
K₂= 120 K/in
W₃= 100 Kip
K₃= 180 K/in
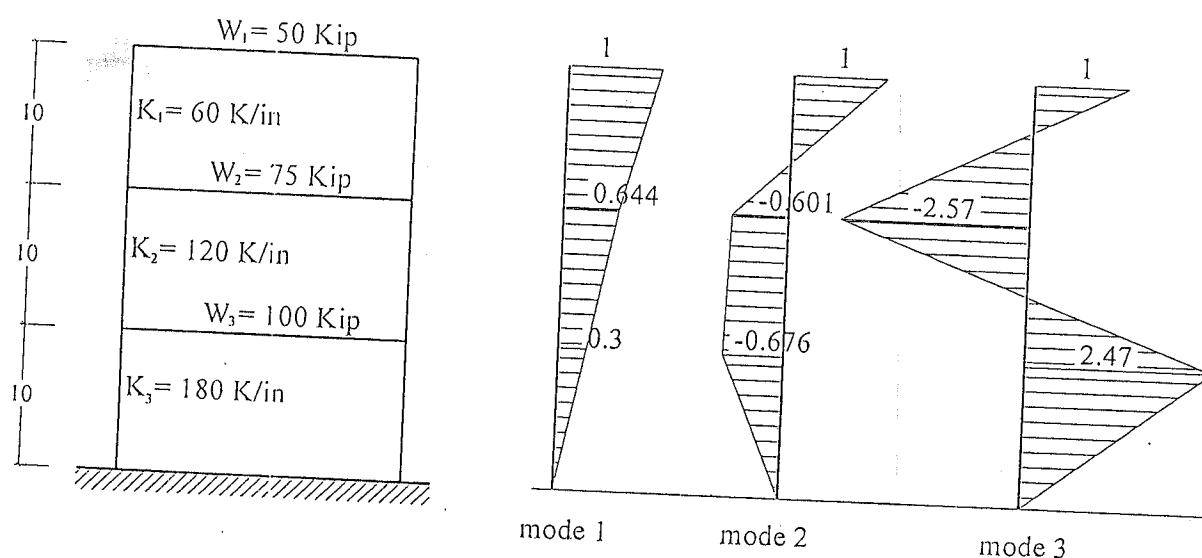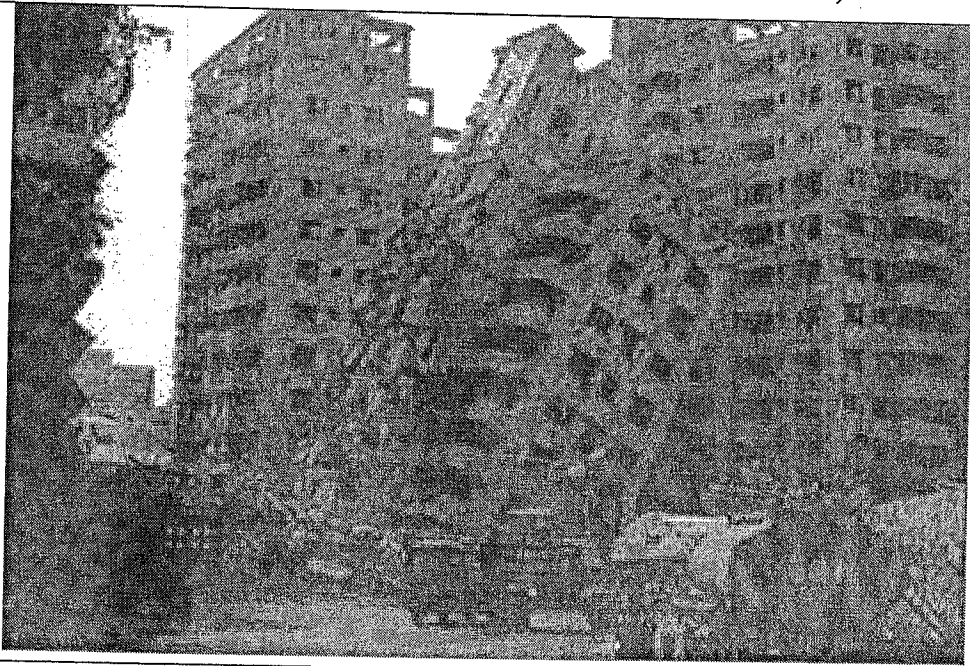
mode 1   mode 2   mode 3

Fig. 2

5-Two cases of typical structural failures during earthquakes are shown below, discuss the possible reason of failure for each case and give your recommendation to prevent such failure. (5 marks for each case)
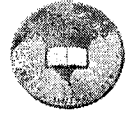

Case 1

Case 2

COURSE TITLE: Specialized Subjects: Special Topics in Reinforced Concrete

DATE: JUNE 14, 2016	TERM: SECOND	TOTAL ASSESSMENT MARKS: 100%	TIME ALLOWED: 3:00 HOUR

Notes:
- Systematic arrangement of calculations and neat sketches are essential
- All drawings should be presented in the Drawing Sheet
- Any missing data should be reasonably assumed
- Concrete characteristic strengths f_{cu} are 30 N/mm² for cast in-situ and 40 N/mm² for precast and prestressed concrete..
- Grade of reinforcing steel is 400/600 N/mm²
- Prestressing steel is low relaxation strands with f_{py}=1700 N/mm², f_{pu}=1900 N/mm².

الإمتحان مكون من أربع أسئلة فى أربع صفحات

Problem #1: (32%)

a- ***Define*** the different factors affecting the behavior of beam-column joints.

b- ***Define with neat sketches*** classifications of beam-column joints.

c- For the Type I beam column joint shown in Fig. (1), it is required to ***check the joint capacity*** to resist the forces shown in the figure in both directions.

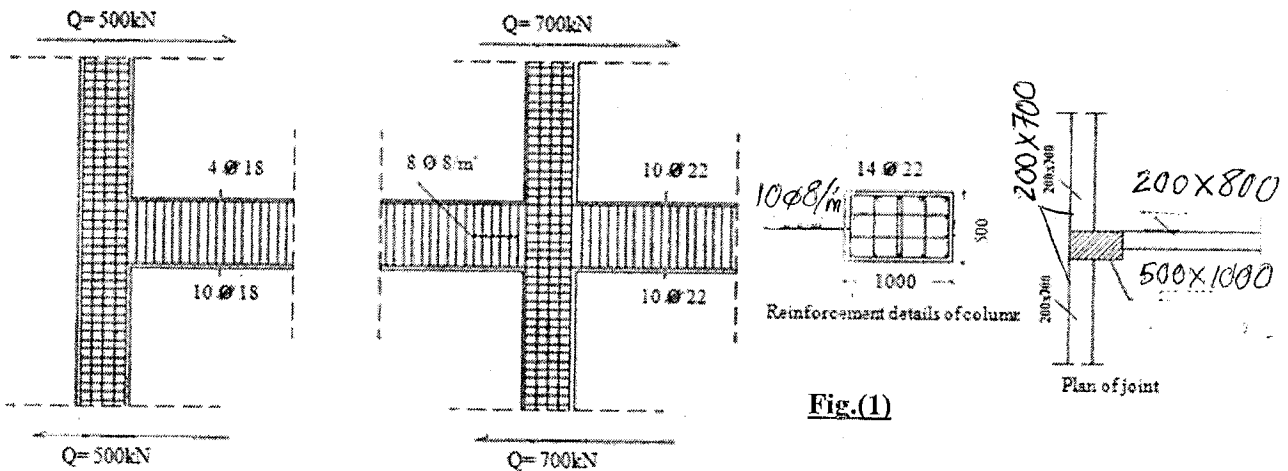| Joint Confinement Factor		
Joint Connectivity	**Joint Type**	
	I	**II**
Confined from 4-sides	2.0	1.6
Confined from 3-sides	1.6	1.2
Other×	1.2	0.9

Fig.(1)

d- Fig. 2 shows structural plan of multi-story residential building (14m×20m) located in Tanta constructed on raft foundation. The center of the core is located at the center of mass of the building. Widths of all walls are 0.4m for the ground and first floors and 0.3m for upper floors. The lengths of the walls (W1,2) and (W3) are 3m and 4m, respectively. It is required to carry out the following:
  i. ***Locate*** the center of rigidity, neglecting the effect of columns.
  ii. ***Calculate*** the bending moments that can be carried by the shear walls W1, W2 and W3 due to earthquake loading taking into account the torsional effect.
  iii. ***Make*** complete design of the core for the given assumed actions only: ultimate normal force = 3800 kN, ultimate shearing force in Y-direction = 800kN and ultimate moment about X-axis of 17500kN.m.
  iv. ***Draw*** the details of reinforcement of the core.

P.T.O.

1

انظر خلفه

Data

- The base shear force due to earthquake loading is 2000 kN.
- Number of floors = 12, (1 ground + 11typical)
- Height of ground story = 4 m and for typical story = 3 m.
- The finishing level of the ground story is (+0.50) and ground beams are used.
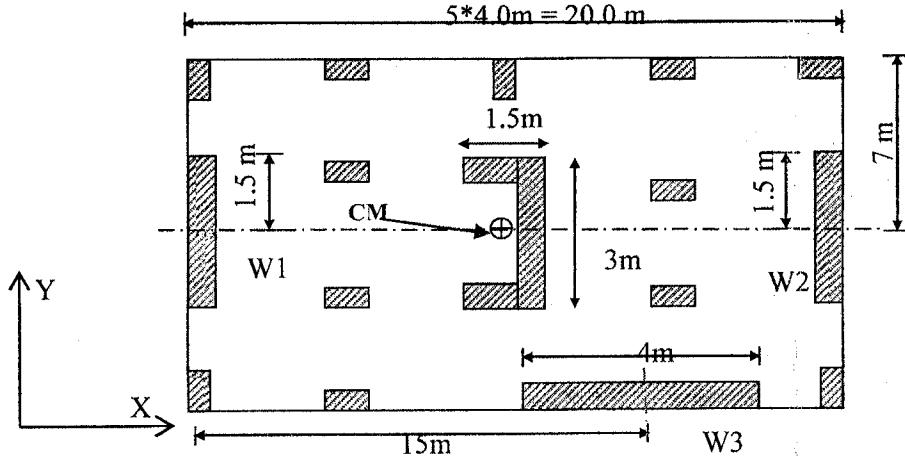- The depth of soil above the raft is (-1.00).

Fig.(2)

PROBLEM # 2 (25%)

It is required to *make* complete design for the shown minaret and its foundation that is located in Tanta city (Fig. 3).

Data

- Total height of minaret from average ground level is 40 m.
- Wall thickness is 350 mm.
- The dimensions of the main solid shaft and the upper part of the minaret are shown in sections 1 & 2 respectively.
- Allowable bearing capacity of soil is 0.25 N/mm^2.
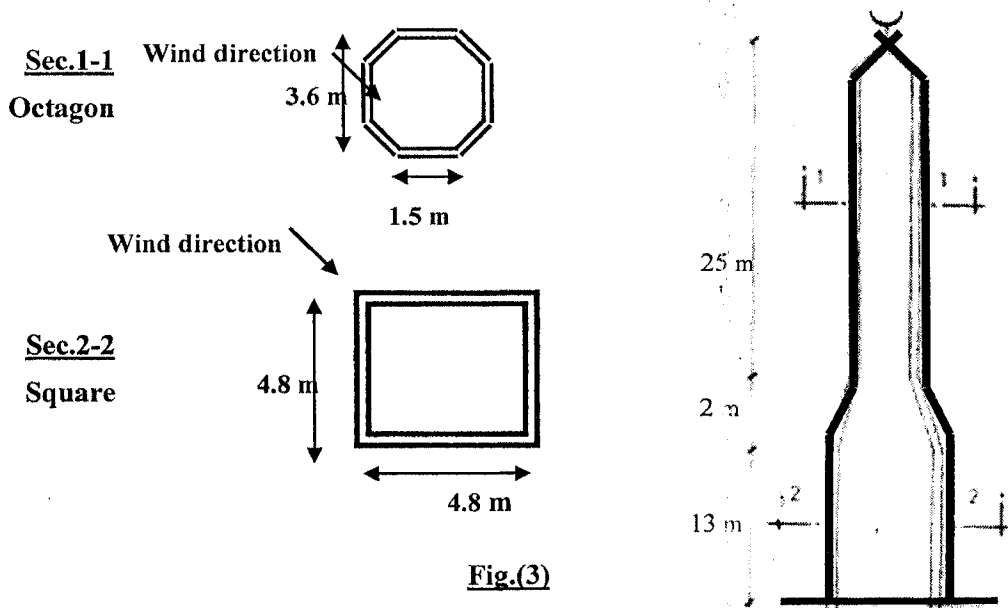- Foundation level is 4 m.

Sec.1-1

Octagon

Wind direction

3.6 m

1.5 m

Wind direction

Sec.2-2

Square

4.8 m

4.8 m

Fig.(3)

25 m

2 m

13 m

P.T.O.

2

انظر خلفه

PROBLEM # 3 (28%)

(a) For a simply supported pre-tensioned pre-stressed concrete beam of 20 m span with the cross-section shown in Fig. (4), it is required to determine the acceptable combinations of P_i and e at mid-span section considering case B according to the ECP 203-2007. And then check the point combinations in Table 1.
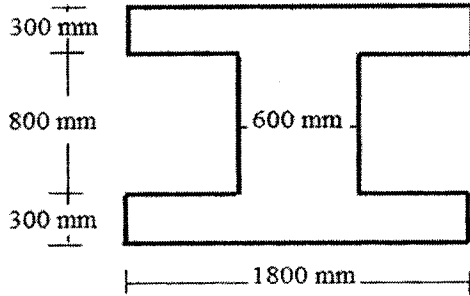

Fig.(4)

Table 1		
Point	P_i, kN	e, mm
1	2000	400
2	1500	600
3	1200	500
4	1500	700

Data
- Concrete characteristic strength at time of pre-stressing, f_{cui} = 32 MPa.
- Assume the total losses = 15%.
- Dead load exclusive the own weight = 8 kN/m
- Live load = 10 kN/m.

(b) For a simply supported bonded post-tensioned pre-stressed concrete beam of 16 m span having rectangular cross-section of 300 mm x 900 mm, it is required to carry out the following:
1. *Check* the flexural adequacy of the beam.
2. *Check* of shear at the critical section.

Data
- Dead load exclusive the own weight = 6 kN/m
- Live load = 8 kN/m.
- Assume the ordinary high tensile steels used in tension and compression are 1400 mm^2 and 500 mm^2, respectively,
- Assume the supporting column width = 500 mm.

PROBLEM # 4 (25%)

Figure (5) shows a multi-story precast industrial building (All element are precast except foundations). If you know that:
- Dead load = 6.0 kN/m^2 (Not including own weight) and Live Load = 5 kN/m^2
- Net area of precast slab cross section (One unit) = 0.2 m^2
- Pre-cast beams have cross section of (0.3 x 1.20) m

It is required to:
1. *Explain* with neat sketches the different modes of failure for dapped end joints and for the precast slab shear keys.
2. *Check* the adequacy of shear keys of the given precast slab to carry the acting loads.

انظر خلفه

Plan

Sec (x-x)

0.25

1.20

30°

0.05 m

0.60 m

0.60 m

0.60 m

Typical section of precast slab

Dapped end dimensions

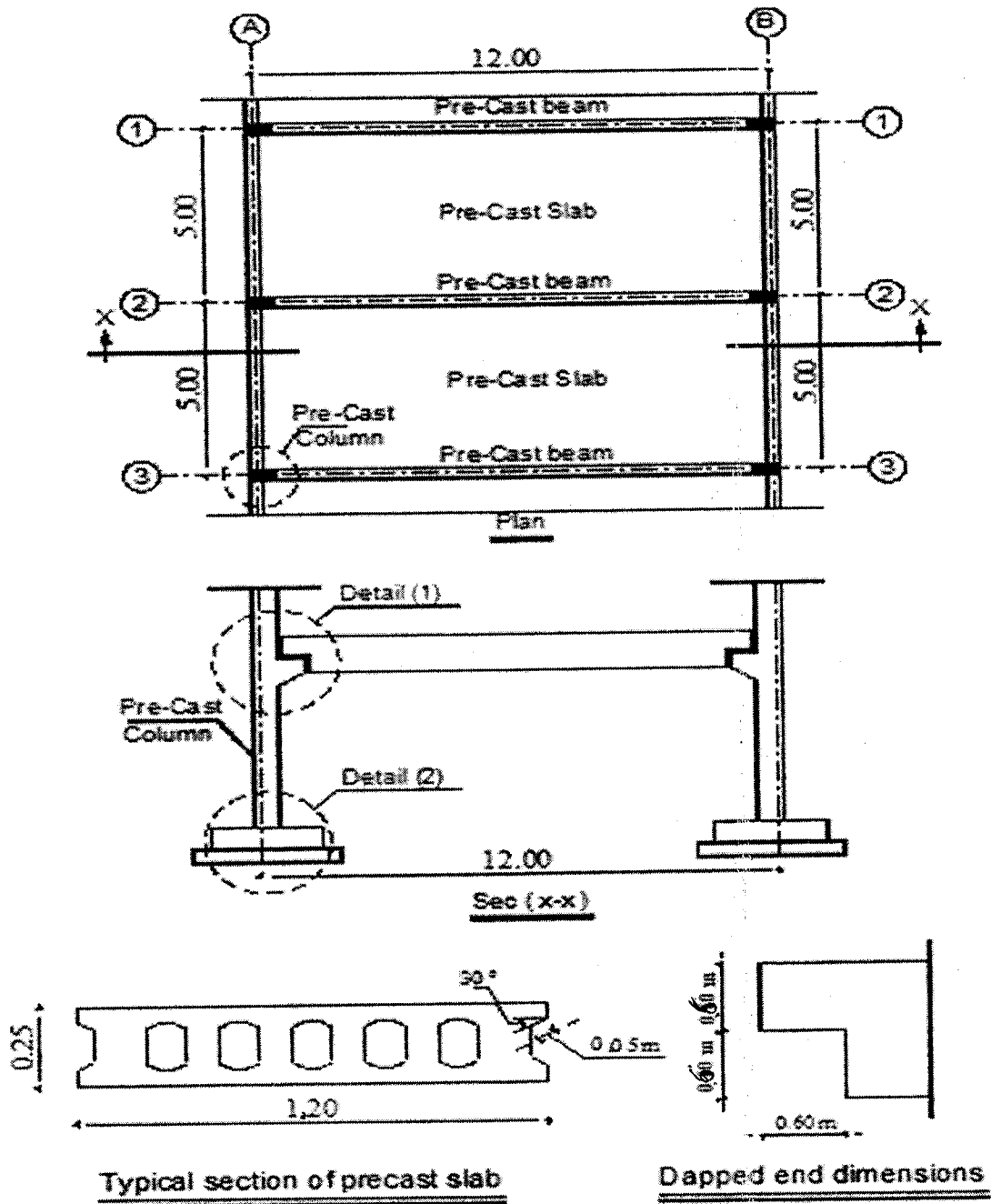**Fig.(5)**

مع أطيب التمنيات بالتوفيق،،

With Best Wishes,

Prof. Dr. Salah El-Din Taher,
Dr. Ahmed Atta,
Dr. Nesreen M. Kassem,

Prof. Dr. Mohamed Hussein,
Dr. Hamdy Mohi Afefy
Dr. Ahmed Baraghet

Remarks: (answer the following questions... assume any missing data... arrange your answer booklet

أجب على الأسئلة التالية في شكل خطوات واضحة و دون تطويل

السؤال الاول (٣٠ درجة)

أ- حدد اى العبارات التالية صواب وايها خطأ مع تصويب الخطأ (١٠ درجات)

١- يجرى اختبار الاشعة السينية المتفرقة (XRD) على الركام الكبير للتاكد من خلوه من املاح الكبريتات التى تسبب صدأ صلب التسليح.

٢- يشترط لصلاحية ماء الخلط ومعالجة الخرسانة ان يكون صالحا تماما للشرب.

٣- يمكن دهان صلب التسليح بزيت مناسب لحمايته من الصدأ اثناء التشوين.

٤- فى حالة ثبات مصدر التوريد للمواد المستخدمه فى صناعة الخرسانة فان اعتماد المصدر يكون كافيا لضمان الجودة.

٥- ركام ذو مقاس اعتبارى اكبر ٤٠ مم يناسب صب سقف خرسانة مسلحة به اقل مسافة خالصة بين حديد التسليح ٤٠مم وعرض القطاع ٢٥٠مم وسمك البلاطة ١٢٠مم.

ب- صمم قائمة تحقق (Check list) يمكن بها التحقق من كل مما يلى: (٦ درجات)
١- اعمال الفرم (الشدات) اللازمه لصب بلاطة سقف من النوع البلاطة العادية (Solid slab).
٢- اعمال الحدادة المسلحة اللازمة لعمود من الخرسانة.

جـ- حدد باختصار اهم البنود التى يجب ان يغطيها توصيف البنود التالية: (٦ درجات)
١- بند توريد وصب خرسانة مسلحة للاساسات فى تربة تحتوى على نسبة عالية من الكبريتات.
٢- بند توريد وصب خرسانة مسلحة لاعمدة تصب بمضخة الخرسانة.

د ـ باختصار وضح ما يلى: (٨ درجات)
١- اهم النقاط والبنود التى يجب ان تحتويها خطة ضبط الجودة للمشروع.
٢- اهم البنود التى يجب ان يغطيها التفتيش الفنى قبل صب الخرسانة.

السؤال الثانى (٢٠ درجة)

أ- يصادف تطبيق الاختبارات الغير متلفة على الخرسانة بعض المشاكل ، للحالات التالية وضح المشاكل المتوقعة وكيف يمكن التغلب عليها (مستعينا بالرسومات): (١٠ درجات)
١- استخدام جهاز الموجات الفوق صوتية لاساسات مغمورة تحت الماء.
٢- وجود صلب تسليح فى القلب الخرسانى موازى للمحور.
٣- استخدام مطرقة الارتداد على سطح خرسانى قديم الصب.
٤- اجراء اختبار الموجات الصوتية عى خرسانة فى منطقة حارة.
٥- الترخيم المقاس بعد ٢٤ ساعة من التحميل فى اختبار التحميل اكبر من المسموح به.

ب- لاختيار إحدى محطات الخلط المركزية كمورد للخرسانة الجاهزة الخلط لأحد المشروعات تم عمل مقارنة بين متوسط مقاومة الضغط على أساس متوسط ٦ مكعبات قياسية عند عمر ٢٨ يوم وكانت النتائج كما يلى: (١٠ درجات)

جدول نتائج المقاومة المتوسطة لمحطتى الخلط

المحطة	الخواص (كجم/سم٢)	اليوم الأول	اليوم الثانى	اليوم الثالث	اليوم الرابع	اليوم الخامس	اليوم السادس
محطة الخلط الاولى	متوسط مقاومة الضغط	٣١٠	٣٠٠	٢٩٠	٢٧٥	٢٦٥	٢٦٠
	المدى	٥٠	٤٠	٦٠	٤٥	٣٠	٥٠
محطة الخلط الثانية	متوسط مقاومة الضغط	٢٩٠	٢٩٥	٢٨٥	٢٧٠	٢٩٠	٢٧٠
	المدى	٣٥	٤٥	٣٠	٥٠	٤٠	٥٥

والمطلوب رسم لوحتى ضبط الجودة للمتوسط والمدى لكل من المحطتين مع التعليق عليهما ثم حدد أيهما أفضل من ناحية مستوى ضبط الجودة. علما بان ثوابت لوحات ضبط الجودة كما يلي:

A = 0.48, B = 2.0 & C = 0.0

السؤال الثالث (٢٠ درجة)

أ- باختصار فرق بين كل مما يلى: (٦ درجات)
١ ـ ضبط الجودة وتأكيد الجودة.
٢ ـ المقاومة المتوسطة والمقاومة المميزة.
٣ ـ عدد عينات القلب الخرسانى لضبط الجودة وتعيين المقاومة للخرسانة.

ب- وضح المقصود بكل مما يلي: (٦ درجات)
١ ـ كربنة سطح الخرسانة كيف تحدث وكيف يمكن التحقق منها.
٢ ـ تلف طبقة من سطح الخرسانة بفعل تعرضها للحريق وكيف يمكن قياس سمكها.
٣ ـ اعتماد المواد على اساس شهادة المنتج.

جـ ـ بهدف التحقق من مقاومة الضغط الفعلية لخرسانة أعمدة خرسانية تم عمل اختبار القلب الخرسانى ، حيث تم اقتطاع اربعة قلوب خرسانية وبياناتها كما يلى: (٨ درجات)

رقم العينة	القطر (مم)	الارتفاع (مم)	سيخ ١ (قطر مم/ المسافة حتى نهاية العينة مم)	سيخ ٢ (قطر مم/ المسافة حتى نهاية العينة مم)	حمل الكسر (طن)
١	١٥٠	١٢٠	-	-	٣٢.٠٠
٢	١٥٠	١٥٠	-	-	٣٠.٠٠
٣	١٥٠	١٧٠	١٢٠ / ١٦	٥٠ / ١٠	٢٨.٠٠
٤	١٥٠	١٤٥	-	-	٣١.٠٠

والمطلوب :
- حساب المقاومة المناظرة للمكعب القياسي.
- تقييم حالة الأعمدة باعتبار أن المقاومة المميزة التي بني عليها التصميم تبلغ ٢٥٠ كجم/سم٢

انتهت الاسئلة

مع خالص الرجاء بالسداد و التوفيق ،،،

د / متولى عبدالله و اللجنة

Tanta University
Faculty of Engineering
Irrigation and Hydraulics Engineering Department
Examination (Fourth Year) Students of Civil Engineering

Course Title: Water Resources Management		Course code: CIH4209
Date: 08. June, 2016	Final Second Term Exam	Total Marks: 70 Marks	Time allowed: 3 Hours

Notes:
Systematic arrangement of calculations and clear neat drawings are essential.

الإمتحان مكون من 4 أسئلة وفى صفحتين

Question 1. (14 marks)

Table 1 presents 12 monthly precipitation records measured at 3 stations *A, B, and D* respectively.

For the given data it is required to:

i. Estimate the Coefficients of the multiple linear regression model. (Consider the precipitation of station *A* as dependent variable).

ii. Estimate the missing values of the precipitation at station *A*.

iii. Evaluate the estimated model.

Table 1

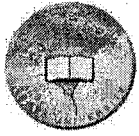| Month	1	2	3	4	5	6	7	8	9	10	11	12
Station A	107	missing	97	167	130	175	176	118	68	87	112	missing
Station B	139	114	126	217	169	227	228	153	89	113	145	213
Station C	105	160	96	198	168	202	168	168	80	111	135	219

Question 2. (16 marks)

Using the **graphical** method:

A. Maximize $Z = 28x + 150y$ (8 marks)

Subject to: (1) $4x - 6y \geq 12$; (2) $1.5y - x \geq 3$

B. Maximize $Z = 60x + 130y$ (8 marks)

Subject to: (1) $2x - 3y \leq 5$; (2) $x + 3y \leq 11$; (3) $4x + y \leq 15$; $x, y \geq 0$

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Question 3. (10 marks)

A farmer has a **1000** Feddans farm on which he plants two crops: corn and soybeans. For each Feddan of corn planted, his expenses are **$90** and for each Feddan of soybeans planted, his expenses are **$170**. Each Feddan of corn requires **350 liters** of storage and yields a profit of **$95;** each Feddan of soybeans requires **200 liters** of storage and yields a profit of **$120.** If the total amount of storage space available is **800000** liters and the farmer has only **$20000** on hand.

Formulate the optimization problem.

Question 4. (30 marks)

Solve the following linear programming problem using simplex method:

A. **Maximize** $Z = 2X_1 + 3X_2 + X_3$ **(15 marks)**

    Subject to:
- $X_1 + X_2 + X_3 \leq 80$
- $2X_1 + X_2 + X_3 \leq 25$
- $X_2 + X_3 \leq 12$
- $X_1; X_2; X_3 \geq 0$

B. **Minimize** $Z = 1400 X_1 + 1600 X_2 + 400 X_3$ **(15 marks)**

    Subject to:
- $6X_1 + 5X_2 + X_3 \geq 80$
- $7X_1 + 4X_2 + 2X_3 \geq 25$
- $X_1; X_2; X_3 \geq 0$

Best Wishes - Dr. Mosaad Khadr & the Committee

Ministry of Higher Education
Tanta University
Faculty of Engineering

بسم الله الرحمن الرحيم ـ وزارة التعليم العالى وحماية البيئة ؛

Final Exam
June, 2016
Time Allowed: 3.00 Hours

Harbor Eng. – Fourth year Civil Eng.

Answer the following questions, Note : the exam is two pages and any missing data can be assumed

Question 1

a) Using neat sketch explain how to use wind speed in harbor Engineering.

b) Define very briefly with a neat sketch the following: measurements of seawater level, and coastal engineering problems and their solution and required studies for each.

c) The following table indicates the number of hours of occurrence for several wind ranges for a specific year, it is required to plot the wind rose and determine the prevailing wind direction. Considering that the number of calm wind hours is 58, number of variable hours is 15 and number of unrecorded wind hours is 35.

U (knots)	345°–014°	015°–044°	045°–074°	075°–104°	105°–134°	135°–164°	165°–194°	195°–224°	225°–254°	255°–284°	285°–314°	315°–344°
1-6	358	502	1035	450	312	220	203	152	91	158	209	273
7-12	186	223	487	211	200	129	122	110	71	108	142	140
13-18	172	151	323	141	113	83	93	66	55	95	96	105
19-24	78	82	192	95	107	65	49	34	34	87	47	53
25-30	14	19	45	15	23	13	--	--	--	--	--	15

Question 2

a) Using neat sketch explain how to find the berth length and basin width for different cases.

b) Using the SMB , Darbyshire and Nomogram methods find the wave height and wave period comparing the obtained result, if the storm have the following characteristics:

   i) The wind speed is 28 knots, the fetch is 15 N.M., and wind duration is 1.5 hrs,

   ii) The wind speed is 28 knots, the fetch is 90 N.M.,

   iii) The wind speed is 22 knots and wind duration is 4 hrs.

c) A harbor is to be constructed a long the shown coastal area. Wave are approaching the entrance with the crest line making an angle of 25^0 , the wave height in deep water is 3.4 m and wave period is 9.0 seconds. The depth of dredging is 15.0 m and Kr at entrance is 0.74. Find the wave height at point A in figure 1.

Question 3

a) Using neat sketch explain in details the different type of breakwater and its using conditions with advantages and disadvantages of each type.

b) For a wave height 4 m and wave period 8 seconds, draw the wave profile ($\Delta\theta = 45°$) over 2 wave lengths for t=0 and t=5 seconds.

c) Design the rubble mound breakwater head section and draw with neat sketch a detailed cross section showing its different elements. Knowing that; the wave height in deep water is 4.5 m, the wave period

is 10 second, the design water depth is 14 m, the road width is 10.0 m with overtopping condition, where the overtopping discharge is 0.09 m³ /s/m. Note that A=0.018, B=37, r=0.87, the tidal range is 2.0 m and the maximum available units is 3.25 tons and side slope is 3:1 (Use Rough angular blocks and Tribar both in random)

Question 4

a) Using neat sketch explain the factors that affect the harbor planning.

b) Calculate the ship mooring force in t/m, if the vessel is bulk cargo, DWT is 150000 ton, the freeboard height is 25 m and wind speed is 30 m/sec., making an angle of 30° with the berth. Four bollards are used for mooring with spacing 25 m.

c) Determine the minimum cross section of a canal for single moving way for a ship $\dfrac{55 X 7.5}{1.75}$ with rated speed of 12 km/hr and side slope of 1:1. Find also the return flow and the squat.

d) Using neat sketch explain in details the different type of walls used in berths construction and the steps of design of berth of blocks wall type.
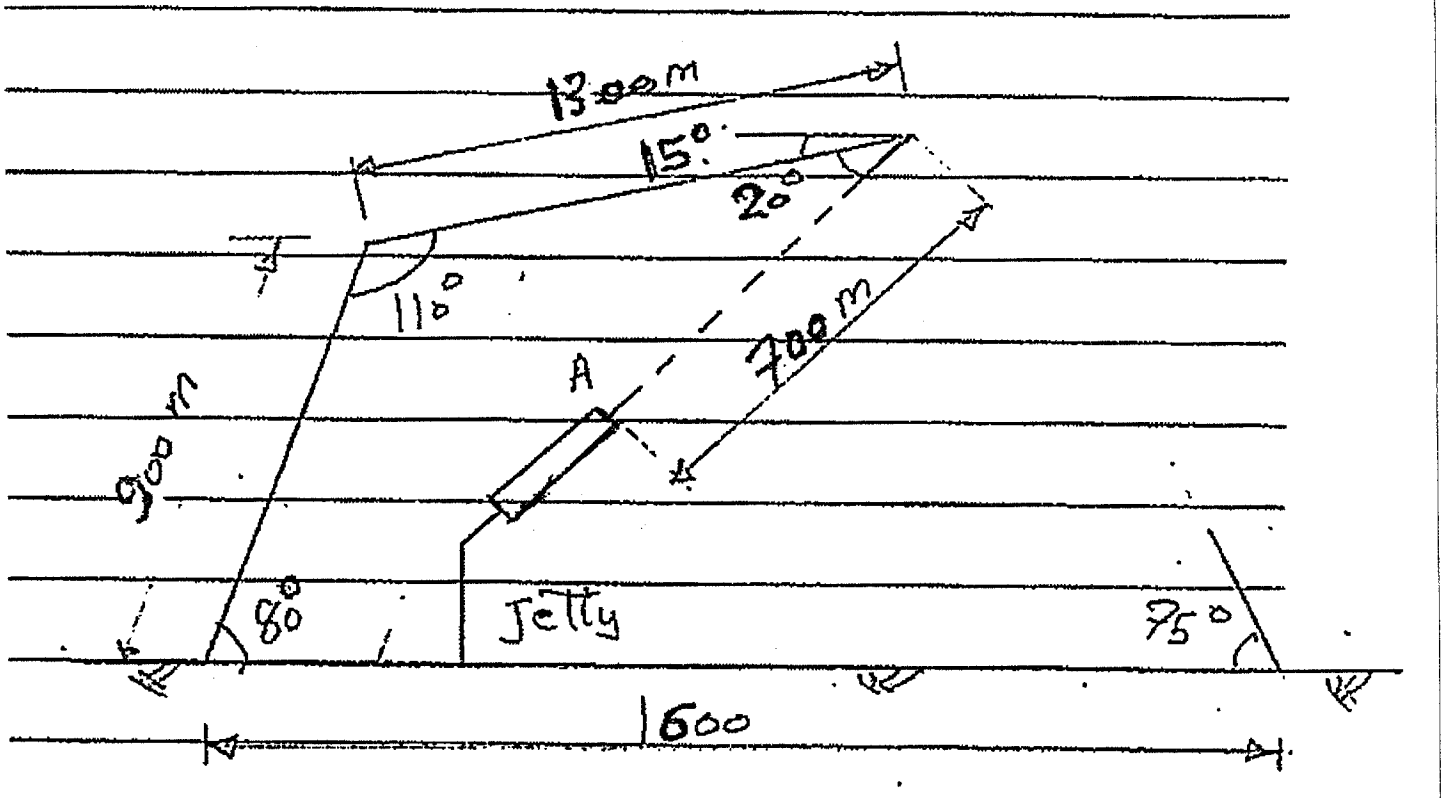

Figure 1