



Faculty of Engineering

Department : Structural Engineering
 Lecturer : Dr. Emad Elbeltagi
 Course : Construction Project Management
 Course Code : 08315
 Total Marks : 110
 Date : 13 Jan 2013
 Class : 3rd Civil
 Time allowed : 3 hours

Final Exam

Question 1: (32 Marks)

Table 1 gives the activities involved in a small contract and their weekly resource usage.

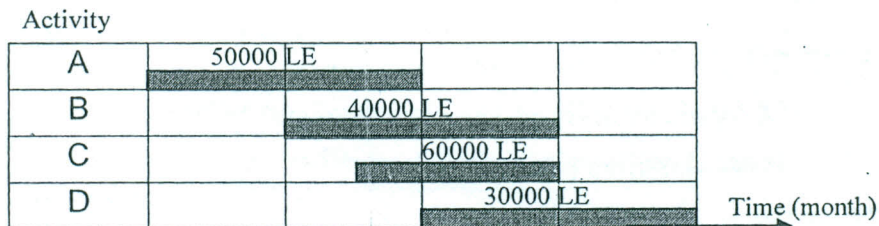
Table 1

Activity	Depends on	Duration	Resources
A	J, B, E	4	6
B	-	4	5
C	D	4	4
D	-	4	3
E	-	3	3
F	C	3	2
G	H, I	4	3
H	C	4	5
I	F	5	3
J	H	4	4
K	I, J, F	5	2
L	G, D	3	4
M	K	6	5
N	B, A	2	1

a. Determine the activities' timing (اوقات الأنشطة) and the project completion time. Calculate activities' free and total floats and mark the critical path (حدد المسار الحرج). (14 marks)

b. Determine the schedule timing of the activities so that the weekly resource usage (الإستخدام السبوعي) dose not exceed 6 units (لا يزيد عن 6 وحدات) at any time period. (18 marks)

Question 2: (22 Marks)



A simplified project is shown in the above figure. The direct costs associated with the individual activities are shown above the bars. It is assumed that project indirect cost will amount to LE5,000 monthly. The contractor included a profit mark-up of LE10,000 to his bid so that the total bid price was LE210,000. The

owner retains 10% of all validated progress payments until one half of the contract value (i.e. LE105,000). The progress payments will be billed at the end of the month (يتم دفع المستخلصات شهريا) and the owner will transfer the billed amount to the contractor's account 30 day later (يؤخر المالك دفع المستخلص لمدة شهر).

- a. Draw the income, expense and net cash flow curves (ارسم منحنيات المصروفات، الدخل و التدفقات النقدية الصافية). (13 marks)
- b. Find the highest amount of cash (أعلى قيمة نقدية) the contractor needs and the month in which this amount is needed? (2 marks)
- c. Calculate the financial charge (تكلفة الإقتراض) if the interest rate is 12% per year. (7 marks)

Question 3: (19 Marks)

- a. Determine whether the following statements are True () or False (X): (7 marks)
1. The amount of information that a project manager knows about a project increases as the project moves towards completion.
 2. Dams, bridges, and highways would be classified (يمكن تصنيفها) as commercial building projects (مشروعات تجارية).
 3. Contract changes are more likely to occur on a single fixed price contract than on a cost plus a fee contract.
 4. The project duration represents the sum of the durations of all activities of the project.
 5. As project moves on in time (يتقدم), the ability to change the project becomes more difficult and more expensive.
 6. Loading of rates (تحميل الأسعار) would be risky for the contractor if the price of an item is reduced and the quantity of this item increased during construction.
 7. Activity total float is calculated as the (Late finish – Early start – Duration)
- b. Complete the following sentences: (12 marks)
- 1- Construction Management concerns (تختص بـ) with controlling:, & of construction.
 - 2- Turn-Key projects are generally more risky (أكثر خطورة) to the
 - 3- Typical and well-defined (المعرفة جيدا) building projects are often constructed based on type of contracts.
 - 4- A drawback (أحد عيوب) of a “cost plus a fixed-fee” contract is that
 - 5- Main characteristics (الخصائص الرئيسية) of a project are:, and
 - 6- Construction projects are classified (تصنف) based on:, and
 7. Free float is defined as
 8. Contract price (سعر العقد) = +
 9. Contracts are classified based on, and divided intocontracts &contracts

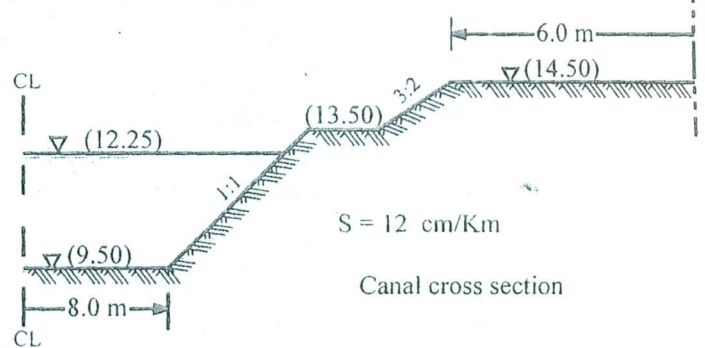
Design of Irrigation Structures (I)

- All sketches should be clear, neat and well proportioned
- Any missing data may be reasonably assumed.

Total marks = 100
Two pages

QUESTION (1) (17 marks)

At the intersection of the roadway with a canal, a rolled steel joist bridge is to be constructed of 3 vents 4.5m each span. The canal cross section is shown in the figure. The following data are available:



- No heading up
- Roadway over bridge = 6.0 m
- Moving load = 60 tons lorry.
- Intensity of uniformly distributed L.L = 400 kg/m².

It is required to;

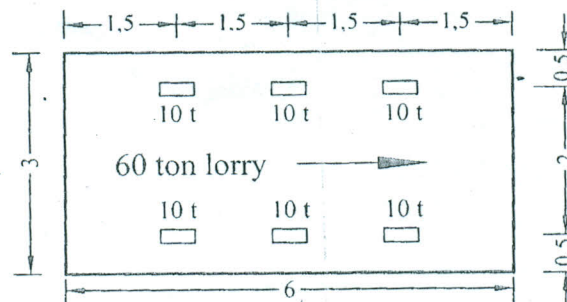
- 1- Design of main planks and cross girder. (7 marks)
- 2- Calculate the factor of safety for components of the screw pile, given P=20 t (from bridge), d = 30 cm, D = 100 cm, penetration depth = 5 m bearing capacity at ground level = 1.5 Kg/cm², $\gamma_s = 1.8 \text{ t/m}^3$, $\phi = 25^\circ$. F_{all} for concrete = 60 kg/cm². (4 marks)
- 3- Draw fully dimensioned sketches for P.H.E.R of the structure. (6 marks)

QUESTION (2) (18 marks)

- a) State with neat sketches types of escapes and their functions. (4 marks)
- b) At the end of canal, a Tail Escape (square well) is required to be constructed to escape the excess water from the canal to a branch drain provided that the water level in the canal does not exceed 20 cm. Following data are available.

	<u>Canal</u>	<u>Drain</u>
Bed width	3.0 m	4.0 m
Bed level	(9.50) m	(6.75) m
High water level	(11.00) m	(8.75) m
Berm level	(11.30) m	(10.80) m
Bank level	(12.30) m	(12.30) m
Bank width	6.0 m	8.0 m
Side slopes	1:1	3:2
Water surface slope	10 cm / Km	9 cm / Km

1. Give a complete design for the elements of the structure. (Length of last reach = 3.0 Km) (10 marks)
2. Draw fully dimensioned sketches for Sectional Elevation of the structure. (4 marks)

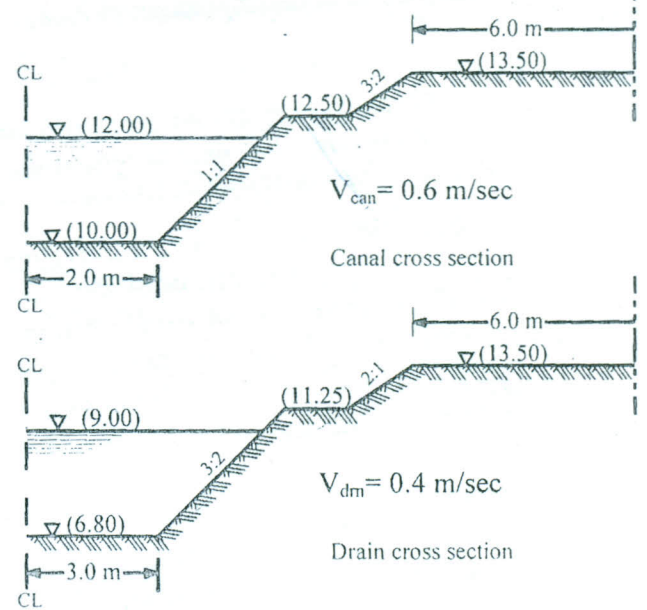


QUESTION (3)

(28 marks)

a) A straight two vent 2 x 2 m R.C syphon is to be constructed at the intersection between the given drain and canal, this syphon provided to **intermediate escape** (through the right berm only) to escape the excess water. If the escape discharge = 10% from draining discharge. It is required to;

1. **Design** the syphon hydraulically. **(7 marks)**
2. What are the cases of loading acting on the syphon, **show** the critical ones on the different cross sections of syphon and the affecting loads on it. **(8 marks)**
3. **Draw** the U.S section elevation of the syphon. **(5 marks)**

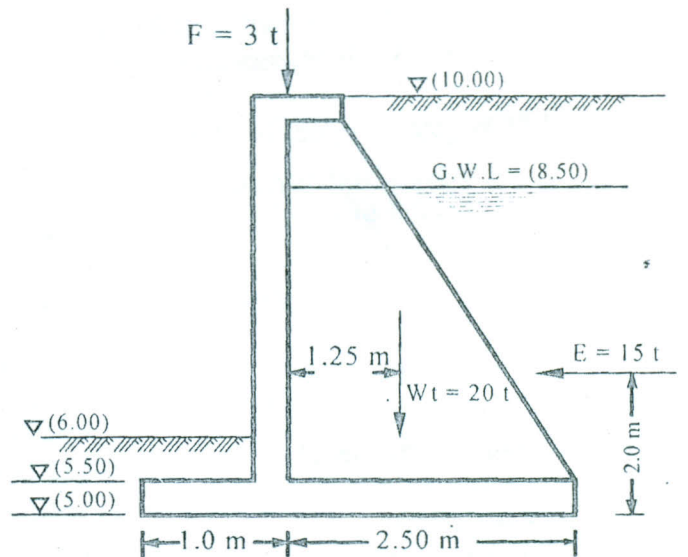


b) The alternative for the syphon in **Question (3-a)** is aqueduct without intermediate escape, two vent R.C box type. It is required to, **design** the vents (**open channel hydraulic system**) and determine location of supports for aqueduct part. **(8 marks)**

QUESTION (4)

(20 marks)

- a) Give the empirical dimensions of all elements of the Arch Bridge used net sketch. **(5 marks)**
- b) The given figure shows a R.C counterfort type retaining wall. The allowable bearing capacity of the soil is 1.5 Kg/cm² and sliding coefficient $\mu = 0.5$. It is required:
 - 1- **Check** the wall stability against sliding, overturning and stressing. **(10 marks)**
 - 2- **Show** how you can design the horizontal slab and in this wall, show it's of Reinforced details. **(5 marks)**

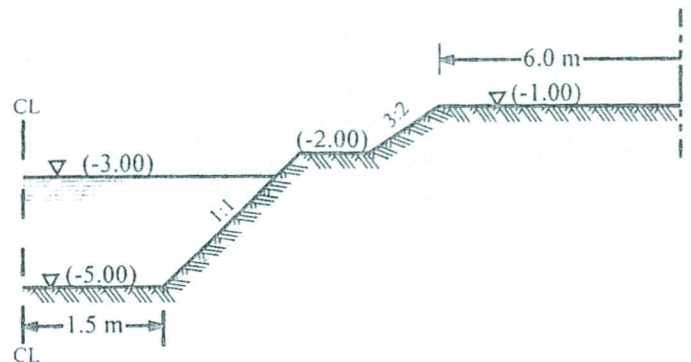


QUESTION (5)

(17 mark)

A R.C. bridge providing **zero heading-up**, was proposed to pass a road 9.0m wide across a canal whose discharge is 5.0 m³/sec and the canal cross section is shown in the figure. It is required:

- 1- **Choose** span of the bridge, **calculate** the **maximum bending moment** for **superstructure**. **(12 marks)**
- 2- **Draw** **sectional side view** for bridge. Live loads are 600 kg/m² and 60 ton lorry. **(5 marks)**



With Best Wishes
Dr. Mohammed Gamal

Dr. Sany Khalaf