Kafr El-Sheikh University Faculty of Engineering Civil Engineering Dept Final term exam Examiner: Associ. Prof. M. El-Enany		Design of Irrigation structures I(CES3221) Third year Civil Date: May 2018 Time : 4 hour Full mark : 150 marks

- Any missing required data can be reasonably assumed — مسموح بالجداول و المنحنيات
- Neat sketches and systematic calculations are vitally considerable. — الامتحان من صفحتين

Problem No. (1) [35 marks][a6, a13, b2, b14, c3, c10, c15]

Design the **counfort** of the counterforted R.C. **wing** wall for the case of loading shown in Fig. (1), distance between the counterforts = 2.5m

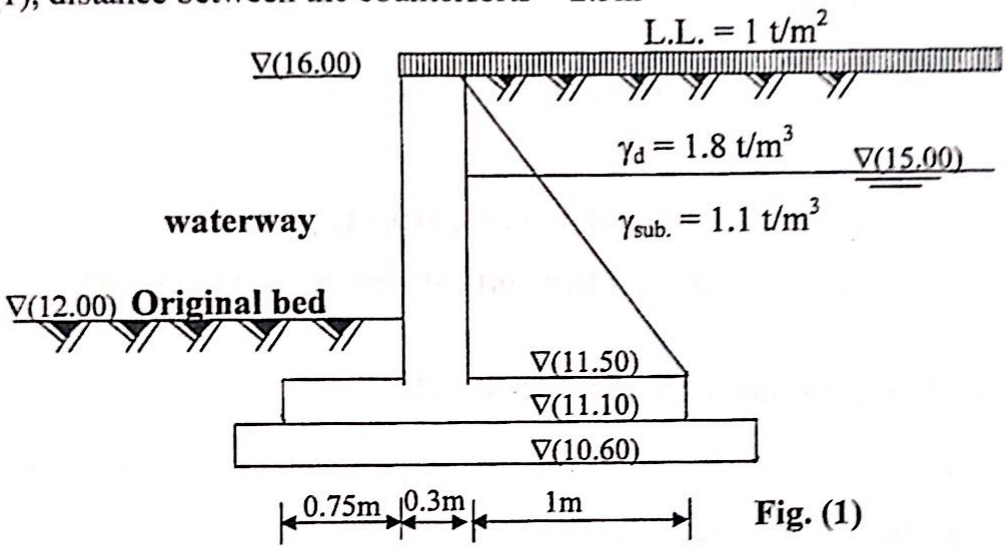

Fig. (1)

Problem No. (2) [70 marks] [a13, b2, b14, b15, c3, c10, c15]

A **crossing structure** is required to be constructed at the intersection of two waterways, where the crossing structure is **steel pipe(s) according to** the following data:

Item	Waterway (1)	Waterway (2)
Discharge	4.5 m^3 /sec.	9 m^3 /sec.
Bed width	5m	9m
Bed level	(7.00)	(5.00)
Water level	(8.35)	(6.50)
Berm level	(9.00)	(9.50)
Bank level	(10.50)	(10.50)
Bank width	6m	8m
Side slopes	3:2 and 2:1	1:1 and 3:2

باقى الأسئلة فى الخلف

Problem No. (2) [Continued]

It is required to:

a) design the crossing structure (steel pipe(s)) **hydraulically.** [15 marks]

b) calculate the **thickness** of the **culvert part** **(steel pipe(s))** of the crossing structure for the case of **crossing structure is full and the other waterway is empty**, the foundations of the culvert part are **seats**, $\gamma_{Sub.} = 1.1$ t/m^3 , $\gamma_d = 1.8$ t/m^3 , 70 t trailer is considered

c) draw to reasonable scale **sec. elevation** of the crossing structure [20 marks]

Problem No. (3) [20 marks] [a13, b2, b14, b15, c3, c10, c15]

Explain, with neat sketches, the steps of **hydraulic design** of the **tail escape**.

Problem No. (4) [30 marks] [a13, b2, b14, b15, c3, c10, c15]

A R.C. **Bridge** of **slab type** is required to be constructed at the intersection of a **waterway** and **a railway** according to the following data:

waterway characteristics:

Bed width = 8m , bed level = (10.00) , water level = (12.00) , berm level = (12.50)

Side slopes = 1:1 and 2:1, road level = (13.25), road width = 6m, discharge = 8 m^3 /sec.

railway characteristics:

level = (13.25), railway is **two-way**

It is required to :

a- design the bridge hydraulically [15 marks]

b- design the slab of the bridge. [15 marks]

GOOD LUCK