Kafr El-Sheikh University Faculty of Engineering Civil Engineering Dept Final term exam	Design of Irrigation structures I Third year Civil Date: May 2016 Time : 4.hour

- Any missing required data can be reasonably assumed
- Neat sketches and systematic calculations are vitally considerable.

الامتحان من صفحتين

Problem No. (1) [40 marks]

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

Canal 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.

Roadway characteristics:

Road width = 8m with 2 side walk each of 1m, road level = (13.25)

Laods : 60 t lorry. **It is required to** :

a- design the bridge hydraulically [10 marks]

b- design the slab of the bridge. [10marks]

c- check the stability of the bridge **pier** for the case of **max. eccentricity** [20 marks]

Problem No. (2) [55 marks]

A steel pipe syphon is to be constructed at the intersection of two waterways according to the following data, where the pipe(s) is supported on **continuous footing**. It is required to:

Item	Waterway (1)	Waterway (2)
Discharge	3.5 m^3 /sec.	8 m^3 /sec.
Bed width	3m	8m
Bed level	(5.95)	(4.00)
Water level	(7.25)	(5.40)
Berm level	(7.60)	(7.60)
Bank level	(8.60)	(8.60)
Bank width	6m	8m
Side slopes	1:1 and 3:2	3:2 and 2:1

باقى الأسئلة فى الخلف

Problem No. (2) [Continued]

a) give the hydraulic design of the syphon considering only **inlet**, **friction** and **exit** losses.

b) design the pipe section in the **syphon part** of the siphon for the case of syphon **full** and waterway above the syphon is **empty**, [23marks]

$\phi = 30^{o}$, $\gamma_{dry.}$=1.8 t/m^3, $\gamma_{sub.}$=1.1 t/m^3

c) draw to suitable scale sectional elevation of the syphon showing all levels and dimensions. [20 marks]

Problem No. (3) [25 marks]

Explain, with neat sketches, the steps of **design** of the **cross girder** of a **rolled steel joist bridge** having timber floor, 20 t lorry is considered.

Problem No. (4) [30 marks]

A tail escape is required to be constructed at the end of a canal to escape the excess of water into a drain, Fig.(1). The length of the last reach of the canal is 1.8 km. The discharge through the canal is 3.50 m^3/sec. Friction coefficient of the pipe (λ) = 0.025

It is required to design **hydraulically** the tail escape (orifice, well and pipe)..

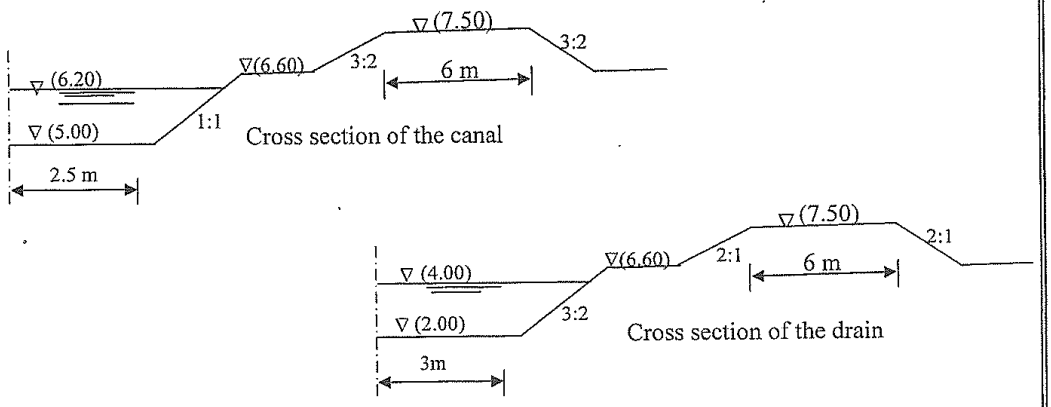

Fig.(1)

GOOD LUCK