Kafr El-Sheikh University Faculty of Engineering Civil Engineering Dept Final term exam		Design of Irrigation structures I(CES3221) Third year Civil Date: 14 June 2021 Time : 4.hour Full mark : 150 marks

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

Problem No. (1) [60 marks]

A R.C. **Bridge** of **slab on M.G only** is required to be constructed at the intersection of a **waterway** and **a roadway** according to the following data:

waterway data: Bed width = 8m , bed level = (10.00) , water level = (11.50) , berm level = (12.25), Side slopes = 1:1 and 2:1, road level = (13.25), road width = 6m

R.C. bridge data: spacing beween M.G. = 2m, two side walks each of width 1m , **two vents** each of span = 3m, P.C. pier of width = 1m, slab thickness=**30cm**, girder dimension: depth = 80cm, width = 30cm

roadway data: level = (13.25), width = 10m, **70 t lorry** is considered. It is required to:

a- Design the slab of the bridge. [10 marks]

b- Calculate the maximum moment and shear acting on the M.G. [20 marks]

c- Draw to suitable scale **section elevation** of the bridge [30 marks]

Problem No. (2) [40 marks]

A **steel pipes syphon (each of diameter = 1.4m, thickness = 1.5cm)** is required to be constructed at the intersection of two waterways, according to the following data:

Item	Waterway (1)	Waterway (2)
Discharge	4 m^3 /sec.	9 m^3 /sec.
Bed width	4 m	10 m
Bed level	(7.00)	(4.00)
Water level	(8.50)	(6.00)
Berm level	(9.00)	(8.50)
road level	(10.00)	(10.00)
road width	6m	10m
Side slopes	1:1 and 3:2	3:2 and 2:1

باقى الأسئلة فى الخلف

Problem No. (2) [Continued]

It is required to:

a) Design the syphon **hydraulically.** [19 marks]

b) Check the thickness of the steel pipe for the **syphon part** of the **syphon (foundation is continuous).** [21 marks]

$\gamma_{Sub.} = 1.1\ t/m^3$, $\gamma_d = 1.8\ t/m^3$, $\Phi = 30^o$

Problem No. (3) [28 marks]

Explain, with neat sketches, the **design steps** of the **bridge part** of R.C. box **Aqueduct** in both directions (transverse (plan of cross section) and longitudinal directions.

Problem No. (4) [37 marks]

Design the R.C. wall (stem, heel and toe) for the case of loading shown in Fig. (1).

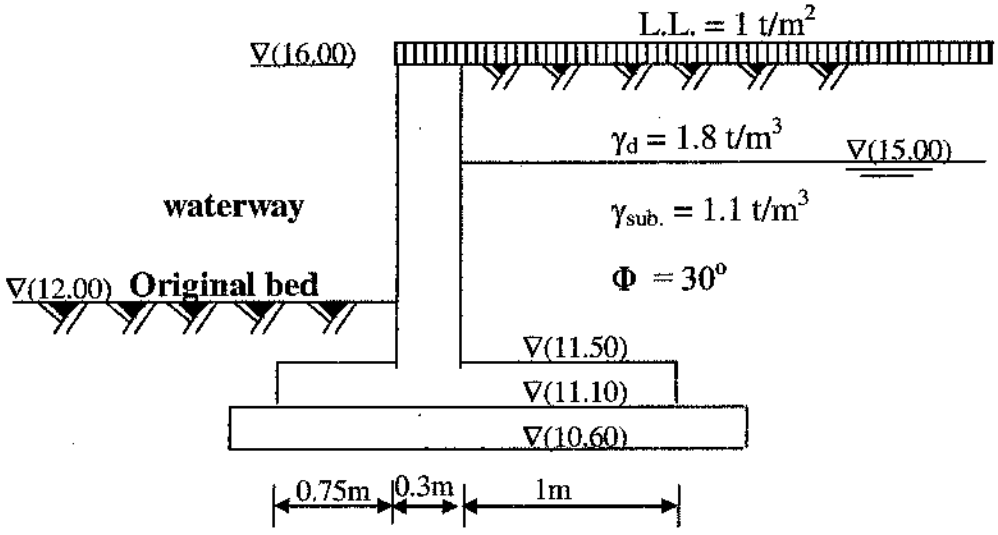

Fig. (1)

GOOD LUCK