Menoufiya University		Postgraduate: Master
Faculty of Engineering,		Subject: : Dam Engineering
Shebin El-Kom		Code No.: CVE 637
Dep.:Civil Engineering Department	Minufiya University	Date:18/08/2020
Semester: Second		Time Allowed: 3.0 hrs.
Academic year:2019-2020		Total marks:100

Solve the following questions, Any Missing Data Can Be Reasonably Assumed.
Illustrate your answer with neat sketches. Answers should be organized, concise and readable.

Question (1)   (15 marks)

A) What are the causes of failure of Earth Dams?   (3 marks)

B) What are the forces acting on Dams?   (3 marks)

C) What is the classification of Dams?   (3 marks)

D) What are basic criteria should be satisfied on safety for earth Dams? (3 marks)

E) What is the function of :   (3 marks)

   1- Dry rubble masonry.

   2- Cut-off wall.

   3- Inspection galleries inside High Dams.

Question (2)   (25 marks)

Table (1) illustrates the relation between the surface water levels upstream a dam and both the volume of the stored water and the out flow discharge.

The ordinates of an inflow hydrograph to the reservoir during a certain period is given in table (2).

Table (1) Data required to solve the problem.

Water level(m)	24	27	32	37	42	44	46	48	50
Volume of stored water (million cu-m)	0	2.21	11.31	28.21	55.9	69.03	92.17	128.31	178.1
Outflow discharge (cu-m/sec)	0	0	0	0	0	130	300	500	780

Table (2) Data required to solve the problem.

Time (day)	0	1	2	3	4	5	6	7	8	9	10
Inflow discharge (cu.m/sec)	26	45.5	300	845	930	500	286	170	105	78	58.5

Assuming that the surface water level pre-flood = (42.00) m, i.e. at time t=0 , it is required to:

(a) Draw both the inflow and the outflow hydrographs.

(b) Calculate the maximum water level, flood peaks of the routed flood and the reservoir lag.
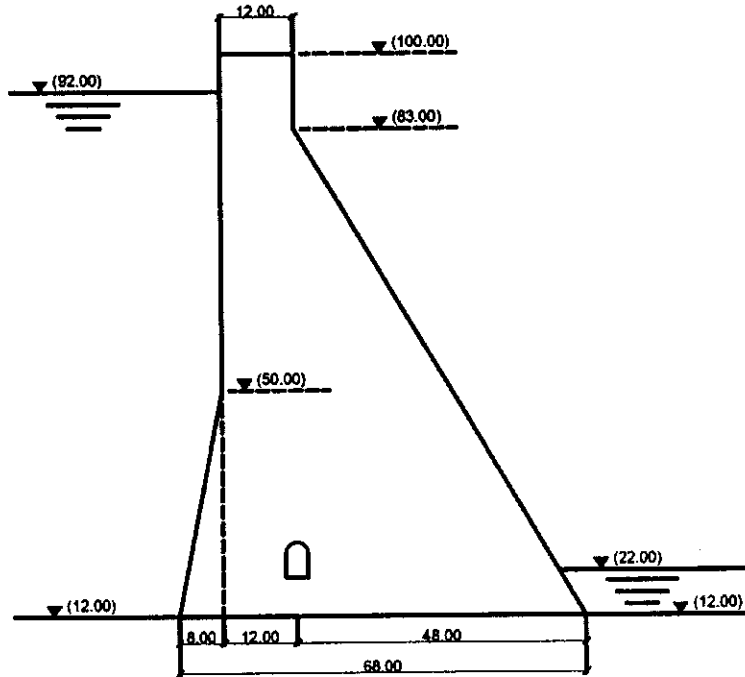
Question (3)   (25 marks)

For the shown dam it is required to calculate the following:-

   1. The Major principles at the toe.

   2. The intensity of shear.

3. The sliding factor.
4. The shear friction factor
5. Recalculate with horizontal earthquake in case of empty reservoir.

Data: $\gamma_m = 2.4 \text{ t} / \text{m}^3$

μ (coefficient of friction) = 0.75

q_{av} (average shear strength) = 14 kg / cm^2

α (earthquake factor) = 0.1

Question (4)   (35 marks)

Design a concrete gravity dam for the following data:
- Maximum water level = (237.00).
- Road level for dam = (245.00).
- Reservoir level of bottom of dam = (125.00).
- Maximum allowable compressive stress in concrete = 30 kg/cm^2.
- Specific gravity of concrete = 2.4 ton/m^3.

With My Best Wishes

Prof. Mohamed Sobeih

This exam measures the following ILOs								
	Q1-A,C	Q3	Q4				Q1-E	Q3
	MK1	MK3	MK2				MP1	MP4
	Knowledge &Understanding Skills						Professional Skills	