



Subject: **Hydraulic Structures**  
Class: **Fourth year**  
Examiner: **Prof. Dr.Saleh I. Khassaf**

Exam: Final  
Time: Three hours  
2<sup>nd</sup> attempt/2017- 2018

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Attempt **all questions**

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**Note: Assume a suitable value if you need to solve any problem.**

**Q.1] given a head regulator of the following data:**

**Discharge=35cumecs,upstream water level=29.53m,upstream bed level=26.35m, downstream water level=29.28m, downstream bed level=26.35m,lnegth from upstream edge of floor to the gate=20m, length from gate to downstream end floor is 60m.**

**A- Find the clear water way of the regulator, neglect the velocity head take  $C_d=0.92$  .**

**B- If we used sill under the gate with crest level 0.6m above the bed level of the canal, find the clear water way with neglect the velocity head , take  $C_1=0.577$ ,  $C_2=0.8$  . (20%)**

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**Q.2]Calculate the thickness of the plate in ( inch) for the sliding gate which has a height 3m and width 2m,using four division with  $f_s= 20000$ psi. (15%)**

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**Q.3] Find the thickness of concrete floor and draw the uplift pressure diagram using Lane's method, fig.(1), the head on the structure is 4m . Make a table of your results. (15%)**

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**Q.4] Find the properties of the hydraulic jump occur in a rectangular channel 10m wide and 60cumecs discharge, if the energy dissipated in the jump is 4.17 kg.m/kg . What is the suitable type of U.S.B.R. stilling basin . Sketch it (15%)**

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**Q.5] A concrete box culvert at two opening (2x3)m and (2x2)m. The total head of the structure is 0.2m with total length 30m. Find the discharge of the structure , if  $K_1=0.3$  ,  $K_2=1.0$  . sketch only the structure with the load diagram. (15%)**

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**Q.6] Answer of the following questions: (20%)**

**a- What are the difference between aqueduct and siphon.**

**b-What is the function of vertical drop, with sketch.**

**c-When the hydraulic structure failure by piping**

**d- what are the factors effecting on the selecting of the rip-rap. Sketch the protection of any hydraulic structures.**

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**With my best wishes**

**Prof. Dr. Saleh I. Khassaf  
Examiner**

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