Kafr El-Sheikh University	Open Channel Hydraulics (CES3119)
Faculty of Engineering	Final term exam.
Civil Engineering Dept.	Date: 6 January, 2019
Third year civil	Time : 3 hour
Examiner: Associ. Prof. Moustafa El-Enany	Full mark: **125** marks

Answer all the following five questions

Any other required data may be reasonably assumed. الامتحان مكون من صفحتين

Question No. (1) [20marks] (A5, B2,B14, C1)

Design a best trapezoidal hydraulic section shown in Fig. (1) to pass a discharge of 10 m^3/sec , n = 0.025

bed slope (S) = 10cm/km, $v_{min.}$ = 0.4m/sec

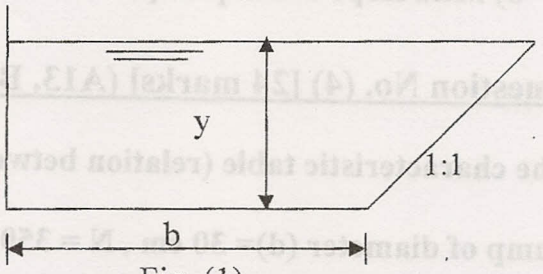

Fig. (1)

Question No. (2) [20 marks] (A5, B7,B14, C1)

A trapezoidal channel, of bed width of 10m and side slope = 1:1, carries a discharge of 45 m^3/sec at a depth of 2m. There is a transition to rectangular channel of bed width 6.5m. The transition is accompanied by lower the channel bed by a value of ΔZ. Calculate the value of ΔZ which does not cause the upstream to be chocked.

Question No. (3) [40 marks] (A13, B2,B7, C7)

a) A rectangular channel of bed width 30 m has a discharge of 60 m^3 /sec, bed slope of 0.006 and Manning coefficient, n = 0.02. A gate is located across the channel, where the gate opening is 0.4m and water depth just upstream the gate is 1.2m as shown in Fig.(2). It is required to classify the flow at:

1) 150m upstream the gate 2) 15m downstream the gate

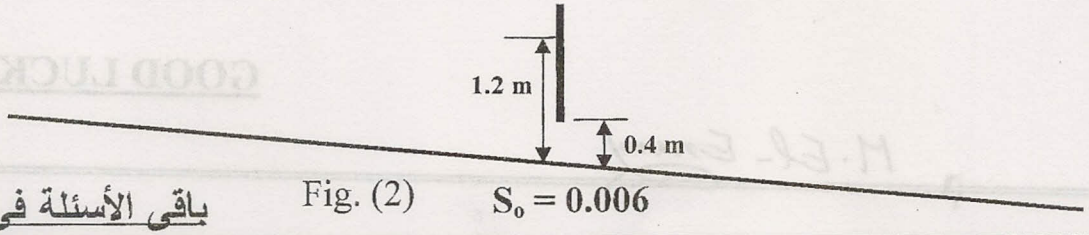

Fig. (2) S_o = 0.006

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Question No. (3) [continued]

b) **Sketch the water surface profiles of G. V. F. in the following changes in bed slopes:**

1) **Steep slope to milder steep slope** **[3 marks]**

2) **Critical slope to steep slope** **[3 marks]**

3) **Mild slope to steep slope** **[4 marks]**

Question No. (4) [24 marks] (A13, B2,B14, C1)

The characteristic table (relation between the head and the discharge) of a single pump of diameter (d)= 30 cm , N = 350 rpm is given in the following table:

Head (m)	30	27	24	18	12	6
Discharge (L/sec)	0	6.9	11.4	15.8	18.9	21.5

It is required to calculate the characteristic table for the following three cases:

a) **Three identical pumps connected in series, N = 400 rpm, d = 30cm. [8marks]**

b) **Two identical pumps connected in parallel, d = 35cm , N = 350 rpm [8marks]**

c) **A single pump of diameter (d) 40 cm, N = 300 rpm** **[8marks]**

Question No. (5) [21marks] A13, B2,B14, C1)

A newly designed dam is to be modelled in the laboratory and the reach of the river to be modelled is 18 km long, the length of the dam is 400 m, water depth is 20m and the maximum flood discharge is 4000 m^3 /sec. If the maximum laboratory discharge is limited to 1 m^3 /sec and the flume available for the model construction is 50 m long and 2 m wide and depth 1.2m. Determine the scale ratio for such study.

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