

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E –IIst SEMESTER–EXAMINATION – JULY- 2012

Subject code: 1721203

Date: 10/07/2012

Subject Name: Design of Canal Network & Regulation Works

Time: 10:30 am – 13:00 pm

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a)** Discuss the main causes of water logging and explain its different ill effects. **07**
(b) Give the design procedure for a trapezoidal lined canal when bed slope, side slope (or angle θ), rugosity coefficient N and B/D ratio are given. **07**
- Q.2 (a)** Explain the terms: Exit Gradient and Critical Exit Gradient. What is the importance of exit gradient in designing a hydraulic structure founded on the permeable soil? **07**
(b) Design a lined canal to carry a discharge of 110 cumecs. Take B/D ratio as 6.5, $N = 0.018$, side slope = 1.25:1 and bed slope = 1/4000. **07**

OR

- (b)** Work out the expenditure justifiable for lining canal 50 km long and of 80 cumecs capacity with 9.5 m bed width and 3.6 m depth with side slope of 1.25:1. Ignore other benefits accruing from lining. Consider the cost of construction of lining at the rate of Rs. 1200/m² of wetted perimeter. Given the absorption loss in lined canal $K = 0.35Q^{0.058}$ cumecs/Mm² of wetted perimeter and that of in unlined canal, $K = 1.6 Q^{0.620}$ cumecs/Mm² of wetted perimeter. The expected rate of interest in the project is 8.5%. Assume the life of lining as 60 years and the cost of water saved by lining is Rs. 5.5 lacs/cumec. **07**
- Q.3 (a)** Distinguish between: **07**
(i) Aqueduct and Siphon aqueduct,
(ii) Siphon aqueduct and super passage.
- (b)** Explain the canal transition. State the different methods of canal transition and describe in detail any one of them. Design a canal transition for the following data: **07**
(i) Length of the flume = 15 m
(ii) Width of the throat = 10 m
(iii) Width of canal = 16 m.
Use Mitra's method for canal transition.

OR

- Q.3 (a)** What is in-situ concrete lining? How the sub grade for the concrete lining is prepared? Give I.S.456-1978 Recommendations for cement concrete lining. **07**
(b) State the functions of canal outlets. Discuss the different requirements of good outlets. **07**
- Q.4 (a)** What is the necessity of canal falls? Discuss different factors for selecting the location of a fall. **07**
(b) State the different design criteria for open drains. **07**
An open drain is to be designed for an area of 500 ha. If the drainage coefficient is 5.5 cm/day, determine the capacity of the drain required and a suitable section. Take side slope as 1:1. Use Lacey's formula taking $f = 1.1$.

OR

- Q.4 (a)** Explain Khosla's method of independent variables. **07**
(b) Fig.1 shows the section of a weir founded on permeable soil with $G_E = 1/7$. Find the pressures at key points E_3 and D_3 . Check the safety of this structure against the exit gradient consideration. Use given Khosla's curve. **07**
- Q.5 (a)** Write a note on Inverted Filters. Explain the scour depth. **07**
(b) For the hydraulic structure shown in Fig.2, determine the location of point-P where the hydraulic jump forms. Find out the water surface R.L. at this point and write the procedure for plotting the pre jump profile for this structure. Take intensity of flow = 10 cumecs/m. Use Blench and Montague's curves. **07**

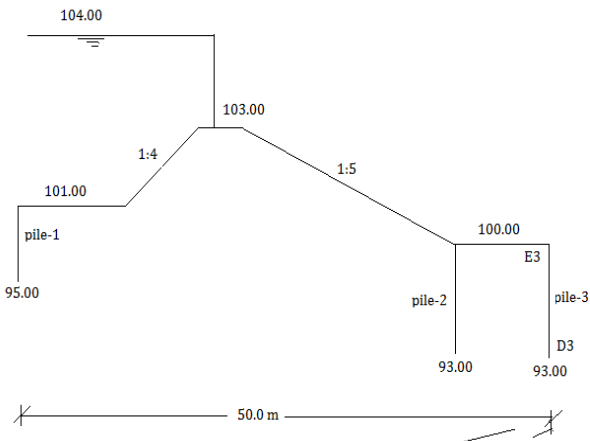
OR

Q.5 Write Short Notes (Any Four):

14

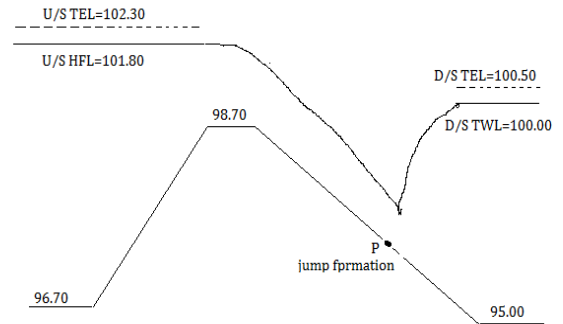
- (i) Canal regulation works and their functions.
- (ii) Sediment control in off taking canals.
- (iii) Draw backs in Kennedy's and Lacey's theory.
- (iv) Sloping glacis weir.
- (v) Design of vertical drops by Bligh's empirical formulae.

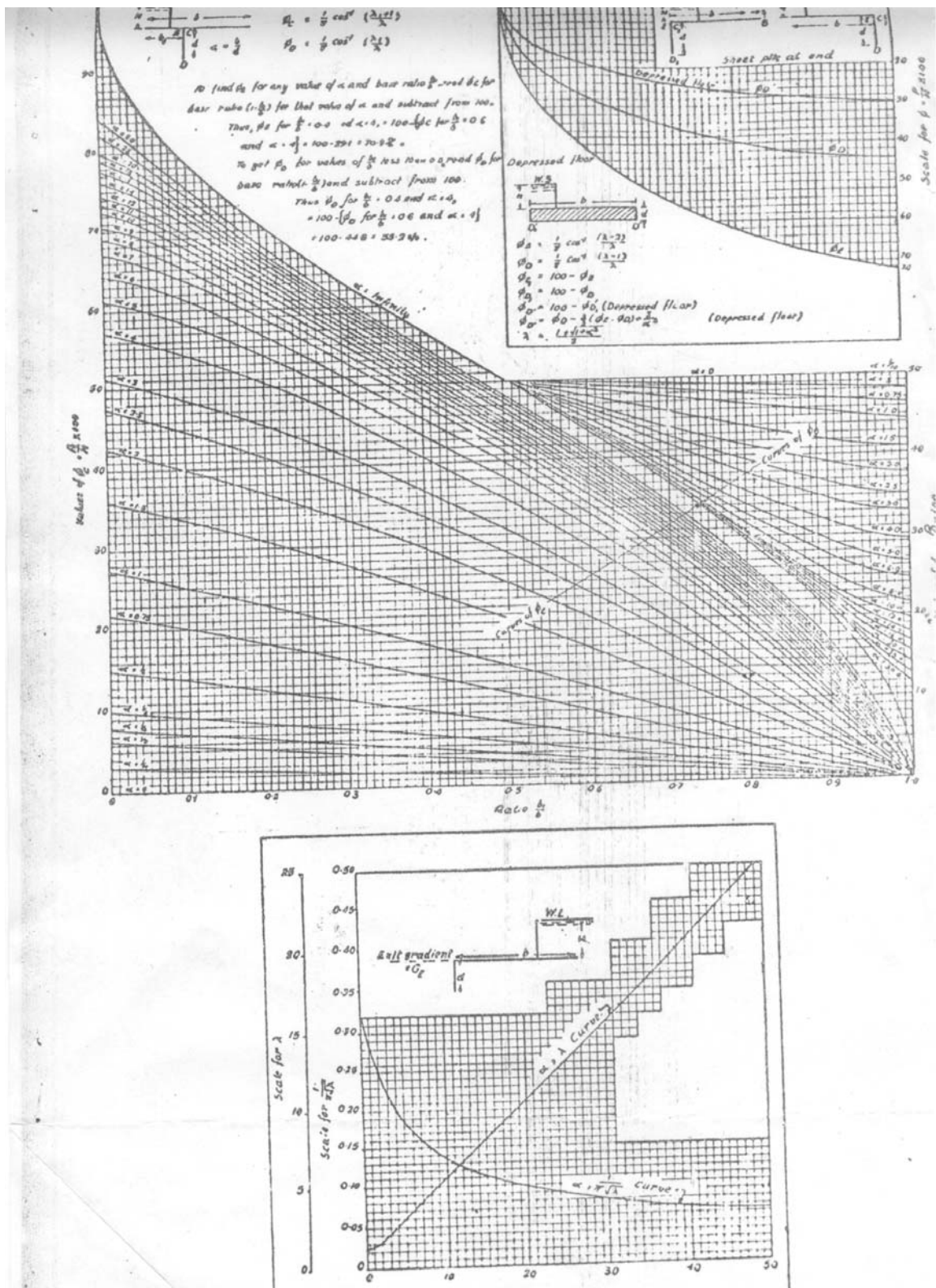
Fig.1 Q.4(b)

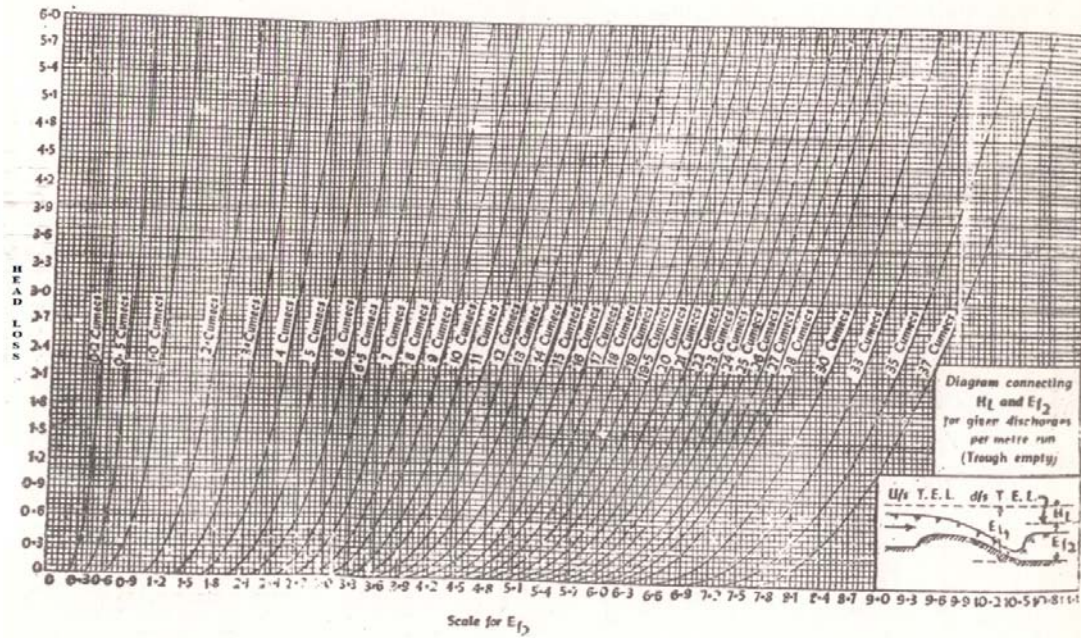


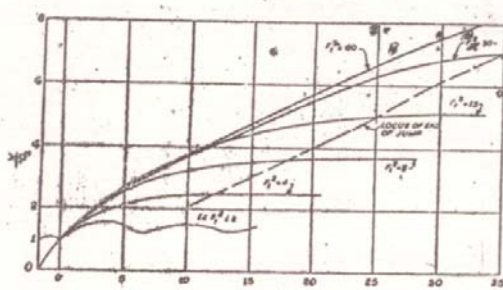
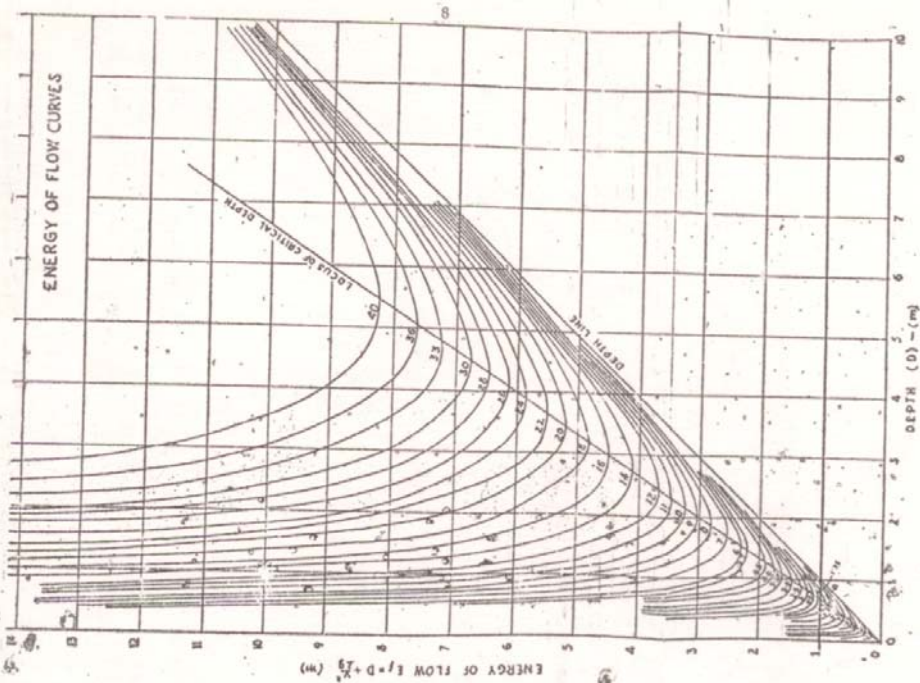
Figures are not to scale

Fig.2 Q.5(b)









HYDRAULIC JUMP & ENERGY DISSIPATION