Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – SUMMER • 2014

Subject code: 1721203 Date: 20-06-2014

Subject Name: Design of Canal Network and Regulation Work

Time: 02:30 pm - 05:00 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)** Name different types of lining done on the channels. What are the factors that influence the choice of a particular type of lining? **07**

(b) What is meant by regime of a river? Compare briefly the silt theories of Kennedy and Lacey. **07**

Q.2 **(a)** Explain the term Outlet. What are the essential requirements of a good outlet? **07**

(b) Design an irrigation canal by Laceyôs theory for the following data: **07**
F.S.D = 14 m^3/sec, f = 1, Side slopes ½ : 1 (Horizontal : Vertical), Coefficient of rugosity N = 0.0225

OR

(b) An irrigation canal has been constructed with following parameters: **07**
Full supply discharge = 45 cumec
Bed width = 30 meter
Full supply depth = 1.8 meter
Side slopes = ½:1
Bed slope = 1 in 6600
Manningôs N =0.0225
Critical velocity ratio = 1
Check whether the section designed satisfies Kennedyôs theory.

Q.3 **(a)** State the different causes of failure of weirs founded on permeable soils with remedies. **07**

(b) Design a concrete lined channel to carry a discharge of 200 cumec at a slop of 0.1 per 1000. The side slopes of the channel are 1.25 : 1 and N may be taken as 0.016 Velocity = 1.4 m/sec **07**

OR

Q.3 **(a)** Explain Laneôs weighted creep theory. **07**

(b) Determine the most efficient cross-section of a trapezoidal canal to carry the water at the rate of 15 cubic meter per second. To prevent scouring the maximum velocity is not to exceed 1 meter/second. The side slope of the canal 2:1(Horizontal : vertical). Take C = 60 , determine bed slope for the canal. **07**

Q.4 **(a)** What corrections are required in determining seepage pressure by method of independent variables **07**

(b) Two sheet piles of unequal length are provided at two ends below an impervious floor of 12 m length. Total head created on the floor is 2 m. Using Khoslaôs method of independent variables calculate uplift pressures at the junction of inner faces of both piles with the floor. Take upstream pile 3 m deep and downstream pile 4 m deep. **07**

OR

Q.4 **(a)** State the design criteria for Head Regulator and explain the same by giving neat figure. **07**

(b) A horizontal apron of 16 m length a sheet pile is provided at 12 m distance from the upstream end. The sheet pile is of 4 m depth. The weir on the floor stores water upon 3 m height. Calculate uplift pressures at both faces of the sheet pile just below the floor and also at lower end of the sheet pile. **07**

Q.5 **(a)** Distinguish between: **07**
(i) Aqueduct and Siphon aqueduct,
(ii) Siphon aqueduct and super passage.

(b) Design a straight glacis fall on the branch canal with following particulars: **07**

Full supply discharge $\frac{u/s}{d/s}$ =14.5 cumec

Full supply level $\frac{u/s}{d/s} = \frac{40.00}{39.10}$

Full supply depth $\frac{u/s}{d/s}$ =1.40 m

Bed width of canal $\frac{u/s}{d/s}$ =9.2 m

Permissible exit gradient = 1/7

Calculate (1) crest dimensions (2) cistern dimension (3) Cut-off .

OR

Q.5 **(a)** What is the necessity of canal falls? Discuss different factors for selecting the location of a fall. **04**

(b) Design a siphon aqueduct with the following data: **10**

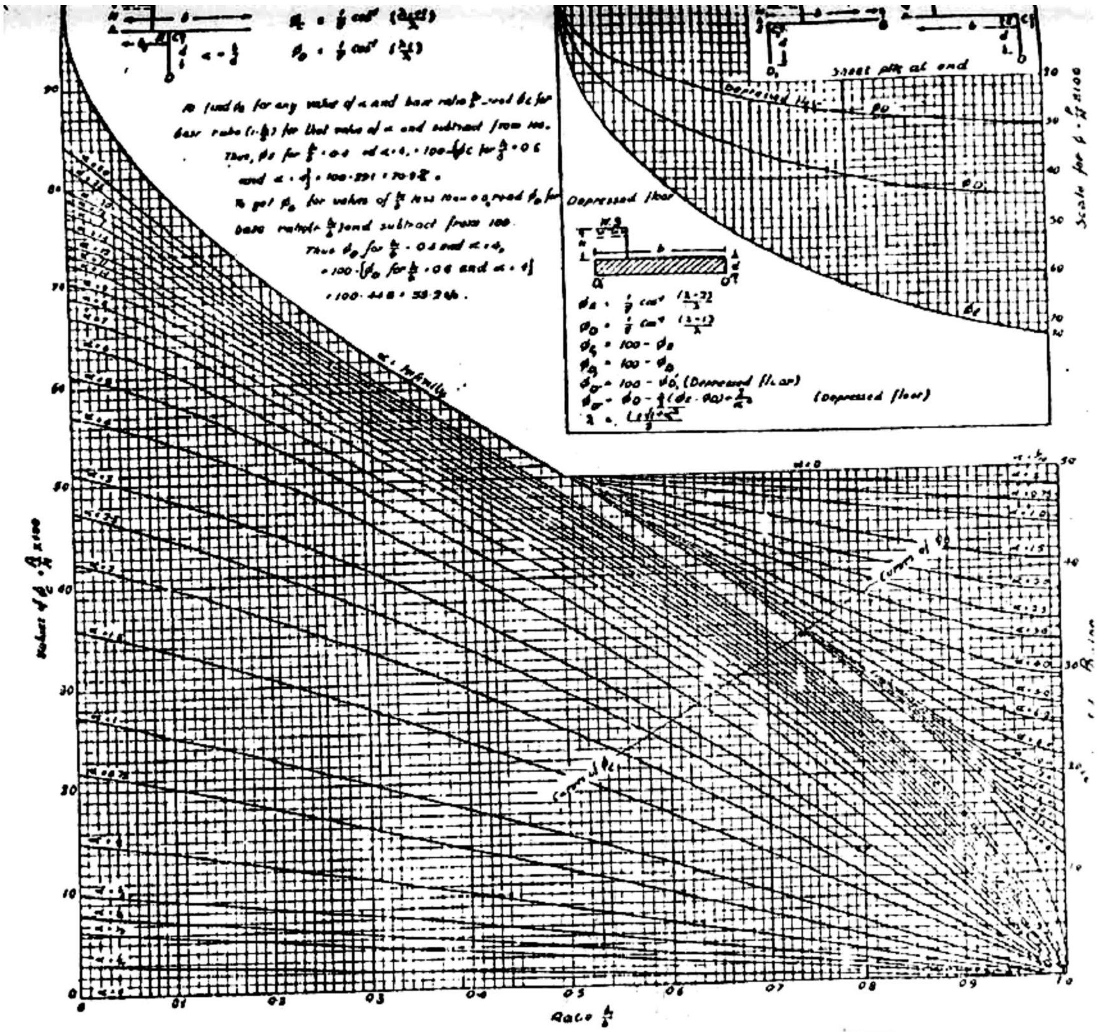
(1) Canal :

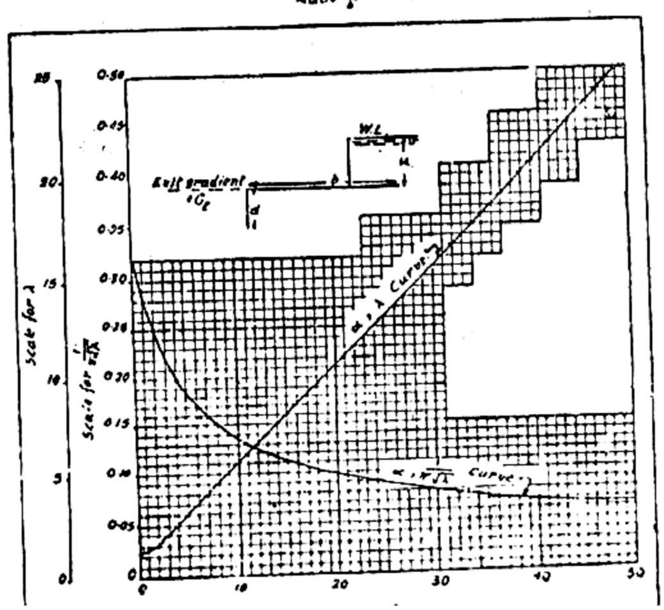
Discharge	20 cumec
Bed width	18 m
Depth of water	1.30 m
Bed level	250 m

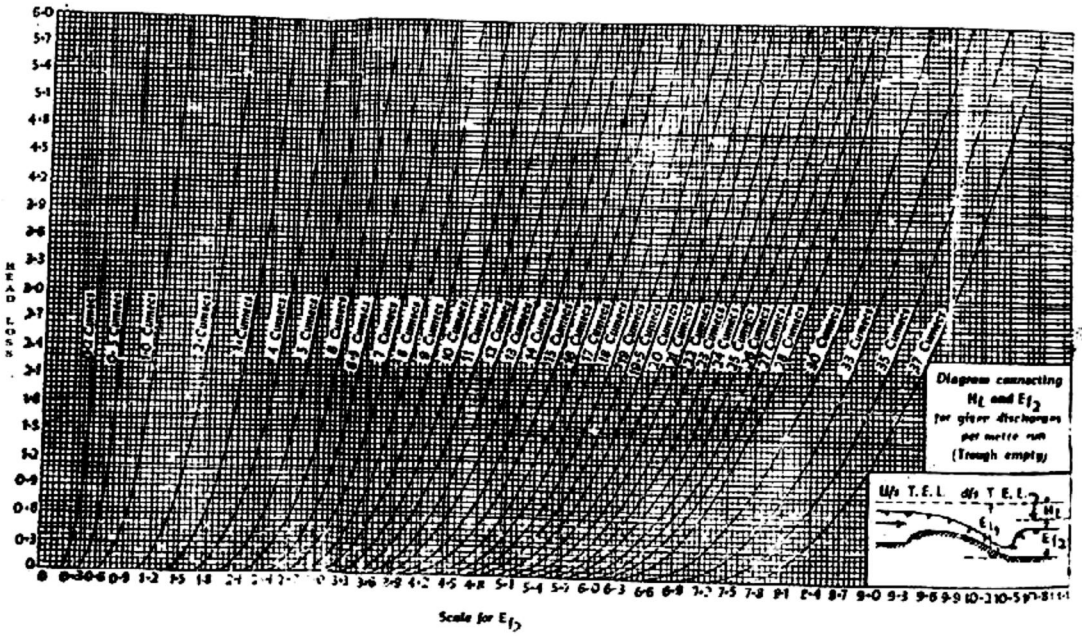
(2) Drainage:

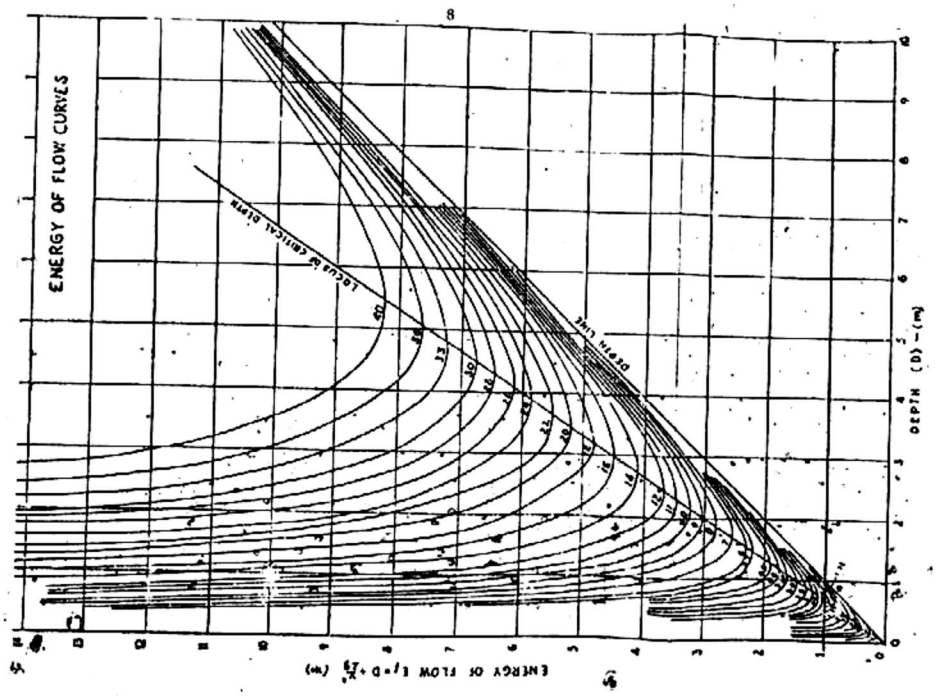
High flood discharge	200 cumec
High flood level	250.70 m
Bed level	248.50
General ground level	250.00 m

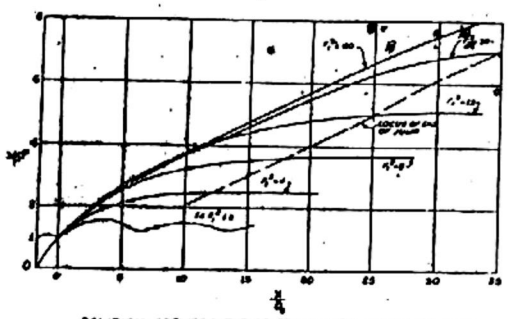
Calculate: (1) drainage water way .(2) canal water way (3) head loss and bed level at different sections (4) transitions


Sheet pile at end
Depressed floor
(Depressed floor)
Scale for $\frac{1}{\pi\sqrt{\lambda}}$


Exit gradient
Scale for λ
α, λ Curve







RELATION BETWEEN THE LENGTH AND THE HEIGHT OF JUMP

HYDRAULIC JUMP & ENERGY DISSIPATION

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