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10CV65

Sixth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Hydraulic Structures and Irrigation Design Drawing

Time: 4 hrs. Max. Marks:100

Note: ***Answer any TWO full questions from Part-A and any ONE question from Part-B.***

PART – A

1 a. Explain the various factors to be considered while selecting a site for a reservoir. **(07 Marks)**

b. The monthly yield of water from a catchment is given below. Determine the minimum capacity of the reservoir if the flow is drawn at a uniform rate assuming that there is no loss of water over the spillway. Use mass curve method.

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Inflow vol. in Mm^3	1.4	2.1	2.8	8.4	11.9	11.9	7.7	2.8	2.52	2.24	1.96	1.68

(08 Marks)

2 a. Explain step by step the analytical procedure to be adopted for analyzing the stability of gravity dams (Not step by step method). **(07 Marks)**

b. Following data were obtained from the stability analysis of a concrete gravity dam:
Total overturning moment about toe = 1×10^6 kN-m
Total resisting moment about toe = 2×10^6 kN-m
The vertical force above base = 5×10^4 kN
Base width of the dam = 50 m
Slope of the d/s face = 0.8 (H) : 1 (V)
Calculate the maximum and minimum vertical stress to which the foundation will be subjected to. What is the maximum principle stress at toe? Assume there is no tail water. **(08 Marks)**

3 a. What are the causes of failure of earth dams? Explain them along with relevant sketches. **(07 Marks)**

b. In a slip circle analysis of downstream slope of a dam during steady seepage. The section of the dam was drawn to a scale 1 cm = 5 m and the results obtained were :

Area of N - rectangle = 15.25 sq.cm
Area of T - rectangle = 6.50 sq.cm
Area of U - rectangle = 5.20 sq.cm
length of arc = 12.50 cm

The properties of the materials of the dam are :
Effective angle of friction = 26°
Unit cohesion = 0.20 kg/km^2
Unit weight of soil $\gamma = 2$ g/cm^2
Determine factor of safety for the slope. **(08 Marks)**

PART – B

4 An irrigation tank is provided with a surplus weir which has the following data:

i) Combined catchment area = 25.89 km^2
ii) Intercepted catchment area = 20.71 km^2
iii) Top width of bund = 2 m
iv) Side slope of the tank bund = 2 H : 1 V
v) Top bund level = 14.50 M
vi) Max. water level = 12.75 M
vii) F.T. L = 12.00 M
viii) Average ground level at the site of work = 11.00 M
ix) Saturation gradient with 1 m clear cover = 4 : 1
x) Hard soil is available for foundation at = 9.5 m
xi) Coefficient in Ryve's formulae for combined catchment = 9
xii) Coefficient for intercepted catchment = 1.5

Provide protection revetment wherever necessary. Assuming suitable data, wherever necessary design the body wall, wing wall and apron. **(25 Marks)**

Draw the following views:

a. Cross sectional elevation of weir **(15 Marks)**
b. Half plan at top and half plan at foundation **(20 Marks)**
c. Longitudinal section of weir. **(10 Marks)**

5 Design a tank sluice with a tower head with the following data:

i) Full supply discharge = 0.20 cumecs
ii) Tank bund top level = 40 m
iii) Ground level at site = 34.50 m
iv) Level of hard soil = 33.50 m
v) Top width of bund = 2 m
vi) Side slope of bund = 2 : 1
vii) Sill level of sluice = 34.00 M
viii) Thickness of barrelslab = 15 cm
ix) M.W.L of tank = 38.00 m
x) F.T.L of tank = 37.00 m
xi) Average low water level = 35.00 m

The details of the channel below the sluice are as under:

i) Bed level = 34.00 m
ii) F.S.L = 34.50 m
iii) Bed width = 1.25 m
iv) Side slope = 1½ : 1
v) Top level of bank = 35.50 m **(25 Marks)**

Assume any other details suitably. Draw to a suitable scale the following views:

a. Longitudinal section of sluice **(20 Marks)**
b. Half plan at top and half plan at foundation level. **(15 Marks)**
c. Cross-section across tower head and across barrel. **(10 Marks)**

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