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10CV65

Sixth Semester B.E. Degree Examination, June/July 2016
Hydraulic Structures and Irrigation Design - Drawing

Time: 4 hrs. Max. Marks:100

Note: 1. ***Answer any TWO full questions, from Part – A and any ONE question from Part - B.***
2. ***Assume missing data suitably.***

PART – A

1 a. Explain the graphical method for the determination of the required storage capacity of a reservoir when the demand is i) Uniform ii) Non - uniform. **(07 Marks)**

b. Write short notes on any two of the following : **(04 Marks)**
i) Flood control reservoir ii) Distribution reservoir iii) Multipurpose reservoir.

c. The construction costs for certain possible heights of a dam at a given site have been estimated and the storage capacity for all these dam heights are tabulated in the table below:

Sl.No	Height of the dam in meter	Construction cost in million rupees	Storage in million cubic meters
1	10	04	50
2	20	08	100
3	30	12	180
4	40	18	250
5	50	27	350
6	60	39	500
7	64	50	600

Determine the most economical height of the dam. **(04 Marks)**

2 a. Define Gravity dam. Explain with neat sketch the drainage galleries in gravity dam. **(06 Marks)**

b. Following data were obtained from the stability analysis of a concrete gravity dam : **(09 Marks)**
i) Total overturning moment about toe = 1.1×10^6 kN-m.
ii) Total resisting moment about toe = 2.1×10^6 kN-m.
iii) Total vertical force about base = 54,000 kN.
iv) Base width of the dam = 50m.
v) Slope of the D/S face = 0.8H : 1V.
Calculate the maximum and minimum vertical stress to which the foundation will be subjected to, what is the maximum principal stress at toe? Assume there is no tail water.

3 a. Explain the two different methods which are adopted for constructing earthen dams. Which of these methods would you prefer and why? **(06 Marks)**

b. What precautions and remedial measures would you undertake to control the seepage through, i) Earthen dam body ii) The dam foundation. **(09 Marks)**

PART – B

4 Design a surplus weir for the following data : Combined catchment area = 51km^2 ;
Intercepted catchment area = 46km^2 ; Top bund level (TBL) = 100.00m ;
Maximum water level (MWL) = 98.50 m ; Full tank level (FTL) = 97.5m ;
Average ground level at proposed site = 96.5m ; Top width of tank bund = 2m ;
Side slopes of bund on either side = 2:1 ; Level of hard strata for foundation = 95.00m ;
The ground level below the weir (D/S of weir) slopes to a level of 95.50m in a distance of about 6m.
Ryve's co-efficient C = 8 ; Modified Ryve's coefficient C = 2.5.
Provisions may be made to make Kutcha regulating arrangements to store water upto MWL in terms of necessity. **(25 Marks)**

Draw to a suitable scale the following views of the above designed surplus weir.

a. Cross section of weir. **(10 Marks)**
b. Draw half longitudinal section and half longitudinal elevation. **(15 Marks)**
c. Draw half plan at foundation and half plan at ground level. **(20 Marks)**

5 Design a canal regulator –cum – road bridge with the following particulars :
Hydraulic particulars of canal upstream : Full supply discharge = 20m^3/sec ;
Bed width = 15m ; Bed level = 20.0m ; Full supply depth = 2.0m ;
Full supply level = + 22.0m ; Top level of bank = + 23.0m.
The right bank is 5m wide and left bank is 2m wide.
Hydraulic particulars of canal downstream : Full supply discharge = 16m^3/sec ;
Bed width = 15m ; Bed level = + 20.0m ; Full supply depth = 1.75m ;
Full supply level = + 21.75m ; Top level of bank = + 22.75m. **(25 Marks)**
Top width of banks are the same as those on the upstream side. The regulator carries a road way single lane designed for I.R.C loading class 'A'. Provide clear freeboard of one meter above F.S.L for road bridge. Good foundation soil is available at +19.00. Assume the ground level site as +22.00. The co-efficient of drawing ratio for 80% is 1.645, 85% is 1.58 and 90% is 1.358.
Draw :

a. Cross section showing half elevation and half section. **(10 Marks)**
b. Longitudinal section. **(15 Marks)**
c. Half plan at foundation and half pan at ground level. **(20 Marks)**

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