

Sixth Semester B.E. Degree Examination, Feb./Mar. 2022
Hydraulic Structures and Irrigation Design Drawing

Time: 4 hrs.

Max. Marks:100

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

PART - A

- 1 a. Explain the procedure to determine reservoir capacity for a specific yield by mass inflow curve. (07 Marks)
- b. A reservoir has a capacity of 6mm^3 and a drainage area of 250km^2 . The average annual run off is 400mm and the sediment yield is $12.5\text{MN}/\text{km}^2$. The sediment has an average specific weight of $15\text{kN}/\text{m}^3$. Find the time required to reduce the reservoir capacity to 2mm^3 . Adopt a uniform volume increment. The trap efficiency Y may be approximated by

$$Y = 100 \left[1 - \frac{1}{(100X + 1)} \right]^{1.5} \text{ where X is capacity-inflow ratio.} \quad (08 \text{ Marks})$$

- 2 a. Explain uplift pressure on gravity dam with neat sketches. (07 Marks)
- b. Derive an expression for principal stress and shear stress for an elementary profile of a gravity dam. (08 Marks)
- 3 a. Explain briefly different types of earthen dams with neat sketches. (07 Marks)
- b. Explain briefly the various causes of failure of earth dams. (08 Marks)

PART - B

- 4 Design a canal drop of 1.5m with the following data:

Canal upstream:

Full supply discharge	= $4\text{m}^3/\text{sec}$
Bed width	= 6m
Bed level	= 116.50m
Full supply depth	= 1.8m
Full supply level	= 118.30m
Top width of bank	= 2m
Top bank level	= 119.50m

Canal downstream:

Full supply discharge	= $4\text{m}^3/\text{sec}$
Bed width	= 6m
Bed level	= 115.00m
Full supply depth	= 1.8m
Full supply level	= 116.80m
Top width of bank	= 2m
Top bank level	= 118.00m
Ground level at the site of work	= 118.00m

Good soil available for foundation is at RL 115.50m.

(25 Marks)

Draw:

- a. Half plan at foundation and half plan at top. (20 Marks)
- b. Longitudinal section. (15 Marks)
- c. Cross-section showing half elevation and half-section. (10 Marks)

5 Design a regulator-cum-road bridge for the following data:

Hydraulic particulars of canal upstream:

Full supply discharge	= 20m ³ /sec
Bed width	= 15m
Bed level	= 20.00m
Full supply depth	= 2m
Full supply level	= 22.00m
Top level of bank	= 23.00m

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	= 20.00m
Full supply depth	= 1.75m
Full supply level	= 21.75m
Top level of bank	= 22.75m

Right bank is 5m wide and left bank is 2m wide.

The regulator carries a roadway single lane designed for IRC loading class A. Provide clear freeboard of 1m above FSL for the road bridge.

Good foundation soil is available at +19.00m. Assume ground level at site as 22.00m.

(25 Marks)

Draw:

- Half plan at top and half plan at foundation level
- Half sectional elevation.
- Section through regulator vent.

(20 Marks)

(15 Marks)

(10 Marks)

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