



Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Hydraulic Structures and Irrigation Design Drawings

Time: 4 hrs.

Max. Marks:100

- Note: 1. Answer any TWO full questions from Part-A and ONE full question from Part-B.
2. Any missing data may be suitably assumed.

PART – A

- 1 a. Explain different storage zones of a reservoir. (06 Marks)
b. The following flows are recorded in a driest year at a project site. What storage will be required to draw water from the project at a constant rate of 60 cumec?

Month	Jan	Feb	March	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Average flow (cumec)	82	67	56	44	38	42	71	103	128	114	99	94

(09 Marks)

- 2 a. Draw the uplift pressure diagram at the contact between base of the gravity dam and the foundation with water on upstream and
i) No tail water
ii) With tail water
iii) With drainage gallery
Also indicate the magnitude of force. (06 Marks)
b. Derive an expression for base width of elementary profile of gravity dam for (i) No tension condition (ii) No slip condition when reservoir is full. (09 Marks)
- 3 a. List the causes of failure of earthen dam. Mention the remedial measures for them. (10 Marks)
b. A flownet is drawn for a homogeneous earthen dam of 22m water depth and 2m free board. Number of flow channels = 4 and potential drops = 10. The dam has a horizontal filter of 30m length at the downstream end and $k = 5 \times 10^{-4}$ cm/sec. Calculate the discharge per meter width of dam. (05 Marks)

PART – B

- 4 Design a surplus weir with a stepped apron of a tank forming part of chain of tanks with the following details:
- | | |
|---|---------------------|
| Combined catchment area | = 25km ² |
| Intercepted catchment area | = 20km ² |
| Maximum water level | = 125.75m |
| Full tank level | = 125.00m |
| Ground level at proposal site | = 124.00m |
| GL below proposed weir upto a reach of 5m | = 123.00m |
| Tank bund level | = 127.50m |
| Top width of tank bund | = 2m |
| Side slopes of bund on either side | = 2H:1V |
| Hard foundation level | = 122.50m |
| Ryves coefficient for combined catchment | = 9 |
| Ryves coefficient for intercepted catchment | = 1.6 |
| Hydraulic gradient | = 1:5 |

(25 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

Draw to a suitable scale:

- a. Half plan at top and half plan at foundation. (20 Marks)
- b. Half elevation and half sectional elevation. (15 Marks)
- c. Cross-section across the weir. (10 Marks)

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

Particulars	u/s	d/s
Full supply discharge	18m ³ /s	15m ³ /s
Bed width	12m	12m
Full supply level	12.00m	11.50m
Top bank level	13.00m	12.50m
Bed level	10.00m	10.00m
Top width of bank	2m	2m
Side slopes	2H:1V	2H:1V

The road width is single lane designed for IRC class-A loading. General ground level at site 12.00m. Hard soil at foundation is 9.00m. Bligh's coefficient = $C = 10$. Design ventway, gates, apron and protection works. (25 Marks)

Draw to a suitable scale:

- a. Half plan at top and half at foundation. (20 Marks)
- b. Half elevation and half sectional elevation. (15 Marks)
- c. Sectional elevation through regulator vent. (10 Marks)

4 FEB 2020

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