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10CV65

Sixth Semester B.E. Degree Examination, Aug./Sept. 2020
Hydraulic Structures and Irrigation Design Drawings

Time: 4 hrs. Max. Marks:100

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

PART – A

1 a. List the purposes of a reservoir. **(04 Marks)**

b. Define the terms (i) Density currents (ii) Trop efficiency. **(04 Marks)**

c. The following information is available regarding the relationship between trap efficiency and capacity inflow ratio for a reservoir. Find the probable life of the reservoir with an initial reservoir capacity of 30 million cubic meters, if the annual flood inflow is 60 million cubic meters and the average annual sediment inflow is 3,60,000 tonnes. Assume specific weight of sediment as 1200 kg/m^3. The useful life of the reservoir will terminate when 80% of initial capacity of the reservoir is filled with sediment. (Refer Table Q1 (b)). **(07 Marks)**

$\left(\frac{\text{Capacity}}{\text{Inflow}}\right)$ratio	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Trap Efficiency $(\eta\%)$	87	93	95	95.5	96	96.5	97	97.2	97.3	97.5

Table Q1 (b)

2 a. What do you understand by drainage galleries and why are they provided in gravity dams. **(06 Marks)**

b. Discuss in brief the following modes of failure of gravity dams:
(i) Overturning.
(ii) Sliding.
(iii) Crushing. **(09 Marks)**

3 a. Draw a neat sketch of a zoned embankment type earthen dam and name its components. **(04 Marks)**

b. List the causes of failure of earthen dams. Explain any one in brief. **(06 Marks)**

c. A flow net is to be plotted for a homogeneous earthen dam of height 22 m and free board 2.0 m. The results obtained are:
Number of potential drops = 10
Number of flow channels = 4
The dam has horizontal filter of 30 m at downstream end and coefficient of permeability of dam material is 5×10^{-4} cm/sec. Calculate the discharge per metre run of dam. **(05 Marks)**

PART – B

4 Design a tank surplus wier for a major tank connected with tank in series:

(i) Field data :

Combined catchment area – 35 km^2

Intercepted catchment area – 26.5 km^2

General ground level at proposed site – 711.70 mts.

Level at which good foundation soil is available – 709.00 mts.

[Slope at the proposed surplus wier from its centerline reaches 710.7 mts in a distance of] – 10 mts

Construction details :

Maximum water level – 714.5 mts

Full tank level – 713.7 mts

Top of Bund level – 715.7 mts

Top width of bund – 2.2 mts

Side slopes – 2 : 1

Other details :

Make provision to store water upto maximum water level. Proper abutments, wing walls and returns are to be designed. Assume a hydraulic gradient of 1 in 5 and Ryve's coefficient = 9. **(25 Marks)**

Draw to a suitable scale:

(i) Half plan at top and half plan at foundation. **(20 Marks)**

(ii) Half elevation and half sectional elevation. **(15 Marks)**

(iii) Cross section across the wier. **(10 Marks)**

5 Design a canal drop (notch type) with the following data:

Particulars	U/S canal	D/S canal
Full supply discharge	4 m^3/sec	4 m^3/sec
Bed level	+10 m	+8 m
Bed width	6 m	6 m
Full supply depth	1.5 m	1.5 m
Top level of embankment	+12.50 m	+10.50
Top width of embankment	2.0 m	2.0 m
Side slopes	1 : 1	1.5 : 1
Average ground level @ site	+10.50 m	-
Hard rock level	+8.50 m	-
Half supply depth	1 m	-

(25 Marks)

Draw to a suitable score :

(i) Half plan at top and Half plan at foundation. **(20 Marks)**

(ii) Half elevation and Half longitudinal section. **(15 Marks)**

(iii) Cross section along the canal. **(10 Marks)**

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