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Roll No. :

320832(20)

**B. E. (Eighth Semester) Examination,
April-May 2021**

(New Scheme)

(Civil Engg. Branch)

WATER RESOURCES ENGINEERING-II

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : All questions are compulsory. Part (a) of each question is compulsory and attempt any one parts from (b), (c). Assume suitable data wherever necessary. Use of Khosla curve and Specific Energy curve are permitted.

1. (a) Explain how silt pressure is estimated in case of gravity dam stability analysis? 2

(b) Design the practical profile of a gravity dam made of

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stone masonry given the following data :

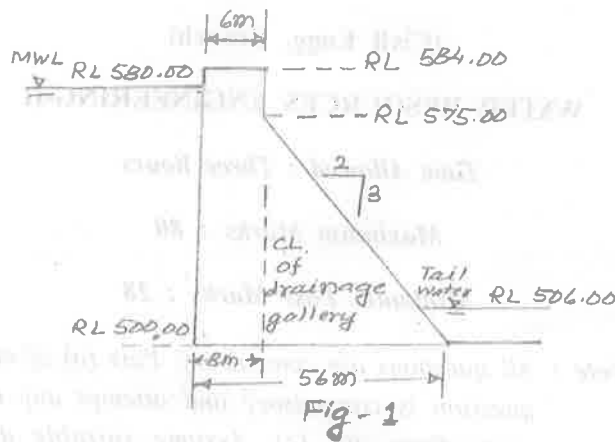
R.L. of base of Dam = 198 m

R.L. of MWL of reservoir = 238 m

Specific gravity of masonry = 2.4

Safe compressive stress in masonry = 1200 kN/m^2 . 14

(c) Figure 1.0 shows the section of a gravity dam built of concrete. Calculate. 14



- (i) The maximum vertical stresses at the heel and toe of the dam.
- (ii) The major principal stress at the toe of the dam.
- (iii) The intensity of shear stress on a horizontal plane near the toe.

Assume weight of concrete = 24 kN/m^3 .

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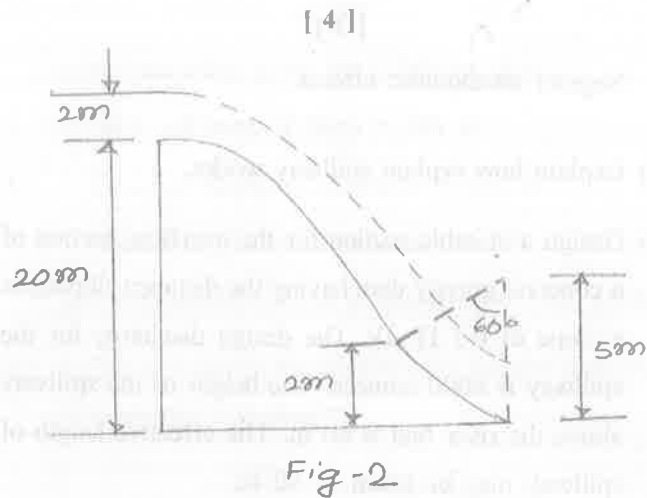
[3]

Neglect earthquake effects.

2. (a) Explain how syphon spillway works. 2
- (b) Design a suitable section for the overflow section of a concrete gravity dam having the distance sloping at a slope of 0.7 H : IV. The design discharge for the spillway is 6000 cumecs. The height of the spillway above the river bed is 60 m. The effective length of spillway may be taken as 50 m. 14
- (c) (i) Discuss briefly the various types of energy dissipators that are used for energy dissipation below overflow spillway, under different relative position of TWC and y_2 curve. 7
- (ii) An overflow ogee spillway of height 20 m is discharging water with a head of 2 m over the crest. A reverse curvature of radius 5 m, subtending an angle of 60° at the centre is provided at the spillway bottom as shown in fig.-2. Assuming discharge coefficient as 2.2 determine the Froude No. at the toe of spillway and provide a suitable stilling basin with all auxilliary devices. Draw the detailed diagram also. 7

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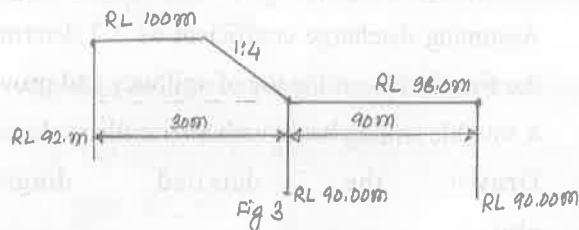
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3. (a) Differentiate between :

- (i) Pond level and afflux
- (ii) Weir proper and under sluice

(b) Use Khosla's curves to calculate the percentage uplift pressures at the three cutoffs for a barrage foundation profile shown in fig.-3, applying corrections as applicable. (Given slope correction for 1 in 4 slope is 3.3%.



Having determined the percentage uplift pressure,

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explain how the foundation floor thicknesses are determined corresponding to a known specific gravity of the material of the floor.

(c) Design a vertical drop weir for the following particulars :

- Nature of bed : Coarse sand with the value of Bligh coefficient $C = 11$
- Flood discharge : 320 cumecs
- Length of weir : 38 m
- Height of weir above low water : 1.9 m
- Height of falling Shutter : 0.6 m
- Top width of weir : 2.0 m
- Bottom width of weir : 3.5 m

Draw the detailed cross section of weir also.

4. (a) What is meant by canal regulation?

(b) Design a cross regulator for a distributary channel taking off from the parent channel, for the following data :

Discharge of parent channel = 100 cumes

Discharge of distributary = 15 cumes

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FSL of parent channel U/s = 208.10 m

d/s = 207.90 m

Bed width of parent channel U/s = 42 m

d/s = 38 m

Full supply water depth in parent channel

U/s = 2.5 m

d/s = 2.5 m

Permissible Khosla's safe exit gradient

= 1/6

(c) (i) Write down the design steps for Sharda type canal fall. 7

(ii) Write down the design steps for distributary head regulator. 7

5. (a) Explain Type-II Aqueduct. 2

(b) Design and give a dimensional sketch of an aqueduct to carry water of an earth canal over a drainage with the following data : 14

RL of bed of drainage = 520.0 m

HFL of drainage = 523.0 m

Bed width of drainage = 50.0 m

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Side slope of drainage at crossing = 1/2 : 1

RL of ground = 525 m

RL of bed of canal = 524.50 m

Discharge of canal = 30 cumecs

Depth of water in canal = 1.7 m

Bed width of canal = 22.0 m

(c) Give neat sketch of suitable designs of aqueducts for each of the following crossing :

(i) A major canal over a small drainage

(ii) A canal carrying low discharge over a large a drainage

(iii) A major canal over a large drainage.

Explain the methods of design of fluming required in crossing at (iii) above. 14