

Code No: **R32014**

R10

Set No. 1

III B.Tech II Semester Supplementary Examinations, November - 2017

WATER RESOURCES ENGINEERING-II

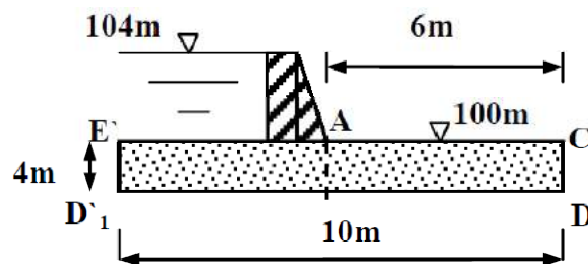
(Civil Engineering)

Time: 3 hours

Max. Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

- 1 a) A weir on a permeable foundation has a level floor of negligible thickness and is 10m long in the direction of flow. At the two ends of the floor 2.5m deep piles are provided. Using Khosla's theory, calculate the uplift pressure at the mid-length of the floor and at quarter points. The effective head of water can be assumed to be 2m. [5M]
- b) For the weir floor shown in Figure below, check: (i) The safety against piping failure, (ii) The safety of the floor against uplift pressure at toe of crest wall (point A), and (iii) Draw HGL using Bligh's creep theory. [10M]



- 2 a) Discuss the factors affecting selection of type of dam, justifying your answer with reference to a few special cases. [7M]
- b) A masonry dam 10m high is trapezoidal in section with a top width of 1m and bottom width of 8.25m. The face exposed to water has a batter of 1:10. Calculate various factors of safety and comment on the stability of the dam. Assume coefficient of friction as 0.75, specific weight of masonry as $2240 \frac{kg}{m^3}$, permissible shear stress as $14 \frac{kg}{cm^2}$. [8M]
- 3 a) Write short notes on: (i) Galleries in gravity dams, (ii) Foundation treatment for gravity dams, and (iii) Structural joints in gravity dams. [9M]
- b) A 100m high concrete gravity dam trapezoidal in cross-section has upstream face vertical, crest width 6m, base width 75m and free board equal to 4m. Calculate the maximum principle stress at the toe when reservoir is full. Take unit weight of concrete as $23.544 \frac{kN}{m^3}$. Neglect all other forces except hydrostatic water pressure, uplift pressure and self-weight. There is no drainage gallery and no tail water. [6M]

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- 4 a) Discuss various causes of failure of earth dam. [5M]
- b) In order to determine the factor of safety of the d/s slope during steady seepage, the section of a homogeneous earth dam was drawn to scale of $1\text{cm} = 10\text{m}$; and the following results were obtained on a trip slip circle. [10M]

Area of N – diagram = 12.15cm^2

Area of T – diagram = 6.5cm^2

Area of U – diagram = 4.02cm^2

Length of arc = 11.6cm

The dam material has the following properties:

Effective angle of internal friction = 26°

Unit cohesion = $0.2 \frac{\text{kg}}{\text{cm}^2}$

Unit weight of soil = $2 \frac{\text{g}}{\text{cm}^3}$

Determine the factor of safety of the slope.

- 5 a) A spillway is a safety valve of a dam — Justify the statement. Also explain its functional requirements. [7M]
- b) Discuss different causes of failure of an earth dam suggesting suitable preventive measures. [8M]
- 6 Design a trapezoidal notch fall for the following data. Assume important missing data. Draw the important views. [15M]

Full supply discharge : $20 \text{ m}^3/\text{sec}$ (US / DS)

Full supply level : $101 \text{ m US} / 100 \text{ m DS}$

Full supply depth : $2 \text{ m US} / 2 \text{ m DS}$

Bed width : $10 \text{ m US} / 10 \text{ m DS}$

Bed level : $99 \text{ m US} / 98 \text{ m DS}$

Drop : 1 m

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- 7 Design a canal regulator for the following data: [15M]

Discharge of parent channel : $120 \text{ m}^3/\text{sec}$

Discharge in distributor : $30 \text{ m}^3/\text{sec}$

FSL of parent channel : $218 \text{ m US} / 217.80 \text{ m DS}$

Bed width of parent channel : $52 \text{ m US} / 49 \text{ m DS}$

Depth of water in parent channel : $2.5 \text{ m US} / 2.5 \text{ m DS}$

Depth of water in distributor : 1.5 m

Bed width of distributor : 15 m

FSL of distributor : 217 m

- 8 a) Design a type-III siphon aqueduct for the data given below. Assume any missing data suitably. [7M]

Discharge of the canal : 60 cumecs

Bed width of canal : 20 m

Depth of water in canal : 2 m

Bed level of canal : 160 m

Flood discharge : 320 cumecs

High flood level : 161.5 m

Bed level of drainage : 158 m

General ground level : 160 m

- b) Write short notes on: [8M]
(i) Aqueduct, (ii) Syphon aqueduct, (iii) Canal siphon, and (iv) Level crossing.