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320832(20)

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

(New Scheme)

(Civil Branch)

WATER RESOURCES ENGINEERING-II

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

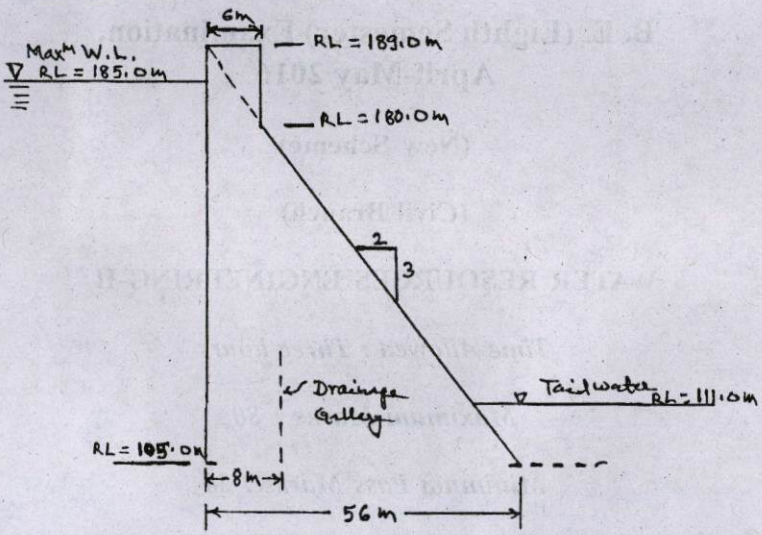
***Note** : All questions are compulsory. Part (a) of each question is compulsory and attempt any **one** part from (b) and (c). Use of Khosla curves and specific energy curves are permitted.*

1. (a) Define Foundation Gallery. 2

(b) (i) What are the various modes of failure of a gravity dam? Explain each of them. 7

(ii) Determine the base width of an elementary profile of a gravity dam. 7

(c) Following figure shows the section of a gravity dam built of concrete. 14



Calculate the following :

(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 shear stress on a horizontal plane near the toe.

(Assume weight of concrete = 23·5 kN/m^3).

2. (a) Define Stilling basin. 2

(b) Design a suitable section for the overflow portion of a concrete gravity dam having the downstream face sloping at a slope of 0·7 H : 1 V. The design discharge for the spillway is 8000 m^3/s. The height of the spillway crest is 104 m above the river bed level. The spillway length consists of 6 spans having a clear width of 10 m each. Thickness of each pier may be taken to be 2·5 m. Assume K_p = 0·01 and K_a = 0·1. 14

(c) Describe the different methods of energy dissipation below overflow spillways. 14

3. (a) Define Diversion Headworks. 2

(b) (i) Describe the causes of failure of hydraulic structures founded on previous foundation. 7

(ii) Explain Bligh's creep theory and Lane's weighted creep theory. 7

(c) A barrage is to be constructed on a river having a high flood discharge of about 8100 m^3/s, with the given data as follows :

Average bed level of the river = 157·0 m

High flood level before construction of barrage = 162·2 m

Permissible afflux = 1·0 m

Pond level = 160·6 m

Prepare a complete hydraulic design for the undersluice section for high flood condition. A safe exit gradient of 1/6 may be assumed. 14

4. (a) Define Regulation work. 2

(b) Design a 1·5 m Sarda type fall for a canal carrying a discharge of 40 cumecs with the following data : 14

Bed level u/s = 205·0 m

Bed level d/s = 203·5 m

Side slope of channel = 1:1

Full supply level u/s = 206·8 m

Full supply level d/s = 205·3 m

Bed width u/s and d/s = 30 m

Safe exist gradient = 1/5

(c) (i) Explain the functions of head regulator and cross regulator. 7

(ii) Describe the design steps of cross regulator and hard regulator. 7

5. (a) Define Cross-Drainage works. 2

(b) Design a suitable cross-drainage work, given the following data at the crossing of a canal and a drainage. 14

Canal :

Full supply discharge = 32 cumecs

Full supply level = 113·5 m

Canal bed level = 112·0 m

Canal bed width = 20 m

Trapezoidal canal section with 1½ H : 1 V.

Drainage :

High flood discharge = 300 cumec

High flood level = 110·0 m

High flood depth = 2·5 m

(c) Explain the different methods for designing the channel transition. 14