Printed Pages – 8

# 320812 (20)

**BE (8th Semester)**

**Examination, April-May 2021**

**Branch : Civil**

## WATER RESOURCES ENGINEERING - II

***Time Allowed : Four Hours***

***Maximum Marks : 80***

***Minimum Pass Marks : 28***

**Note :** All questions are compulsory. In each question there is internal choice. Use of Khosla curve and specific energy curve is permitted.

**Q. 1.** (a) Define foundation gallery. **2**

Attempt any one of the following :

(b) (i) Considering earthquake forces in addition to the hydrostatic pressure

and uplift pressure, determine the base width of the elementry profile of gravity dam so that resultant passes through the outer third points. 7

(ii) What are the various modes of failure of a gravity dam ? Discuss each of them. 7

(c) A concrete dam is shown in following figure. Check the stability of the section. Find the magnitude and direction of principal stresses, normal stress and shear stress at toe and heel. Analysis of dam section is to be carried out under the following conditions :

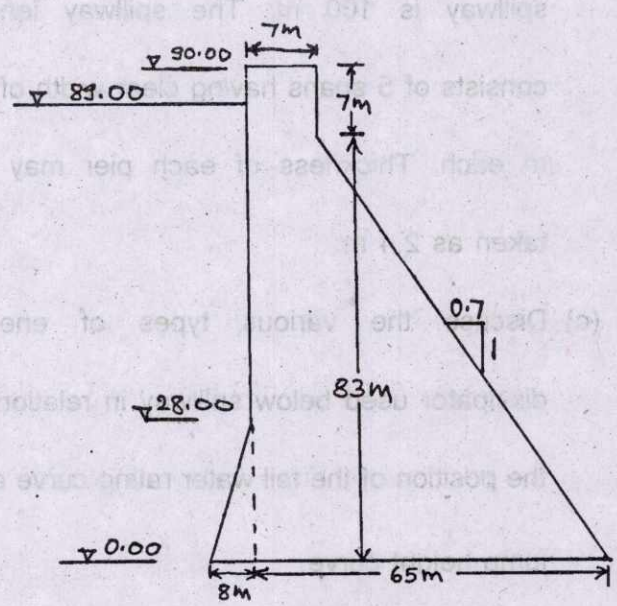
(i) Effect of horizontal earthquake is to be considered ($\alpha$ = 0.1 and $C_m$ = 0.73)

(ii) Reservoirfull

Unit weight of concrete = 2400 kg/m$^3$

Unit shear for concrete = 14 kg/cm$^2$

Uplift pressure is considered to act over 2/3 area of section. **14**



Q. 2. (a) Define stilling basin. 2

Attempt any one :

(b) Design a suitable section for the overflow portion of a concrete gravity dam having the down stream face sloping at a slope of 0.75 H : 1 V. The designed discharge for the spillway is 7500 $m^3/s$. The height of the spillway is 100 m. The spillway length consists of 5 spans having clear width of 11 m each. Thickness of each pier may be taken as 2.4 m. 14

(c) Discuss the various types of energy dissipator used below spillway in relation to the position of the tail water rating curve and jump height curve. 14

Q. 3. (a) What is under sluice ? 2

Attempt any one :

(b) Design a vertical drop weir with the following particulars : 14

Bligh's C = 12

Flood discharge = 289 $m^3/s$

Length of weir = 39.5 m

Height of weir above low water = 2 m

Height of falling shutter = 0.5 m

Top width of weir = 2.0 m

Bottom width of weir = 3.5 m

Also draw the section of the weir.

(c) A barrage is to be constructed on a river having high flood discharge of about 8000 $m^3/s$, with the given data as follows :

Average bed level of the river = 100.0 m

High flood level (before construction of barrage) = 105.2 m

Permissible afflux = 1.0 m

Pond level = 103.6 m

Prepare a complete hydraulic design for the other barrage bay section, for hight flood condition. A safe exit gradient of 1/6 may be assumed. **14**

Q. 4. (a) Define canal drop. **2**

Attempt any one :

(b) Design a straight flumed meter glacis fall with the following data : **14**

Full supply discharge of the canal = 119 $m^3/s$

Bed level of canal $\frac{U/S}{D/S} = \frac{107.5\,m}{106.0\,m}$

Drop = 1.5 m

FSL of canal $\frac{U/S}{D/S} = \frac{109.7\,m}{108.2\,m}$

Bed width of canal U/S and D/S = 60 m

Safe exit gradient for canal material = $\frac{1}{5.5}$

(c) (i) Describe the energy dissipators used in canal falls. **7**

(ii) Describe the different spillway gates. **7**

**Q. 5.** Attempt any one : **16**

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

Canal

Full supply discharge = 31 $m^3/s$

Full supply level = 113.5 m

Canal bed width = 20 m

Canal bed level = 112.0 m

Trapezoidal canal section with 1.5 H : 1 V slopes

Drainage

High flood discharge = 300 $m^3/s$

High flood level = 110.0 m

High flood depth = 2.5 m

General ground level = 112.5 m

(b) (i) Describe the different types of cross drainage works. **8**

(ii) Explain the Hind's method for the design of channel transition. **8**