C.U.SHAH UNIVERSITY
Summer Examination-2016

Subject Name : Design of Hydraulic Structures

Subject Code : 4TE06DHS1   **Branch :** B.Tech(Civil)

**Semester :** 6   **Date :** 09/05/2016   **Time :** 02:30 To 05:30   **Marks :** 70

Instructions:
  (1) Use of Programmable calculator & any other electronic instrument is prohibited.
  (2) Instructions written on main answer book are strictly to be obeyed.
  (3) Draw neat diagrams and figures (if necessary) at right places.
  (4) Assume suitable data if needed.

Q-1		**Attempt the following questions:**	**(14)**
	a)	What is meant by a "Reservoir"?	01
	b)	Define retarding basin.	01
	c)	What is phreatic line for an earth dam?	01
	d)	Enlist different forces that may act on a gravity dam.	01
	e)	What is apex of the crest?	01
	f)	What is meant by a 'Dam sluice'?	01
	g)	What is meant by an energy dissipater?	01
	h)	Enumerate the different type of spillways which are used in dam construction.	01
	i)	What is meant by 'Surcharge storage' in a dam reservoir?	01
	j)	What are contraction joints in gravity dam?	01
	k)	What is cross regulator?	01
	l)	What is canal escape?	01
	m)	Write an equation for length of the water cistern to be provided in a Sarda type fall.	01
	n)	Write the type of fall, which you may recommend for very high drops and very low discharges.	01

Attempt any four questions from Q-2 to Q-8

Q-2		**Attempt all questions**	**(14)**
	(a)	Write a short note on inspection galleries in gravity dam.	05
	(b)	What is meant by "concrete gravity dams"? Draw a neat typical cross-section of such a dam. Name the highest dam of the world as well as that of India.	05
	(c)	Briefly discuss the factors affecting the selection of site for a dam.	04
Q-3		**Attempt all questions**	**(14)**
	(a)	What are the qualities of a good siphon spillway?	05
	(b)	Write short notes on trash racks.	05
	(c)	Distinguish between the Rolled-fill earth dam and Hydraulic–fill earth dam.	04
Q-4		**Attempt all questions**	**(14)**
	(a)	Discuss the Swedish slip circle method for checking the stability of	07

downstream slop under steady seepage condition.

(b)	Describe various energy dissipation devices used below spillway in relation to the position of jump height curve (JHC) and tail water rating curve (TWRC).	07

Q-5 **Attempt all questions** **(14)**

(a)	A flow-net is plotted for homogeneous earthen dam of height 22 m and free board 2.0 m. Number of potential drops and flow channels are 10 and 4 respectively. The dam has a horizontal filter of 30 m length at a downstream end and the coefficient of permeability of the dam material is 5×10^{-4} cm/sec. Calculate the discharge per m run of the dam.	07
(b)	Discuss in brief the causes of failure of earthen dams.	07

Q-6 **Attempt all questions** **(14)**

(a)	Distinguish clearly between a low gravity dam and high gravity dam. Derive an expression used for such a distinction.	07
(b)	Draw the elementary profile of a gravity dam and explain various forces acting on it.	07

Q-7 **Attempt all questions** **(14)**

(a)	Fig. shows the section of a gravity dam (non-overflow portion) built of concrete. Calculate (neglecting earthquake effects) (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 = 23.5 kN/m^3; and unit length of dam. Allowable stress in concrete may be taken 2500 kN/m^2.	12
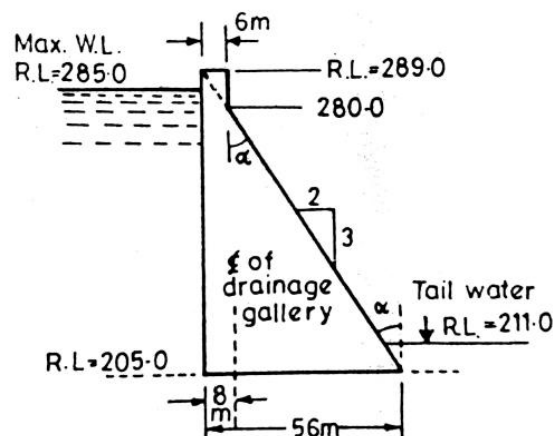
(b)	Enlist the functions of distributary head regulator in a canal network.	02

Q-8 **Attempt all questions** **(14)**

(a)	Design a crest, water way, cutoff walls, and impervious floor of distributary head regulator for an off taking canal for the following data.	10

Off taking canal (distributary)	Parent canal
Discharge = 18 cumecs	Full supply level = 150.00
Full supply level = 149.20	Depth of water = 2.60 m
Bed width = 15 m	Bed level = 147.40
Depth of water = 1.50 m	
Bed level = 147.70	Safe exit gradient = 1/6

(b)	Enlist stepwise procedure for designing a sarda type fall.	04