Enrollment No: _____ Exam Seat No: _____

C.U.SHAH UNIVERSITY

Summer Examination-2017

Subject Name : Design of Hydraulic Structures

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

Semester : 6 **Date :** 13/04/2017 **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)	Name the highest dam of the world as well as that of India.	01
b)	Enlist types of dam.	01
c)	Enlist various component parts of a dam outlet works.	01
d)	The most preferred soil for the central impervious core of a zoned embankment type of an earthen dam, is _____	01
e)	The process of laying and compacting earth in layers by power rollers under Optimum Moisture Conditions (OMC) for construction of earthen dams, is known as: _____	01
f)	Define axis of the dam.	01
g)	Define hydraulic height of the dam.	01
h)	What are the functions of "Water stops" in the gravity dam?	01
i)	Draw a neat typical cross-section of concrete gravity dam.	01
j)	Define spillway.	01
k)	The famous Bhakra dam of our country has been provided with _____ type of spillway.	01
l)	If H is the head over the apex of its crest, The discharge passing over an ogee spillway, per unit length of its apex line, is proportional to _____	01
m)	Bar screens, used to cover dam outlets to prevent entry of debris or ice into the sluiceway conduits, are called:_____	01
n)	Enlist the functions of a cross regulator in a canal network.	01

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

Q-2 **Attempt all questions** **(14)**

(a)	Discuss in brief relative merits and demerits of Gravity dams over Earth dams.	05
(b)	Discuss step by step the analytical procedure that you will adopt for analyzing the stability of gravity dams.	05
(c)	Determine the critical height of a gravity dam, taking the specific gravity of concrete as 2.40 and allowable compressive stress as 3340 kN/m^2.	04

Q-3 **Attempt all questions** **(14)**

(a)	Explain methods of reduction of uplift pressure with neat sketch.	05
(b)	Write short note on straight glacis fall.	05

(c) Enumerate various factors deciding location of canal fall. 04

Q-4 **Attempt all questions** **(14)**

(a) In order to compute the seepage discharge, a flow net is plotted for a homogeneous earth dam of height of 30 m and free board 2.0 m. The results obtained were: 05
Number of potential drops = 12
Number of flow channels = 4
The dam has a horizontal filter of 30 m length at the downstream end. Compute the seepage discharge per metre length of the dam. If the coefficient of permeability of dam material is 3×10^{-4} cm/s.

(b) Discuss different criteria for the design of an earth dam. 05

(c) What are the ill effects of dam construction? 04

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

(a) Determine the computation of seepage rate using flow net. 07

(b) What are the different ways by which a concrete gravity dam may fail, and how will you ensure its safety against each type of failure? 07

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

(a) Determine the forces due to self weight and water pressure on the non-overflow dam as shown in Fig. 1. Take specific weight (w_c) = 24 kN/m^3. and w = 9.81 kN/m^3. 07

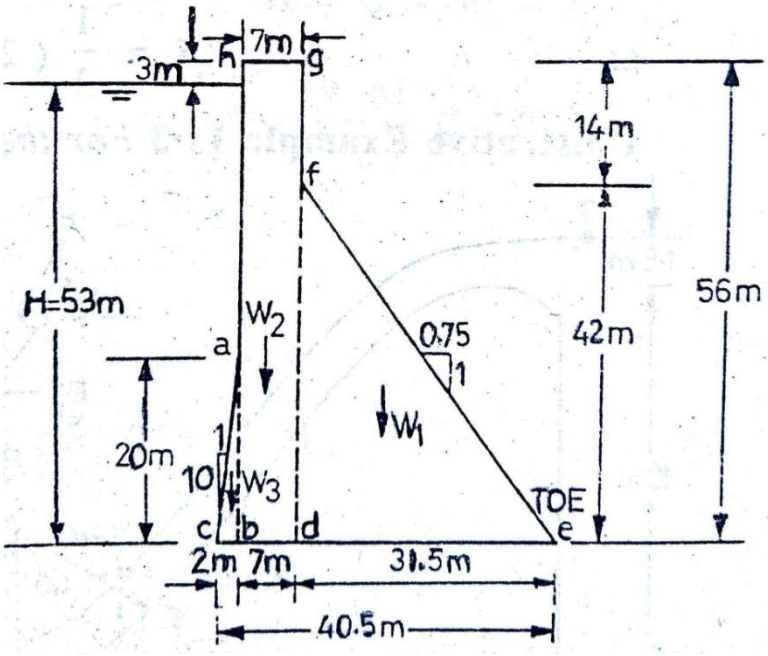

Fig. 1

(b) Enumerate different types of spillway and explain the working of syphon spillway, with a neat sketch. 07

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

(a) Design an ogee spillway for the designed discharge of 8000 cumecs. Downstream face sloping is 0.7 H : 1V. The height of the spillway crest is at RL = 204 m, the average river bed level at the site = 100 m. The spillway length consists of 6 spans having clear width of 10 m each. 10

Thickness of each pier may be taken to be 2.5 m.

(b) How would you decide the location of outlets for a dam? 04

Q-8 Attempt all questions (14)

(a) Design an irrigation outlet for the following data: 08
FSQ of outlet = 50 lit/sec.
FSL in distibutary on u/s side of outlet = 200.00 m.
FSL in water course on d/s side of outlet = 199.92 m.
FSD in distributary on u/s side of outlet = 1.05 m.

(b) Explain the working of Visvesvaraya gates. 06