

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VIII (NEW) EXAMINATION – WINTER 2022****Subject Code:2180601****Date:14-12-2022****Subject Name:Design of Hydraulic Structures****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

MARKS

- Q.1** (a) Write a short note on classification of dam. **03**
 (b) Write a brief note on “Arch dam”. **04**
 (c) Discuss factors affecting for the selection of dam site in detail. **07**

- Q.2** (a) Enlist various causes of failure of an earth dam. **03**
 (b) What is rolled fill earth dam and hydraulic fill earth dam? **04**
 (c) Describe with neat sketch how seepage line is drawn in homogeneous earth dam without any drainage arrangement? **07**

OR

- (c) Discuss measures to control seepage through earth dam and their foundation. **07**

- Q.3** (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:

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 meter length of the dam if the coefficient of permeability of dam material is 3×10^{-4} cm/s.

- (b) Distinguish clearly between low gravity dam and & high gravity dam. **04**

- (c) Design practical profile of a gravity dam for the given data: **07**

R.L. of base of dam = 65 m

R.L. of H.F.L. = 130 m

Safe compressive stress in concrete = 3000 KN/m²

Specific gravity of concrete = 2.4

Height of waves = 1.0 m

OR

- Q.3** (a) Derive the expression for the limiting height of a low gravity dam. **03**

- (b) Discuss normal stress and principal stress in elementary profile under reservoir full condition. **04**

- (c) Describe Foundation treatment of gravity dam. **07**

- Q.4** (a) Define spillway. What is the purpose of its provision? **03**

- (b) What are the essential requirements for locating spillways? **04**

- (c) Describe design features of ogee spillway. **07**

OR

- Q.4** (a) Why spillway are considered “safety valve “for dams. **03**

- (b) Classify and write suitability of various spillways. **04**

- (c) 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** (a) What are HR and CR in the context with the canal network? **03**
(b) Discuss the design criteria for a canal cross regulator. **04**
(c) Explain stepwise procedure for designing Sarda type fall. **07**
- OR**
- Q.5** (a) Why canal fall is provided in canal? **03**
(b) How location of canal fall should be decided? **04**
(c) Write design principles of glacis type fall. **07**
