

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VIII (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2180601

Date: 06/05/2017

Subject Name: Design of Hydraulic Structures(Departmental Elective - III)

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.

- Q.1** (a) What is spillway? What are the requirements of spillway? Explain any two spillway with neat sketch, **07**
(b) How location of canal fall should be decided? Also discuss design features of various components of impervious floor of Sarda type fall. **07**
- Q.2** (a) Discuss radial type spillway gates. Also write short note on arch dam. **07**
(b) Explain design considerations for an embankment dam. **07**
- OR**
- (b) Derive an expression to compute seepage discharge through body of dam with a horizontal drainage filter. **07**
- Q.3** (a) Why position of phreatic line is to be predicted in dam section? Also compute seepage rate by using flow net. **07**
(b) Discuss step wise design procedure of cross regulator and distributary head regulator. **07**
- OR**
- Q.3** (a) Design practical profile of a gravity dam for the given data: **07**
 - R.L. of base of dam = 47 m
 - R.L. of H.F.L. = 97 m
 - Safe compressive stress in concrete = 2450 KN/m²
 - Specific gravity of concrete = 2.4
 - Height of waves = 1.5 m
- (b) Enlist various causes of failure of an earth dam. Discuss only structural failure causes in earth dam. **07**
- Q.4** (a) Discuss two dimensional method for stability analysis of gravity dam. **07**
(b) Explain various energy dissipation measures adopted below spillway for relative up and down position of J.H.C & T.W.R.C. Also write brief note on cavitation in spillway. **07**
- OR**
- Q.4** (a) Discuss normal stress and principal stress in elementary profile under reservoir full condition. Also enumerate various loading combinations specified by USBR & IS, used for design of gravity dam. **07**
(b) Discuss uplift pressure force and earthquake force acting on a gravity dam. **07**
- Q.5** (a) Describe design features of ogee spillway. **07**
(b) How computation of hydraulic jump is carried out? Also write brief note on plunge pool. **07**
- OR**
- Q.5** (a) Design the downstream profile, approach channel and discharge channel in case **07**

of Chute spillway for given data:

- Spillway crest level = 160 m
- Level of bottom of flank at which low ogee weir is provided = 145 m
- Design discharge = 4500 cumecs
- Numbers of span = 5
- Clear distance between piers = 10 m
- Thickness of each pier = 2.5 m

- (b) Differentiate cross regulator and distributary head regulator. Why drainage gallery is provided within a dam section? **07**
