No. of Printed Pages : 3 **ET-536(A)**

B.Tech. Civil (Water Resources Engineering)

Term-End Examination

00332 **December, 2016**

ET-536(A) : HYDRAULIC STRUCTURES – I

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **five** questions. All questions carry equal marks. Support your answers with examples and neat diagrams, wherever necessary. Use of scientific calculator is permitted. Assume appropriate data, if not given.*

1. (a) What is meant by a reservoir ? Discuss briefly the different types of reservoirs and the purpose served by each type. *2+4=6*

(b) What types of dams could be selected for the following sites ? Justify your answers with reasons. *4×2=8*

(i) A wide gorge with good foundation

(ii) A narrow deep gorge with strong abutments

(iii) A gorge with weak foundation but with abundant availability of material locally

(iv) A gorge in hilly terrain with poor access

2. (a) How do waves affect the stability of a dam ? How do you compute the wave pressure ? 7

(b) Discuss how you will proceed for consolidation grouting in a fractured rock foundation. 7

3. (a) What is an arbitrary section of a gravity dam and how would you design one such section ? 7

(b) What are the types of failures of earth dams ? 7

4. (a) How will you test the stability of an earth dam constructed of C-ϕ soils ? 7

(b) What is a rule curve for a reservoir ? Illustrate with an example. 7

5. (a) Draw a neat layout of Diversion head-works and indicate various components of the system. Briefly indicate the function of each component. 7

(b) Why is it necessary to control silt entry in the canal ? What methods are adopted for the purpose ? 7

6. (a) What are the criteria for safety against uplift pressure in case of weirs founded on permeable foundations ? Write an expression for the thickness of floor in terms of residual head and the specific gravity of the material of the floor. 5+2=7

(b) Discuss the Slope-Area method for determining stream flow. 7

7. (a) "The profile of an ogee spillway is made in accordance with the shape of the lower nappe of a free falling jet." Explain the statement. 7

(b) Explain energy dissipation arrangement for the following two cases : $2 \times 3\frac{1}{2} = 7$

(i) T.W.C. coincides with H.J.C.

(ii) T.W.C. is always above H.J.C.

8. Write short notes on any ***four*** of the following : $4 \times 3\frac{1}{2} = 14$

(a) Joints in a Gravity Dam

(b) Environmental Effect of Reservoirs

(c) Hydraulic Jump

(d) Exit Gradient and Safe Exit Gradient

(e) Admixtures

(f) Storage Zones in a Reservoir

(g) Fish Ladder
