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RM-7667

B. E. (Sem. VIII) (Civil) Examination

May / June – 2010

Design of Hydraulic Structures

(Elective - I)

Time : Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. (Sem. 8) (Civil)**

Name of the Subject :

☛ **Design of Hydraulic Structures (Elective-1)**

☛Subject Code No. : **7 6 6 7** ☛Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

(2) Figures to the right indicate full marks.

(3) Draw neat figure wherever required.

(4) Assume any other suitable data if required.

SECTION - I

1 (a) Explain how jump height curves can be plotted for various discharges by doing the hydraulic jump calculations. **7**

(b) Draw sketches of the energy dissipating structure you will provide when the tail water curve lies below jump height curve for all discharges. **5**

(c) The discharge over an spillway is 5000 cumecs. Taking effective length over the ogee spill way as 60 metres, coefficient of discharge 2.18 and erest height above river bed level as 60 metres check if hydraulic jump is possible. Find the length of the stilling basin for this discharge and assuming TWC coincides with J.H.C. **8**

2 (a) Develop an expression for the horizontal component and the vertical component in terms of the lip velocity V_o and lip angle θ, for the jet trajectory for the ski jump bucket throw. **7**

OR

(a) Explain the protection works for condition IV (4).

(b) Design the expansion transition on the basis of Chaturvedi's analysis :

Canal bed width - 20 metres

Depth of water in canal - 1.4 metre

Side slope in canal - 1:1

Aquaduct through width - 10 metres.

3 (a) Explain the factors affecting selection of spillway gates. Enlist the advantage of radial gates. **7**

OR

(a) Explain aeration of gated ogee spillways and explain pitting. **7**

(b) Design the approach channel of a chute spillway for the following data : **8**

Length of approach channel : 150 metres

Spillway crest level : 200 m

Level of bottom of flank at which low ogee weir is to be constructed : 192 m

Design discharge : 5000 cumecs.

No. of 10 m spans in spillway : 5

Thickness of spillway pier : 3 m

C = 2.2

Find width of the approach channel, head over the spillway crest with velocity of approach and depth of water over the spillway crest.

SECTION - II

4 (a) Discuss the design principles of design of side channel spillway. **8**

(b) What is meant by priming and depriming of siphon spillway ? Discuss the advantages and limitation of Siphon spillway. **6**

(c) Determine the no. of Siphon units required to pass flood safely through a saddle siphon when the siphon discharges freely in the air : **5**

(i) Full Reservoir level = 290 m

(ii) Level of centre of siphon outlet = 284 m

(iii) H.F.L. = 209 m

(iv) H.F.D. = 455 m (High Flood Discharge)

(v) Area of throat = 8 m^2

Assume C = 0.65

5 Attempt any **two** : **8×2=16**

(i) Design a river intake with the following data :

(a) R.L. of river bed = 105 m

(b) R.L. of lowest water level = 106 m

(c) R.L. of normal water level = 120 m

(d) R.L. of high flood level = 125 m

(e) Population to be served = 75,000

(f) Average water demand = 200 l/h.

(g) Pumping duration = 14 hrs. a day

(h) Velocity through bore source = 16 cm/sec.

Assume other suitable data if required.

(ii) Discuss the ill-effect and remedial measures of cavitation in pump and turbines.

(iii) What are the different types of outlet gate used at dams? Explain any one.

6 Write short notes on (any **three**) **15**

(i) Site selection of intake structure

(ii) Modes for cavitation studing

(iii) Howell-Bunger valve

(iv) Lake intake

(v) Flat crested shaft spillway.
