Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech (CE-N)/SUPPLE/SEM-7/CE-705/2010

2010

HYDRAULIC STRUCTURES

Time Allotted : 3 Hours | Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : 10 × 1 = 10

   i) The most preferred soil for the central impervious core of a zoned embankment type of earthen dam is

      a) highly impervious clay

      b) highly pervious gravel

      c) coarse sand

      d) clay mixed with fine sand.

   ii) The vertical downward earthquake acceleration = 0·1g, acting on gravity dam, will

      a) increase the resisting weight of the dam by 10%

      b) decrease the resisting weight of the dam by 10%

      c) increase the uplift by 10%

      d) all of these.

   iii) For reservoir full case, the maximum compressive stress is produced at the

      a) Toe b) Heel

      c) Any point on the base d) u/s face of the dam.

iv) For small dams, the gross storage is

a) $0-0{\cdot}5$ Mm^3 b) $0{\cdot}5-10$ Mm^3

c) $10-60$ Mm^3 d) >60 Mm^3.

v) Factor of safety against overturning should be

a) less than 1·5 b) greater than 1·5

c) within 3 – 5 d) within 1·3 – 1·5.

vi) The provision of drainage gallery in a gravity dam helps in reducing

a) uplift pressure b) water pressure

c) silt pressure d) none of these.

vii) The spillway which can be called as an "overflow spillway" is essentially

a) an ogee spillway b) chute spillway

c) shaft spillway d) all of these.

viii) Canal drops are required to

a) dissipate excess energy

b) dissipate inadequate land slope

c) dissipate excess land slope

d) all of these.

ix) A fish ladder is provided in a canal project

a) to catch the fish for commercial movement

b) to enable the fish to move freely in the river

c) to serve the same purpose as a canal ladder

d) both (b) and (c).

x) The type of fall which you may recommend for very high drops and very low discharges is

a) Sarada fall b) Syphon well drop

c) Straight glacis d) Inglis fall.

GROUP – B

(Short Answer Type Questions)

Write short notes on any *three* of the following. 3 × 5 = 15

2. Zoned type earthen dams.
3. Uplift forces acting on gravity dam.
4. Load combination for designing the gravity dam.
5. Factors governing of selecting a site.
6. Difference between "weir" & "barrage".

GROUP – C

(Long Answer Type Questions)

Answer any *three* questions. 3 × 15 = 45

7. What are the modes of failure of gravity dam ? Discuss.
8. An earthen dam made of homogeneous materials has the following data :

   Coefficient of permeability = 5 10 – 4 cm/sec.

   Level of the dam = 200m

   Level of the river bed = 178m

   H.F.L. of the reservoir = 197·5m

   Width of the top of the dam = 4·5m

   Upstream slope = 3 : 1

   Downstream slope = 2 : 1.

   Determine the phreatic line for this dam section and the discharge passing through the dam. 15

9. The figure shows the sections of a gravity dam built of concrete with tapered toe-side slope of 2 horizontal to 3 vertical. Calculate (neglecting the earthquake effects) the maximum vertical stresses at the heel and toe of the dam. 15

Fig

10. a) What are the factors governing for selection of type of dam ?

    b) What are the types of cross drainage works ? Describe any two briefly. 8 + 7

11. Design the salient dimensions of a syphon well drop for the following particulars :

Fall	= 3·8m
General ground level	= +163·36m
Full supply depth	= 75 cm
Bed level upstream	= +162·83m
Discharge	= 1 cumec
Bed width u/s & d/s	= 2·4m

Assume any other data if required. 15