

**GUJARAT UNIVERSITY**  
**B.E. Sem. VII (Civil) Examination**  
**Irrigation**

**Thursday 27th December, 2007]**

**[Time : 3 Hours**  
**Max. Marks : 100**

- Instructions :** (1) Attempt all questions.  
 (2) Answer to the two sections must be written in separate answer books.  
 (3) Assume suitable data if require.  
 (4) Figures to the right indicate full marks.

**SECTION - I**

- 1 ( a ) Expalin the following terms : 16  
 ( i ) C.C.A. ( ii ) Intensity of irrigation ( iii ) Kor depth  
 ( iv ) Outlet factor ( v ) Overlap allowance ( vi ) Water use efficiency.  
 ( b ) Explain the term "Sustainable development". Why environment monitoring & assessment of irrigation projects is needed?  
 ( c ) Explain direct irrigation scheme with a neat sketch.

**OR**

- 1 ( a ) Discuss briefly the benefits as well as the ill effects of irrigation. 16  
 ( b ) Explain the term 'duty' & 'delta'. Derive a relationship between the two for a given base period.  
 ( c ) Determine the storage capacity of soil from the following data.  
 Field capacity = 35%; Wilting point =12% Root zone depth = 1.1m; Dry unit weight of Soil = 1750 kg/m<sup>3</sup>. Also determine the depth of water required in the field if irrigation water is applied when moisture content falls to 20% & the field application efficiency is 80%. Considering conveyance loss as 12% of outlet discharge. Calculate the depth of water needed at canal outlet.

- 2 ( a ) Explain the working of a sprinkler with a neat sketch. 16  
 ( b ) What is the necessity of crop rotation? How fertility of soil can be maintained?  
 ( c ) A tube well is having discharge of 500m<sup>3</sup>/hr. It has to irrigate 150 hectares of wheat & 70 hectares & sugarcane during a year. The delta for wheat & sugercane are 0.6m & 1.8m respectively. How many hours a tubewell should run to irrigate wheat & sugercane?

**OR**

- 2 ( a ) Discuss the drawbacks of Kennedy's theory for design of canal in alluviom soil. 16  
 ( b ) Describe briefly the various considerations made in the alignment of an irrigation canal.  
 ( c ) Design a trapezoidal concrete lined canal, it carry a discharge of 400m<sup>3</sup>/s. at a slope of 1 in 5000. Take side slope of canal 1.5 : 1 & Manning's Rugosity coefficient as 0.012. Assume B/D ratio to be 5.

- 3 ( a ) Write short notes on any **three** : 8  
 ( i ) Scepage failure of earth dam  
 ( ii ) Classification of irrigation canal  
 ( iii ) Waterlogging & its control  
 ( iv ) Assessment of irriagation water.

**P. T. O.**

## A-2

### SECTION II

- 4 ( a ) Draw a neat sketch of diversion headworks & explain functions of each component.  
( b ) Discuss various modes of failure of Gravity Dam.  
( c ) Differentiate between ( i ) Weir & Barrage ( ii ) Silt excluder & silt ejector.

OR

- 4 ( a ) What are the factor which affect the selection of site for dam? Discuss them in brief.  
( b ) Under which sotation the Bandhara irrigation is adopted & what are the main points to be considered for its site selection?  
( c ) Following data refers to homogeneous earth dam; Top width = 4m, Head of water u/s = 16m u/s & d/s slope = 2.5H : 1 V & 2H : 1V respectively. Free board = 2.5m. Horizontal filter 37m from d/s toe. Coefficient of permeability  $K = 0.008$  cm/sec. Calculate seepage per meter length of dam.

- 5 ( a ) Discuss various methods used for energy dissipation below spillway.  
( b ) What do you mean by the elementary profile of a gravity dam? Discuss in brief the forces acting on the dam, while determining elementary profile.  
( c ) Explain step by step procedure to draw phreatic line for earth dam.

OR

- 5 ( a ) What do you understand by a fall in a canal? Why is it necessary? How do you select its location?  
( b ) Define the term exit gradient. What is the importance of exit gradient? How would you check the exit gradient?  
( c ) A concrete gravity dam has maximum waterlevel 305.0 m, bed level 225.0m, top R.L of dam 309.0 m, d/s face slope starts at R.L 300.0 m d/s slope slope 2 : 3, tail water is nil, u/s face of dam is vertical, centreline of drainage gallery is 8m d/s of u/s face, uplift press is 100% at heel, 50% at line of gallery & zero at toe. Weight of concrete is  $2.4 \text{ t/m}^3$ . Considering only weight, water pressure & uplift determine ( i ) Maximum vertical stresses at the toe & heel of dam  
( ii ) Major principal stresses at toe of dam and ( iii ) intensity of shear stress on a horizontal plane.

- 6 ( a ) Write short notes on any three :  
( i ) Head regulator  
( ii ) Filter criteria for earth dam  
( iii ) Spillway gates  
( iv ) Canal lining & its advantage.