

**III B.Tech. II Semester Supplementary Examinations,
November/December -2005
WATER RESOURCES ENGINEERING-II
(Civil Engineering)**

Time: 3 hours

Max Marks: 80

**Answer any FIVE Questions
All Questions carry equal marks**

1. (a) What do you mean by safe yield. Explain how would you determine safe yield from a reservoir of given capacity.
(b) Write a small note on reservoir sedimentation. How do you estimate the probable life of a reservoir? [8+8]
2. (a) Differentiate between
 - i. Diversion Dam and Detention Dam.
 - ii. Over flow Dam and Non-overflow Dam.
 - iii. Rigid Dam and Non-rigid Dam
 - iv. Low Dam and High Dam.(b) Enumerate the different types of dams. What are the factors which effect the selection of a particular type of dam? [8+8]
3. (a) Discuss the main principles of design of masonry gravity dam. Explain how the design procedure is evolved.
(b) Determine the minimum safe base width of an elementary profile of a gravity dam holding 50m depth of water. Assume specific gravity of dam material as 2.4, uplift factor as 0.4, coefficient of friction between concrete and foundation soil is 0.7. Also find out principal and shear stresses at toe of dam. [8+8]
4. (a) Explain the method of checking the stability of earth dam foundation against shear failure.
(b) Derive an expression for discharge through the body of an earth dam with horizontal filter at the downstream. [8+8]
5. (a) Define spillway. What are its functions. Enumerate various types of spillways. Also mention where each of these is suitable.
(b) Describe ogee spillway and sketch an ogee profile. How it is designed. [8+8]
6. (a) Explain the different conditions governing the relationship between JHC and TWC and the corresponding energy dissipation arrangement.
(b) Sketch and explain stilling basin with horizontal apron. Also represent basin appurtenances. [8+8]
7. (a) Explain the design criteria of sarda type canal fall.

- (b) What do you understand by canal head regulator and cross regulators. Describe their functions also. [8+8]
8. (a) Discuss the factors governing the suitable type of a cross drainage work. Describe various steps for the design of a syphon aqueduct.
- (b) Distinguish between:
- i. Aqueduct and syphon aqueduct.
 - ii. Syphon and super passage
 - iii. Level crossing and inlet. [8+8]

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1. (a) Describe in various investigations required for reservoir planning.
(b) Explain different storage zones of a Reservoir with the help of a neat sketch. Does dead storage constitute a loss in a reservoir feeding a hydel power plant. Explain. [8+8]
2. (a) Discuss the merits and demerits of various types of dams in detail.
(b) Discuss the geological and topographical features which affect the selection of type of dam. [8+8]
3. A concrete dam can be assumed to be trapezoidal in section having a top width of 2m and bottom width of 10m. It's height is 12m and the upstream face has a batter of 1:10. Give an analysis of the stability of the dam for the base section for overturning and sliding in the full reservoir condition assuming no free board allowance but allowing for uplift pressures. Assume uplift intensity factor as 100%. Also determine the compressive stress at the toe and the heel and major principal and shear stress developed at the toe. Assume weight of concrete to be 2.4t/m^3 unit shear strength of concrete to be 140t/m^3 and the coefficient of friction between concrete and foundation soil to be 0.7. [16]
4. (a) Illustrate with neat sketch, the following parts of an earth dam and state their functions briefly.
 - i. Rock Toe
 - ii. Horizontal Drainage Blanket
 - iii. Cutoff
 - iv. Riprap.(b) A zoned earth dam has to be built on a river bed with highly permeable gravel and sand to a depth of 20m. Height of the dam above the river bed is 50m. Draw a suitable section of the dam you would propose and give specifications for different materials. [8+8]
5. (a) What do you understand by "priming" and "Depriming". Describe various devices used for early priming in saddle siphon spillway.
(b) Explain the qualities of a good siphon. Describe the working of a volute siphon with the help of a neat sketch. [8+8]
6. (a) Explain hydraulic jump type stilling basin with sloping apron with the help of a neat sketch.

- (b) Discuss Hydraulic jump computations. [8+8]
7. (a) Describe canal escape with the help of a neat sketch.
- (b) What is an outlet. What are the requirements that an outlet should fulfil. Also explain flexibility and proportionality of an aquifer. [8+8]
8. (a) Explain the necessity of cross Draingae works. Explain different types of cross Drainage works in common use.
- (b) What are the different methods of designing canal transitions. Explain any one method in detail. [8+8]

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1. (a) Define reservoir. Discuss various types of reservoirs. Distinguish between single purpose and multipurpose reservoirs.
(b) Define mass inflow curves and demand curves. Explain the procedure for finding storage capacity of a reservoir in order to meet a particular rate of demand. [8+8]
2. (a) Discuss the factors which are considered for the selection of site for a proposed dam. It is assumed that the type of dam has already been selected for the project.
(b) Discuss the various forces acting on a gravity dam in brief. [8+8]
3. (a) Show that the base width of an elementary profile of a gravity dam is $\frac{h}{e}$ where h is height of elementary profile and e is the specific gravity of masonry.
(b) Design the practical profile of a gravity dam of stone masonry given the following data.
R.L of base of dam = 1250m
R.L. of HFL = 1280m.
Specific gravity of masonry = 2.4
Safe compressive stress for masonry of dam = 120t/m²
4. (a) Explain how the following parameters effect design of an earthen dam.
 - i. OMC
 - ii. c and ϕ values.
 - iii. permeability of soil
 - iv. sudden draw down of reservoir.
(b) Discuss the control of seepage in earthen dams in detail. [8+8]
5. (a) Explain the different types of spillway gates with neat sketches.
(b) What is chute spillway. Discuss the design principles involved in the chute spillway. Why is it preferred to ogee and other types of spillways. [8+8]
6. (a) Explain why the energy dissipation should take place in spillways. Discuss various methods used for energy dissipation.
(b) Explain the design procedure for standard stilling basin Type I. [8+8]

7. (a) What do you understand by a rigid module. Describe the working of Gibb's module with the help of a sketch.
(b) Describe different types of canal falls in brief. [8+8]
8. (a) Explain mitra's Method of hyperbolic transition. Derive the equation you use.
(b) Explain the functioning of a level crossing and inlet with the help of sketches. [8+8]

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1. (a) Discuss the factors which are considered for the selection of a site for a Reservoir.
(b) Discuss the various methods of reservoir sediment control. Also explain different causes of silting of reservoirs and suggest suitable method for its control. [8+8]
2. (a) Define the term “Dam”. Discuss in detail the classification of dams.
(b) Write a detailed note on foundation problems and their remedies. [8+8]
3. A concrete gravity dam 15m in height has a top width of 6m and a free board of 3m. upstream face of dam is vertical while downstream face has a slope of 08H to 1V right from top of the dam. Determine factor of safety against overturning and location and magnitude of maximum pressure on foundation. Neglect all other forces except those due to hydrostatic pressure, full uplift pressure and self weight. Take unit weight of concrete as 2.4t/m^3 [16]
4. (a) Explain the causes of failure of earth dams.
(b) Explain the method of plotting phreatic line for an earth dam with a horizontal filter at the down-stream. Also sketch the phreatic line if there is no filter at the d/s end. [8+8]
5. An ogee spillway with vertical upstream face has design discharge of 3000 cumecs, crest length of 150m, normal reservoir level is 700.00, Average river bed level is 650.00 and coefficient of discharge is 2.2. Determine the crest level and complete profile of the overflow spillway section. [16]
6. (a) Suggest different protection works for different relative positions of JHC and TWC. Also draw neat sketches for each case.
(b) List out various stilling basin appurtenances and show their locations in a stilling basin. Also explain their functions. [8+8]
7. (a) What is the necessity of providing a fall on canal. How would you decide the location of a fall. Write a detailed note on notch type fall.
(b) Distinguish clearly between non-modular and semi-modular outlets. Explain Kennedy’s gauge outlet with the help of a sketch. [8+8]
8. (a) Draw a typical plan and section through aqueduct and explain the salient features.

- (b) Explain how the uplift pressure is calculated in case of Aqueduct and syphon Aqueduct. [8+8]
