

III B.Tech II Semester Regular Examinations, Apr/May 2006
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 life of a reservoir. Explain how it is estimated in detail.
(b) How will you distinguish a retarding reservoir from a detention reservoir?
What are their relative advantages and disadvantages? [8+8]
2. (a) Describe the effect of wave pressure and silt pressure on gravity dams with the help of neat sketches.
(b) Discuss I.S. recommendations for different combination of loading during the design of gravity dams. [8+8]
3. (a) Prove that the maximum shear stress intensity in on elementary profile is twice that the average.
(b) How will you check the stability of the gravity dam section for reservoir full condition. [8+8]
4. (a) Illustrate with neat sketches, the following parts of an earthen dam and state their functions briefly.
 - i. Rock toe
 - ii. Horizontal drainage blanket
 - iii. Cut off
 - iv. Riprap. [8](b) Explain design requirements for filter and phreatic line in an earthen dam. [8]
5. (a) Compare and contrast standard crested shaft spillway and Flat crested shaft spillway.
(b) Determine the discharge through a chute spillway of ogee crest. Length of spillway is 250m. Height of spillway crest above u/s approach channel is 10 m. Width of approach channel is 250 m and depth of water over spillway crest is 5m. Assume coefficient of discharge as 2.5 neglecting velocity of approach. [8+8]
6. (a) Describe stilling basin with horizontal apron type energy dissipater with the help of neat sketch.
(b) Write a detailed note in ski jump bucket and Roller bucket. [8+8]
7. Design crest wall and cistern of a sarda type fall on a channel of 15 cumecs, bed width 18m, depth 1.5m, U/S FSL 101m, bed level is 99.5m, No supply Level is 90.00m, Fall 1.0m, side slope is $1\frac{1}{2}$:1. Assume suitable missing data. [16]

8. (a) Explain Hinds method of designing canal transitions.
(b) Explain inlet, outlet and inlet and outlet.

[8+8]

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1. (a) What do you understand by storage zones of a reservoir. Discuss live storage and dead storage. Does dead storage constitute a loss in reservoir feeding a hydel power plant.
(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) Explain under what circumstances would you adopt a gravity dam and earth-ern dam.
(b) What are the factors which effect the selection of type of a dam. Explain. [8+8]
3. (a) Differentiate between a low gravity dam and a high gravity dam. What do you understand by the limiting height of low dam.
(b) Explain the main principles of design of a masonry gravity dam. Explain how the design profile is evolved. [8+8]
4. (a) Sketch out sections of earth dam to suit various conditions of available material and existing foundation conditions.
(b) Explain the method of stability analysis of d/s slope during steady seepage with the help of neat sketch. [8+8]
5. (a) Compare and contrast standard crested shaft spillway and Flat crested shaft spillway.
(b) Determine the discharge through a chute spillway of ogee crest. Length of spillway is 250m. Height of spillway crest above u/s approach channel is 10 m. Width of approach channel is 250 m and depth of water over spillway crest is 5m. Assume coefficient of discharge as 2.5 neglecting velocity of approach. [8+8]
6. (a) Discuss various methods used for energy dissipation below spillways.
(b) Calculate discharge over a spillway, crest length 100m, wherein water flow depth changes from 1m to 4m in hydraulic jump formation in stilling basin. [8+8]
7. Design crest wall and cistern of a sarda type fall on a channel of 15 cumecs, bed width 18m, depth 1.5m, U/S FSL 101m, bed level is 99.5m, No supply Level is 90.00m, Fall 1.0m, side slope is $1\frac{1}{2}$:1. Assume suitable missing data. [16]

8. (a) Discuss the factors governing the suitable type of a cross drainage work.
(b) Describe syphon aqueduct with a neat sketch. [8+8]

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1. (a) Define surcharge storage, valley storage, safe yield and secondary yield.
- (b) Work out the life of a reservoir with an initial reservoir capacity of 30 million cubic metres, if the annual flood inflow is 60 million cubic metres and the average annual sediment inflow is 3,60,000 tonnes. Assume specific weight of sediment equal to 1200 kg/m^3 . The useful life of the reservoir will terminate when 80% of initial capacity is filled with sediment. [8+8]

Capacity/Inflow	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Trap efficiency %	87	93	95	95.5	96	96.5	97	97.2	97.3	97.5

2. (a) Explain under what circumstances, each of the following is preferred to
 - i. Arch dam
 - ii. Buttress dam
 - iii. Earth dam
 - iv. Masonry gravity dam [8]
- (b) Discuss engineering surveys that are carried out to evolve a suitable location, design and construction of the dam structure in detail. [8]
3. (a) It is proposed to construct a gravity dam at a particular river site. Enumerate and explain the various steps needed to carry out the construction.
- (b) Discuss various modes of failure of a gravity dam in detail. [8+8]
4. (a) Explain the method of plotting phreatic line for an earth dam with horizontal filter at down stream. Also sketch the phreatic line if there is no filter at the d/s end.
- (b) Discuss the factors which influence the design of an embankment dam. [8+8]
5. (a) Define chute spillway. Discuss the design principles involved in the chute spillway. Why is it preferred to ogee and other types of spillways.
- (b) What are the spillways and why are they provided. Name the various types of spillways and spillway Gates. [8+8]
6. (a) Describe stilling basin with horizontal apron type energy dissipater with the help of neat sketch.

- (b) Write a detailed note in ski jump bucket and Roller bucket. [8+8]
7. Design crest wall and cistern of a sarda type fall on a channel of 15 cumecs, bed width 18m, depth 1.5m, U/S FSL 101m, bed level is 99.5m, No supply Level is 90.00m, Fall 1.0m, side slope is $\frac{1}{2}$:1. Assume suitable missing data. [16]
8. (a) Explain the necessity of a cross drainage structure. How do you classify cross drainage works. Explain.
- (b) Describe canal syphon with the help of a neat sketch. [8+8]

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1. (a) Discuss the classification of reservoirs in detail.
(b) Explain how the capacity of a reservoir is determined with the help of mass curve. [8+8]

2. (a) Describe the effect of wave pressure and silt pressure on gravity dams with the help of neat sketches.
(b) Discuss I.S. recommendations for different combination of loading during the design of gravity dams. [8+8]

3. A triangular section gravity dam 40m has water stored upto top and base width is 30m. Analyse the dam section to determine
 - (a) Factor of safety against sliding
 - (b) Factor of safety against overturning
 - (c) There is no tension anywhere along the base of dam and
 - (d) maximum compressive stress in the dam body is within safe crushing strength of the material (10 kg/cm^2).

Assume coefficient of friction between the base and foundation as 0.7 and uplift pressure intensity coefficient as 0.45. [16]

4. (a) Discuss the checks that are required to be made to investigate the stability of an earthen dam.
(b) Give a suitable design for a 20m high dam for a site where both clay silt and sand gravel are available in abundance and where foundation is pervious to a depth of 10m. Assume suitable data. Give reasons favouring the suggested design. [8+8]

5. (a) Discuss in brief, different types of spillways provided for dams and mention where each of these is suitable
(b) What is meant by priming and depriming element of siphon. Discuss the devices used for early priming in a saddle siphon spillway. [8+8]

6. (a) Discuss energy dissipation below spillways.
(b) What is Hydraulic Jump? Describe hydraulic jump Computations by giving different expressions involved in it. [8+8]

7. Design crest wall and cistern of a sarda type fall on a channel of 15 cumecs, bed width 18m, depth 1.5m, U/S FSL 101m, bed level is 99.5m, No supply Level is 90.00m, Fall 1.0m, side slope is $\frac{1}{2}$:1. Assume suitable missing data. [16]
8. (a) Describe the classification of aqueducts in detail. Also explain under what circumstances each one is used.
- (b) Explain mitra's method of hyperbolic transition. Derive the equation you use. [8+8]
