

## UNIT 1

1. Draw a neat sketch of a River –regulator and explain its salient components.
2. Write short notes on :
  - (i) Silt ejector
  - (ii) Scouring sluices
  - (iii) Dividing groyne
3. Differentiate between weir and a barrage.
4. Draw a neat layout of Diversion head-works and indicate the various components of the system. Briefly indicate the function of each component.
5. What are the functions of a canal head regulator?
6. What is the purpose served by “scouring sluices” at weirs? What are the important points to be borne in mind in designing these sluices?
7. Illustrate with neat sketch the following parts of a barrage:
  - (i) Sheets piles
  - (ii) Fish ladder
  - (iii) Silt excluder
  - (iv) Divide wall
8. What are “under-sluices and what are their functions in a river regulator?
9. What are the two principle methods of regulating the canal supplies in a diversion head works scheme? What are their comparative merits and demerits?
10. Differentiate between a Silt extractor and a Silt excluder. Draw a neat sketch and discuss the principles involved in designing the different components of a silt extractor.
11. Draw a neat sketch of a silt excluder and indicate briefly the principles involved in designing its different components. How will you express its efficiency?
12. Describe briefly some of the effects of silting in rivers.
13. Describe briefly a method of removal of silt accumulation behind a river regulator.

14. Briefly explain the salient features of Khosla's theory and how it is used in the design of permeable foundations?
15. How does Lane's theory differ from Bligh's creep theory?
16. What is meant by piping on foundation of a weir. Explain Bligh's method of safe guarding the foundation against the ill effects of piping.
17. Explain briefly Khosla's exist gradient concept.
18. State the fundamental difference between Khosla's theory and Bligh's creep theory for seepage below a weir.
19. What are the main causes of failures of weirs on permeable foundations and what remedies would you suggest to prevent them?
20. What is meant by piping in a hydraulic structure? What are ill-effects of piping? What are the precautionary methods to avoid the ill effect of piping?
21. What are the different types of weirs? Explain with neat sketches circumstances under which each type is adopted.

## UNIT 2

1. What is meant by Cross –Drainage Works? Explain as to why such works are not met within a ridge canal system.
2. What are the different types of cross drainage works that are necessary on a canal alignment? State briefly the conditions under which each one is used.
3. Write short notes on :
  - (i) Syphon
  - (ii) Super passage
  - (iii) Syphon aqueduct
  - (iv) Aqueduct
  - (v) Canal syphon
  - (vi) Level crossing
4. Under what conditions of drainage and canal crossings are syphons provided? Draw a plan and section through a typical branch canal syphon, and suggest a method for reducing uplift on the floor of the work.

5. Discuss with neat sketches, the three different types of aqueducts which can possibly be constructed depending upon the size of the drainage to be passed below the canal. Also  
Discuss the factors governing the choice of any of these three types of aqueducts.
6. Discuss the various types of cross drainage works used in canal systems.
7. What considerations govern the selection of the different types of works mainly depending upon the levels of the canal and the drainage?
8. Give neat sketch of suitable designs of aqueducts for each of the following crossings:
  - (i) A major canal over a small drainage.
  - (ii) A canal carrying low discharge over a large drainage.
  - (iii) A major canal over a large drainage.
9. State under what circumstances you will recommended the use of the following cross drainage structures:
  - (i) Syphon
  - (ii) Inlet
  - (iii) Aqueduct
10. What are cross drainage works? What is the necessity of such a work in a canal project, and how does this necessity is fulfilled by such works?

### **UNIT 3**

1. What is meant by a Flood control reservoir and what are their different types?
2. Discuss with a neat sketch the various storage zones of the dam reservoir.
3. Explain how the storage capacity of a reservoir is fixed.
4. What is the relation between reservoir capacity and reservoir yield?
5. Describe briefly the techniques that are employed for computing the storage capacity of a reservoir for different water surface ecapacity of a relevations.
6. What are the factors on which the rate of silting of an impounding reservoir depends? What is trap efficiency?
7. What factors you will keep in mind while selecting a suitable site for a dam reservoir?

8. Briefly describe as to how you would fix the storage capacity of a reservoir and the height of the dam required for this storage.
9. Explain the mass curve method that can be used for determining
  - (i) Reservoir capacity for fulfilling given demand
  - (ii) Demand rate from a reservoir of a given capacity
10. Write short notes on the following:
  - (i) Reservoir losses
  - (ii) Reservoir clearance
  - (iii) Economic height of a dam
  - (iv) Reservoir sedimentation and its control
  - (v) Trap efficiency
  - (vi) Estimating the life of a reservoirs
11. What are the earthen dams and under what circumstances are they preferred?
12. Enumerate the different types of earthen types, and draw neat sketches showing each types.
13. What is meant by pore water pressure? What is its significance in the design of earthen dams?
14. Briefly discuss the checks that are required to be made to investigate the stability of an earthen dam.
15. Define and explain the term phreatic line in earthen dams.
16. Explain and elaborate the importance of seepage through earthen dams.
17. Explain the meaning and importance of equipotential lines and stream lines in connection with seepage analysis of earthen dams.
18. Differentiate between horizontal and vertical piping in earth dams. Suggest permanent measures to check vertical piping.
19. What are the causes of failures of earth dam?
20. Write short notes on any five of the followings:
  - (i) Rock toe
  - (ii) Climney drain
  - (iii) Relief wells
  - (iv) Slope protection in earthen dams
  - (v) Rock fill dams

- (vi) Consolidation of earthen dams
- (vii) Seepage failures of earthen dams
- (viii) Rational design of drainage filters for earthen dams.

#### **UNIT 4:**

21. What is meant by a Flood control reservoir and what are their different types?
22. Discuss with a neat sketch the various storage zones of the dam reservoir.
23. Explain how the storage capacity of a reservoir is fixed.
24. What is the relation between reservoir capacity and reservoir yield?
25. Describe briefly the techniques that are employed for computing the storage capacity of a reservoir for different water surface elevations.
26. What are the factors on which the rate of silting of an impounding reservoir depends? What is trap efficiency?
27. What factors you will keep in mind while selecting a suitable site for a dam reservoir?
28. Briefly describe as to how you would fix the storage capacity of a reservoir and the height of the dam required for this storage.
29. Explain the mass curve method that can be used for determining
  - (iii) Reservoir capacity for fulfilling given demand
  - (iv) Demand rate from a reservoir of a given capacity
30. Write short notes on the following:
  - (vii) Reservoir losses
  - (viii) Reservoir clearance
  - (ix) Economic height of a dam
  - (x) Reservoir sedimentation and its control
  - (xi) Trap efficiency
  - (xii) Estimating the life of a reservoirs

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  - (xv) Seepage failures of earthen dams
  - (xvi) Rational design of drainage filters for earthen dams.

#### **UNIT 5:**

1. "A spillway is a safety valve in a dam". Discuss the statement.
2. What are spillways and where are they provided?
3. Enumerate the various types of spillway, and describe in details the most widely used type.
4. Discuss briefly the design principles that are involved in the design of an ogee spillway and a chute spillway.

5. How would you compute the discharge passing over an ogee spillway. Discuss the various factors affecting the coefficient of discharge in the discharge equation.
6. Compute the discharge over an ogee spillway with coefficient of discharge  $C=2.3$  at a head of 3.8 m. The effective length of the spillway is 110 m. Neglect the velocity of approach.
7. Discuss the merits and demerits of different types of spillway gates.
8. What is a siphon spillway? Enumerate the two types of saddle syphon spillways, and describe with a neat sketch the component parts and functioning.
9. Describe briefly the construction and functioning of a Hooded type of siphon spillways. What is its discharge equation?
10. What is meant by priming? Discuss the priming arrangements used in saddle spillway. What is its discharge equation?
11. What is meant by an energy dissipators ? Discuss the various methods used for energy dissipation below spillways.
12. What is meant by Hydro-power? Compare hydro-power with thermal power w.r.t to Indian conditions.
13. Enumerate the different types of hydel plants, and describe the storage plant.
14. How do you classify a hydro-electric scheme on the basis of its operating head.
15. What are the principle components of a hydro-electric scheme ? Discuss the utility of each component.
16. Write a brief note on the use and types of turbines in a hydroelectric scheme.
17. What is a surge tank and what are its types and uses ?
18. What is a draft tube and what are its uses ?
19. Write short notes on :
  - I) Hydropower potential of India
  - II) Hydropower vs thermal power
  - III) Surge tanks and their types
  - IV) Hydraulic turbines and their types

V) Trash racks

20. Define and differentiate between the following in connection with hydropower:

- I) Firm and secondary power.
- II) Load factor, utilization factor and plant factor.
- III) Installed and dependable capacity of a power plant.
- IV) Design head, rated head, gross head, operating head and effective head.