

UNIT – II CANAL IRRIGATION

1. Define canal

A canal is an artificial channel constructed to convey water from rivers, reservoirs, etc. for several purposes like power generation, navigation, irrigation, etc.

2. What are the classifications of canal?

Canals are classified into different types based on factors which are as follows :

- Based on the nature of the supply source
 - Based on functions
 - Based on the type of boundary surface soil
 - Based on the financial output
 - Based on discharge
 - Based on canal alignment
3. What are the classifications of canal based on the nature of the supply source?
- Permanent Canal
 - Inundation Canal
4. What are the classifications of canal based on the Function?
- Irrigation canal
 - Power canal
 - Feeder canal
 - Carrier canal
 - Navigation canal
5. What are the classifications of canal based on the type of boundary surface soil?
- Alluvial canal
 - Non-alluvial canal
 - Rigid Surface canal
6. What are the classifications of canal based on the financial output?
- Protective canal
 - Productive canal
7. What are the classifications of canal based on the discharge?
- Main canal
 - Branch canal
 - Major distributary canal
 - Minor distributary canal
 - Field canal
8. What are the classifications of canal based on the canal alignment?
- Ridge canal
 - Contour canal
 - Side-slope canal

9. What is canal alignment?

The **alignment** is the feasible path or route from a source location to the desired destination. A **canal** has to be **aligned** in such a way that it covers the entire area proposed to be irrigated with the shortest possible length, and at the same time, its cost including the cost of cross-drainage works is a minimum.

10. Define Canal drop or Fall?

A canal fall or drop is an **irrigation structure** constructed across a canal to **lower down its bed level to maintain the designed slope** when there is a **change of ground level to maintain the designed slope** when there is change of ground level

11. What is the need/necessity of canal falls?

It requires excessive earthwork in filling to maintain the slope. In such a case **falls** are provided to avoid excessive earth work in filling. When the slope of the ground is more or less uniform and the slope is greater than the permissible bed slope of **canal**.

12. List the types of cross-drainage work

(1) Type I (Irrigation canal passes over the drainage)

- Aqueduct
- Siphon aqueduct

(2) Type II (Drainage passes over the irrigation canal)

- Super passage
- Siphon super passage

(3) Type III (Drainage and canal intersection each other of the same level)

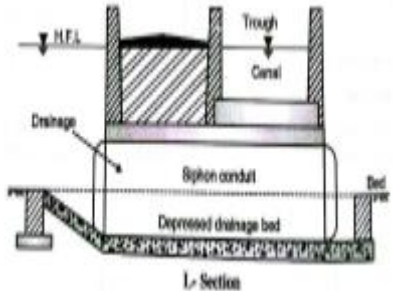
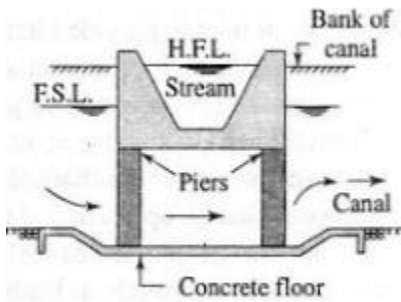
- Level Crossing
- Inlet and outlet

13. What is the necessity of cross drainage works?

The **cross-drainage work** is required to dispose of the **drainage** water so that the canal supply remains uninterrupted. A **cross-drainage work** is also called as **drainage crossing**. The canal at a **cross-drainage work** is generally taken either over or below the **drainage**.

14. Differentiate aqueduct and canal siphon?

Siphon Aqueduct	Canal Siphon
The hydraulic structure in which irrigation canal is passing over the drainage, but the drainage water cannot pass clearly below the canal is known as siphon aqueduct.	If two canals cross other and one of the canals is siphoned under the other, then the hydraulic structure at crossing is called canal siphon.
In siphon aqueduct the H.F.L. of the drain is above the bed of the canal.	In canal siphon the F.S.L. of the canal is much above the bed level to the drain.

Siphon Aqueduct	Canal Siphon
Here bed of the drainage is lowered.	Here the canal bed is lowered.
Water runs under siphonic action through the aqueduct barrels.	Canal runs under symphonic action under the trough.
	

15. What is super passage?

The **Super Passage** is a hydraulic structure in which the drainage passes over the irrigation canal. The structure is suitable when the bed level of drainage is above.

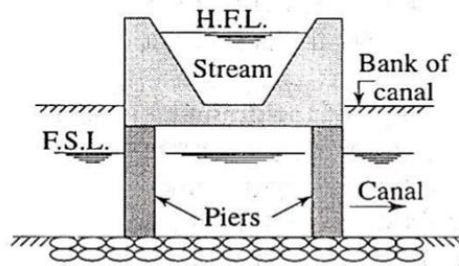


Fig: Super Passage

16. What is level crossing?

When the bed level of canal and the stream are approximately the same and quality of water in canal and stream is not much different, the crossdrainage work constructed is called level crossing where water of canal and stream is allowed to mix.

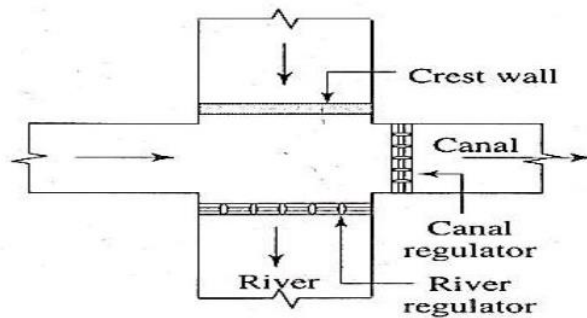


Fig: Level Crossing

17. What is canal head works?

Headwork's is a civil engineering term for any structure at the head or diversion point of a waterway. It is smaller than a barrage and is used to divert water from a river into a canal or

from a large canal into a smaller canal.

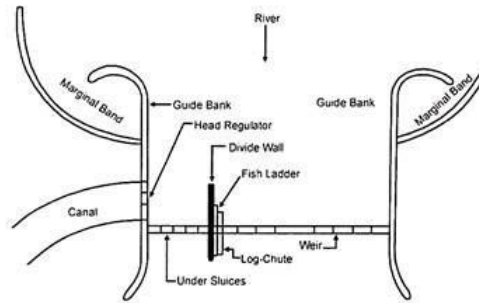
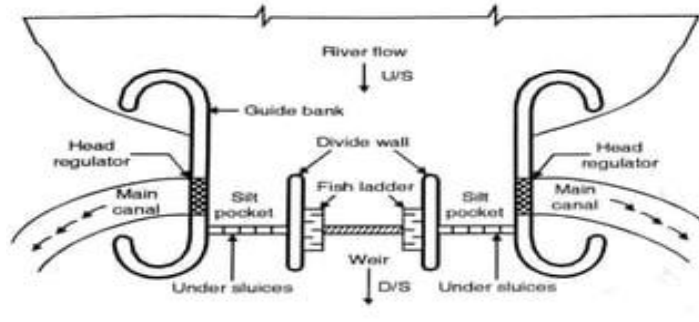


Fig. 15.1. Layout of a diversion head works.

18. Give the component canal head works with neat sketch?

- 1) Under Sluice: 2) Divide Wall: 3) Fish ladder:
- 4) Silt exclusion devices: 5) Silt ejectors: 6) Guide bank
- 7) Marginal embankment: 8) canal head regulator 9) weir (barrage)



19. Site selection for the canal head works?

- ❖ At the site, the river should be being straight and narrow
- ❖ The riverbanks are well defined.
- ❖ The land shall not be valuable submerged dam or barrier when you build.
- ❖ Site elevation must be much larger than the one being irrigated area.
- ❖ The site be easy access by road railways.
- ❖ Building materials be available around the site.
- ❖ The site should not be too far from the command area of the Project, para Avoid Lost transmission.

20. What you mean by canal regulator?

Structure at the head of canal taking off from a reservoir may consist of number of spans separated by piers and operated by gates. Regulators are normally aligned at 90° to the weir. Up to 10" are considered preferable for smooth entry into canal. The functions of canal head regulator are:

- ❖ To admit water into the off taking canal.
- ❖ To regulate the supplies into the canal.
- ❖ To indicate the discharge passed into the canal from design discharge formula and observed head of water on the crest.

- ❖ To control the silt entry into the canal. During heavy floods, it should be closed otherwise high silt quantity will leave to the canal.

21. What is river training works?

River training works The river flowing in alluvial plains meander in wide widths. ... Therefore to insure that the river flows through the barrage and protect the submerging of large tracts of costly land and property upstream , certain works upstream of barrage are constructed. These works are called river training works.

22. Classify river training works?

- (1) Embankments,
- (2) Guide Banks or Bell Bunds,
- (3) Spurs or Groynes,
- (4) Impermeable Groynes,
- (5) Permeable Groynes,
- (6) Bed Pitching and Bank Revetment, and
- (7) Dredging of River.

23. What you mean by meandering of rivers?

Meandering rivers. Rivers flowing over gently sloping ground begin to curve back and forth across the landscape. These are called **meandering rivers**. The flows faster in these deeper sections and erodes material from the **river** bank. The water flows more slowly in the shallow areas near the inside of each bend.

24. What is groynes?

It is a rigid hydraulic structure built from an ocean shore (in coastal engineering) or from a bank (in rivers) that interrupts water flow and limits the movement of sediment.

25. What is meant by Headworks? Classify its types.

Any hydraulic structure which supplies water to the off-taking canal is called a headwork.

Headwork may be

- Storage headwork.
- Diversion headwork

26. Define Diversion Headwork.

Diversion head works is a structure constructed across a river for the purpose of raising the water level in the river so that it can be diverted into the off taking canals.

27. Tell the reason for construction of Diversion headwork.

- It raises the water level on upstream side.
- Other uses of this is to regulates the supply of water into canals.
- It controls the entry of silt into canals.
- It provides some pondage creating small pond.
- It helps in controlling the vagaries of river.

28. What are the components of Diversion headwork?

- Weir (or barrage) proper

IRRIGATION ENGINEERING – QUESTION BANK

- Under sluice
- Divide wall
- Fish ladder
- Control head regulator
- Silt excluder, silt ejector
- River training works: guide banks, marginal bunds

29. List the functions of under-sluices

- Preserve a clear and defined river channel approaching the regulator.
- Control the silt entry into the canal.
- Pass the low floods without dropping the shutter of the main weir.
- Provide greater water-way for floods, thus lowering the flood level.
- They scour the silt deposited on the river bed above the approach channel.

30. What are the functions of fish ladder in Diversion headwork?

The tendency of fish is to move from upstream to downstream in winters and from downstream to upstream in monsoons. This movement is essential for their survival. For the movement of the fishes along the course of the river, the fish ladder is essential. In the fish ladder, the baffle walls are constructed in the zigzag manner

31. Give reason for providing canal lining

Canal Linings are provided in canals **to resist the flow of water through its bed and sides**. These can be constructed using different materials such as **compacted earth, cement, concrete, plastics, boulders, bricks etc.** The main advantage of canal lining is **to protect the water from seepage loss**.

32. Give types of canal lining

- Earthen type lining
 - i. **Compacted Earth Lining**
 - ii. **Soil Cement Lining**
- Hard surface lining

PART – B - 14 Marks

1. Distinguish about classification of canals
2. Explain how canals are classified? Discuss the methods to improve canal irrigation system?
3. Extend short note on alignment of canals and its type.
4. State the necessity and location of canal falls?
5. Distinguish about classification of canals falls/Drop

IRRIGATION ENGINEERING – QUESTION BANK

6. Design a canal drop of 2m with the following data
Hydraulic particulars of the canal above drop

Full supply discharge	=4m ³ /sec
Bed width	=6m
Bed level	= +10.00
Full supply depth	=1.5m
Full supply level	=+11.50
Top of Bank level	=2m wide at +12.50
Half supply depth	= 1.0m

7. State the factors to be considered for the choice of a suitable type of cross-drainage work?
8. What do you understand by the term 'Cross drainage works'. Explain it with neat sketches.
9. Distinguish between Aqueduct and super passage.
10. Briefly explain types of the cross drainage works
11. Discuss briefly explain types of Canal Head Regulator with neat sketch
12. What is the necessity of river training works?
13. Describe in brief different types of river training works?
14. What is mean by guide banks? What are their functions and effects?
15. Write short note on river training works with suitable sketches.
16. Explain the properties of canal lining materials suitable for canal lining
17. Explain the types of canal lining