



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

CIVIL ENGINEERING

TUTORIAL QUESTION BANK

Course Name	:	Water Resources Engineering- II
Course Code	:	A70133-R15
Class	:	IV - B. Tech
Branch	:	Civil Engineering
Year	:	2018 – 2019
Course Coordinator	:	Ms. B. Navya, Assistant Professor, Department of Civil Engineering.
Course Faculty	:	Ms. B. Navya, Mr. R. Suresh Kumar, Assistant Professor, Department of Civil Engineering.

COURSE OBJECTIVE:

This course address the concept of dam, earth dam, gravity dam, canals structures, diversion head works, spillways and drainages works, constitutes to be the most common type, Since it is generally built of locally available in their natural state with a minimum of processing .The responsibility of maintenance of the distributing channel and the whole canal networks lies with government, while that of the field channel lies with the farmers. Know about canal regulation works. Ground water, reservoir water and rain water storing.

S NO	QUESTION	BLOOMS TAXONOMY LEVEL	COURSE OUTCOMES
UNIT - I STORAGE WORKS-RESERVOIRS			
Part - A (Short Answer Questions)			
1	Give the classification of reservoirs.	Remember	1
2	Discuss the steps involved in selecting a site for reservoir construction.	Understand	1
3	Write brief notes on reservoir yield.	Remember	1
4	Explain various levels of a reservoir with neat sketch.	Remember	1
5	Write short notes on mass curve and demand curve.	Understand	1
6	Explain how reservoir capacity can be determined using a mass curve.	Remember	1
7	What is meant by reservoir sedimentation?	Remember	1
8	List out the factors affecting sedimentation.	Remember	1
9	List out the control measures for sedimentation	Understand	1
10	What do you understand by the term life of reservoir?	Remember	1
11	Differentiate b/w single and multipurpose reservoir.	Remember	2
12	What are the different factors which influence the life of reservoir?	Remember	1
13	List out the effects of sedimentation of reservoir.	Understand	1

14	List out the factors on which the sediment load of river depends.	Remember	2
15	What are the uses of constructing dam?	Understand	2
16	Give the classification of dams.	Understand	2
17	List the different types of forces acting on the Dam.	Remember	2
18	Give importance of geological structures in the selection of dam site.	Remember	2
19	List the different uses of Dams.	Understand	2
20	Draw the sketches of different types of dams.	Understand	2

Part - B (Long Answer Questions)

1	Explain the following terms, (i) Catchment area (ii) Normal pool level (iii) Maximum pool level (iv) Minimum pool level.	Remember	1
2	Explain the different types of storages in a reservoir with the help of neat sketch.	Remember	1
3	Explain the mass curve method that can be used for determining: (a) Reservoir capacity for fulfilling given demand (b) Demand rate from a reservoir of a given capacity.	Understand	2
4	Describe the procedure for estimating the reservoir capacity using mass inflow and demand curves.	Understand	2
5	How the capacity of reservoir fixed is based on a specific yield? Also explain how safe yield of a reservoir is obtained for a given capacity?	Remember	1
6	What is meant by reservoir sedimentation and life of a reservoir?	Remember	1
7	Give the classification of reservoirs.	Understand	2
8	Write short notes on gravity dam and buttress dam..	Remember	1
9	Discuss the steps involved in selecting a site for reservoir construction.	Understand	2
10	Explain the procedure to determine reservoir capacity using a mass curve.	Understand	3
11	Explain the purpose of Flood Control Reservoir?	Remember	1
12	Define Trap Efficiency? Explain the importance of trap efficiency in determining the life of reservoir.	Understand	1
13	Write brief notes on reservoir yield and safe yield.	Remember	1
14	Explain the purpose of storage or conservative Reservoir?	Understand	1
15	Give the relation between inflow, outflow, storage data for a reservoir.	Understand	1
16	Explain the purpose of retarding and detention reservoir.	Remember	1
17	Write about Distribution reservoir.	Remember	1
18	Explain about Reservoir Losses.	Remember	1
19	What is the purpose of constructing dam?	Understand	1
20	Give the classification of dams.	Remember	2

Part - C (Problem Solving and Critical Thinking Questions)

1	Find the probability life of reservoir with an initial capacity of reservoir 30 million cubic meters, if annual flood inflow is 60 million cubic meters. The useful life of reservoir will terminate when 80%of the initial capacity is filled with sediment. The volume of sediment=1/6 million cubic meters. <table><tr><td>Capacity inflow ratio:</td><td>0.1</td><td>0.2</td><td>0.3</td><td>0.4</td><td>0.5</td><td>0.6</td><td>0.7</td><td>0.8</td><td>0.9</td></tr><tr><td>Trap efficiency %</td><td>87</td><td>93</td><td>95</td><td>95.5</td><td>96</td><td>96.5</td><td>97</td><td>97.2</td><td>97.3</td></tr></table>	Capacity inflow ratio:	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Trap efficiency %	87	93	95	95.5	96	96.5	97	97.2	97.3	Understand	1
Capacity inflow ratio:	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9														
Trap efficiency %	87	93	95	95.5	96	96.5	97	97.2	97.3														
2	Find the probability life of reservoir with an initial capacity of reservoir 37 million cubic meters, if annual flood inflow is 74 million cubic meters. The useful life of reservoir will terminate when 80%of the initial capacity is filled with sediment. The volume of sediment=0.178 million cubic meters. <table><tr><td>Capacity inflow ratio:</td><td>0.1</td><td>0.2</td><td>0.3</td><td>0.4</td><td>0.5</td><td>0.6</td><td>0.7</td><td>0.8</td><td>0.9</td></tr><tr><td>Trap efficiency %</td><td>87</td><td>93</td><td>95</td><td>95.5</td><td>96</td><td>96.5</td><td>97</td><td>97.2</td><td>97.3</td></tr></table>	Capacity inflow ratio:	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Trap efficiency %	87	93	95	95.5	96	96.5	97	97.2	97.3	Understand	1
Capacity inflow ratio:	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9														
Trap efficiency %	87	93	95	95.5	96	96.5	97	97.2	97.3														
3	Find the probability life of reservoir with an initial capacity of reservoir 40 million cubic meters if annual flood inflow is 80 million cubic meters. The useful life of reservoir will terminate when 80%of the initial capacity is filled with sediment. The volume of sediment=0.165 million cubic meters. <table><tr><td>Capacity inflow ratio:</td><td>0.1</td><td>0.2</td><td>0.3</td><td>0.4</td><td>0.5</td><td>0.6</td><td>0.7</td><td>0.8</td><td>0.9</td></tr><tr><td>Trap efficiency %</td><td>87</td><td>93</td><td>95</td><td>95.5</td><td>96</td><td>96.5</td><td>97</td><td>97.2</td><td>97.3</td></tr></table>	Capacity inflow ratio:	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Trap efficiency %	87	93	95	95.5	96	96.5	97	97.2	97.3	Understand	1
Capacity inflow ratio:	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9														
Trap efficiency %	87	93	95	95.5	96	96.5	97	97.2	97.3														
4	Find the probability life of reservoir with an initial capacity of reservoir 47 million cubic meters if annual flood inflow is 84 million cubic meters. The useful life of reservoir will terminate when 80%of the initial capacity is filled with sediment. The volume of sediment=0.198 million cubic meters. <table><tr><td>Capacity inflow ratio:</td><td>0.1</td><td>0.2</td><td>0.3</td><td>0.4</td><td>0.5</td><td>0.6</td><td>0.7</td><td>0.8</td><td>0.9</td></tr><tr><td>Trap efficiency %</td><td>87</td><td>93</td><td>95</td><td>95.5</td><td>96</td><td>96.5</td><td>97</td><td>97.2</td><td>97.3</td></tr></table>	Capacity inflow ratio:	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Trap efficiency %	87	93	95	95.5	96	96.5	97	97.2	97.3	Understand	1
Capacity inflow ratio:	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9														
Trap efficiency %	87	93	95	95.5	96	96.5	97	97.2	97.3														

5	Find the probability life of reservoir with an initial capacity of reservoir 57 million cubic meters if annual flood inflow is 84 million cubic meters. The useful life of reservoir will terminate when 80% of the initial capacity is filled with sediment. The volume of sediment=0.197million cubic meters.									Understand	1
	Capacity inflow ratio:	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	
	Trap efficiency %	87	93	95	95.5	96	96.5	97	97.2	97.3	

UNIT - II GRAVITY DAMS

Part – A (Short Answer Questions)

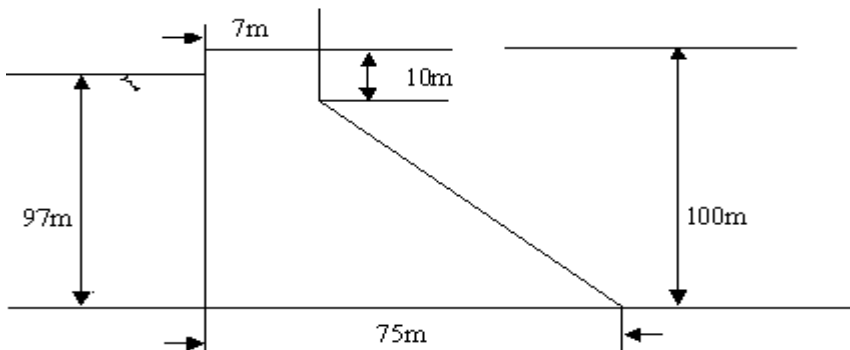
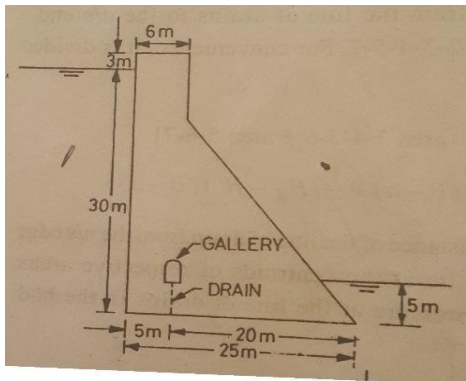
1	Explain the forces acting on a gravity dam.	Understand	3
2	Draw an elementary profile of a gravity dam.	Remember	3
3	Draw the practical profile of a gravity dam.	Understand	3
4	Write the effects of earthquake forces on a gravity dam..	Understand	3
5	Explain the failure of a gravity dam due to overturning.	Understand	3
6	Explain the failure of a gravity dam due to sliding.	Understand	3
7	Explain the failure of a gravity dam due to crushing.	Remember	3
8	Derive the limiting height of a gravity dam.	Understand	3
9	What are the modifications given to an elementary profile to get practical profile?	Understand	3
10	Explain the effect of wave pressure on gravity dam.	Remember	3
11	What is meant by gravity dam?	Understand	3
12	State the merits and demerits of the gravity dam.	Understand	3
13	Define dam base line and structural height of dam.	Remember	3
14	Define Length of the dam and Hydraulic Height of the gravity dam.	Remember	3
15	Short Notes on Limiting Height of Low Gravity Dam.	Remember	3
16	List the various methods of Stability Analysis of Gravity Dam.	Understand	3
17	What are the different types of galleries in Gravity Dam?	Understand	3
18	Write a Short Note on Drainage Gallery.	Remember	3
19	Write a Short Note on Foundation Gallery.	Remember	3
20	Write a Short Note on Inspection Gallery.	Remember	3

Part - B (Long Answer Questions)

1	Define the following parameters with respect to the gravity dam, (a) Dam base line (b) Structural height	Understand	1
2	Write detailed notes on elementary and practical profiles of gravity dams.	Understand	1
3	Enumerate various methods of stability analysis of gravity dam. Explain any two of them.	Understand	1
4	A concrete gravity dam 20 m in height has top width 6 m and free board 2.5 m, upstream face is vertical, while downstream face has a slop of 0.6 H:1 V right from top to bottom. Check the stability of the dam. Take specific weight of concrete as 2.4 t/m ³ consider full uplift. There is no tail water. Assume any other data not given.	Understand	1

5	What are the main points to be considered while selecting a site for a gravity dam construction?	Understand	1
6	Derive limiting height of a gravity dam	Understand	1
7	Write the effects of earthquake forces on a gravity dam.	Understand	1
8	Explain the failure of a gravity dam due to crushing.	Remember	1
9	What are the modifications given to an elementary profile to get practical profile?	Understand	1
10	Explain the forces acting on a gravity dam.	Understand	1
11	What are the advantages of a gravity dam over other dams	Understand	1
12	Differentiate between 'low gravity dam' and 'high gravity dam'	Remember	1
13	Write short notes on: (a)uplift force.(b)Drainage gallery	Remember	1
14	Explain how uplift considerations affect the design of gravity dams.	Understand	1
15	What measures can be adopted to reduce the undesirable effects due to uplift pressure	Understand	1
16	Define the following parameters with respect to the gravity dam I. Length of the dam II. Hydraulic height.	Understand	3

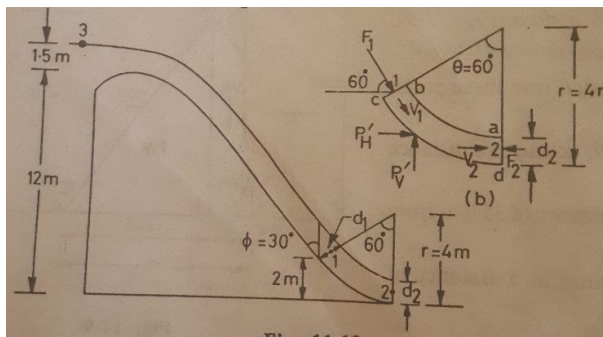
Part – C (Problem Solving and Critical Thinking)

1	The following figure gives profile of a gravity dam with reservoir level as shown. If the co-efficient of friction is 0.8 and weight density of concrete is 24 kN/m^3, Check the safety of the dam against sliding and overturning. Assume any other data not given. 	Understand	3
2	What are the main points to be considered while selecting a site for a gravity dam construction?	Understand	3
3	Determine the uplift force at the base of gravity shown in fig-4.for the following three cases.(a) No drains (b) with drains and grout curtain at a distance of 5m from the u/s end (c) tension crack up to 2m from the u/s end. 	Understand	3

4	A trapezoidal masonry dam of top width 3m and bottom base 8m and height 12m. coefficient of friction between soil is 0.6, allowable compressive strength is 400KN. (a) Check for tension (b) Check for over turning (c) Check for over stressing of masonry	Understand	3
5	A masonry dam of 4m height, top 1m wide and 3m at bottom. Find out maximum and minimum stresses. Unit weight of water 10KN, unit weight of concrete 24KN/m ³ . (a) when the reservoir is full (b) when the reservoir is empty	Understand	3
6	A concrete of trapezoidal section whose height is 16m base width is 8m top width 3m. (a) Find the resultant thrust on the base of dam per unit length or per meter length. (b) Find out the point where the resultant cuts the base? (c) Intensities of maximum and minimum stresses across the base of dam.	Understand	3
7	A Concrete dam of trapezoidal section 12m height base 6m, top width 3m. Unit weight of water is 10 and unit weight of concrete is 25KN. Find the resultant, minimum and maximum intensities of stress.	Understand	3
8	A trapezoidal masonry dam of top width 3m and bottom base 8m and height 12m. coefficient of friction between soil is 0.6, allowable compressive strength is 400KN. (d) Check for tension (e) Check for over turning (f) Check for over stressing of masonry	Understand	3
9	A masonry dam of 5m height, top 1m wide and 2.5m at bottom. Find out maximum and minimum stresses. Unit weight of water 10KN, unit weight of concrete 24KN/m ³ . (a) when the reservoir is full (b) when the reservoir is empty	Understand	3
10	A trapezoidal masonry dam of top width 4m and bottom base 8m and height 10m. coefficient of friction between soil is 0.5, allowable compressive strength is 500KN. (g) Check for tension (h) Check for over turning (i) Check for over stressing of masonry	Understand	3
UNIT-III EARTH DAMS & SPILLWAYS			
Part - A (Short Answer Questions)			
1	What are the types of embankment dams?	Understand	4
2	Explain various earth dams classified based on the materials used.	Understand	4
3	Explain various types of earth dams classified based on methods of construction.	Remember	4
4	Explain the hydraulic failures of earth dams.	Understand	4
5	Explain seepage failures of earth dams.	Remember	4
6	Explain the structural failures of earth dams.	Understand	4
7	Give brief description of phreatic line of an earth dam.	Understand	4
8	Write the criteria for safe design of earth dams.	Understand	4
9	Write short notes on rolled type earth dams.	Understand	4
10	Write short notes on zoned type earth dams.	Remember	4
11	What is the purpose of providing a spill way to the dam structure?	Understand	5

12	What are the essential requirements of a spillway?	Understand	5
13	What are the factors affecting spillway capacity?	Understand	5
14	What are the components of a spillway?	Understand	5
15	Give the classification of spillway based on purpose.	Understand	5
16	Give the classification of spillway based on control	Remember	5
17	Give the classification of spillway based on pertinent feature.	Remember	5
18	Explain free over fall spillway with neat sketch.	Understand	5
19	Explain ogee-shaped spillway.	Understand	5
20	Explain siphon spillway.	Remember	5
Part – B (Long Answer Questions)			
1	Explain earth dams with neat sketch.	Remember	4
2	Write short notes on, (a) Hydraulic failures of earthen dams (b) Significance of pore pressure in relation to earthen dam construction (c) Slope protection in earthen dams (d) Filters in earthen dams.	Understand	4
3	Write briefly about overtopping, wave erosion and piping phenomenon in earthen dams.	Remember	4
4	Explain the design criteria for dams.	Understand	4
5	What is phreatic line? Explain its significance in earthen dams.	Remember	4
6	Explain the structural failures of earth dams	Understand	4
7	Give brief description of phreatic line of an earth dam.	Understand	4
8	Write the criteria for safe design of earth dams.	Understand	4
9	Write short notes on rolled type earth dams.	Understand	4
10	Write short notes on zoned type earth dams.	Remember	4
11	What are the requirements of spillways? What are the factors which affect the spillway capacity? Explain various components of spillway briefly.	Remember	5
12	List any eight qualities of a good siphon.	Understand	5
13	Write short notes on, (a) Straight drop spillway (b) Side channel spillway (c) Ogee spillway (d) Priming device for siphon spillway	Understand	5
14	Given the classification of spillways gates. Explain each type of gate brief	Remember	5
15	Draw the neat sketch of USBR drum gate mention its salient features.	Understand	5
16	Give the classification of spillway based on pertinent feature.	Remember	5
17	What are the factors affecting spillway capacity?	Understand	5
18	Explain ogee-shaped spillway.	Understand	5
19	Explain siphon spillway.	Remember	5
20	Write about hydraulic jump.	Understand	5
Part – C (Problem Solving and Critical Thinking)			

1	For a homogeneous earth dam 52m high, and 2m freeboard, a flow net was constructed and following results were obtained. Number of potential drops=24, numbers of flow channels=4.the dam has a horizontal filter of 40m length at its d/s end. Calculate the discharge per meter length if the coefficient of permeability of the dam is 3×10^{-3} cm/sec.	Understand	4
2	Design a suitable section for the overflow portion of a concrete gravity dam having the d/s face sloping at 0.7 H:1V. The design discharge for the spillway is 8000 cumecs. The height of the spillway crest is kept at RL 204.0m. The average river bed level at the site is 100.0m. The spillway length consists of 6 spans having a clear width of 10m, each. Thickness at each pier may be taken as 2.5m.	Understand	4
3	For a homogeneous earth dam 50m high, and 2.5m freeboard, a flow net was constructed and following results were obtained. Number of potential drops=24, numbers of flow channels=4.the dam has a horizontal filter of 40m length at its d/s end. Calculate the discharge per meter length if the coefficient of permeability of the dam is 3×10^{-3} cm/sec.	Understand	4
4	Design a suitable section for the overflow portion of a concrete gravity dam having the d/s face sloping at 0.6 H:1V. The design discharge for the spillway is 10000 cumecs. The height of the spillway crest is kept at RL 205.0m. The average river bed level at the site is 100.0m. The spillway length consists of 6 spans having a clear width of 10m, each. Thickness at each pier may be taken as 2m.	Understand	4
5	For the overflow section shown in fig.3 determine the dynamic force on the curved surface. take the coefficient of discharge of the spillway as 2.1 and the radius of the bucket (curved section) as 4m	Understand	5



UNIT-IV DIVERSION HEADWORKS & WEIRS ON PERMEABLE FOUNDATIONS

Part – A (Short Answer Questions)

1	Give a brief note on diversion headwork.	Understand	6
2	Distinguish between weir and a barrage.	Understand	6
3	Give the classification of weirs.	Understand	6
4	Draw a neat sketch of layout of a diversion headwork.	Remember	6
5	Mention various components of a diversion headwork.	Understand	6
6	Explain the functions of canal head regulator.	Remember	6
7	Give the necessity of providing silt excluder.	Understand	6
8	What is the purpose of providing a divide wall in a diversion headwork?	Remember	6
9	Give the necessity of providing silt ejector inside a canal..	Understand	6
10	What are guide banks and marginal banks?	Understand	6
11	Explain Bligh's creep theory.	Understand	7

12	Discuss utility and limitations of Khosla's theory.	Understand	7
13	Explain the design of a weir on permeable foundations for surface flow	Understand	7
14	State the fundamental difference between Khosla's theory and Bligh's creep theory for seepage of flow below weir.	Understand	7
15	What is Khosla's theory? How it is used?	Remember	7
16	Explain the criteria adopted in designing various components of weir built on permeable foundations using khosla's theory.	Understand	7
17	Distinguish between Bligh's creep theory and Khosla's theory.	Understand	7
18	What is sub surface flow?	Understand	7
19	Explain the criteria adopted in designing various components of weir built on permeable foundations using Bligh's creep theory.	Understand	7
20	Discuss the limitations and anomalies of Bligh's creep theory.	Understand	7
Part – B (Long Answer Questions)			
1	What is the difference between diversion head works and a storage head works (dam) ? What considerations will you	Understand	6
2	Explain clearly the difference between barrage and weir.	Remember	6
3	Write a short notes on the following, (a) Dropping shutters. (b) Stop logs Also draw the relevant sketches.	Remember	6
4	Explain different causes of weirs or barrages on the regimes of river.	Remember	6
5	Explain the functions of various components of a diversion work.	Understand	6
6	Explain the functions of canal head regulator.	Remember	6
7	Give the necessity of providing silt excluder.	Understand	6
8	What is the purpose of providing a divide wall in a diversion headwork?	Remember	6
9	Give the necessity of providing silt ejector inside a canal..	Understand	6
10	What are guide banks and marginal banks?	Understand	6
11	Discuss utility and limitations of Khosla's theory.	Remember	7
12	Discuss khosla's theory for design of weir on permeable foundations. Enumerate the various corrections that are needed in its application.	Understand	7
13	Compute the uplift pressure based on Bligh's theory.	Understand	7
14	Explain the design criteria of weir on permeable foundations according to Bligh's creep theory.	Understand	7
15	Why exit gradient is provided and how it can be determine.	Understand	7
16	Explain the criteria adopted in designing various components of weir built on permeable foundations using khosla's theory.	Understand	7
17	Distinguish between Bligh's creep theory and Khosla's theory.	Understand	7
18	What is sub surface flow?	Understand	7
19	Explain the criteria adopted in designing various components of weir built on permeable foundations using Bligh's creep theory.	Understand	7
20	Discuss the limitations and anomalies of Bligh's creep theory.	Understand	7
Part – C (Problem Solving and Critical Thinking)			
1	Data refer to fall site, full supply discharge $u/s/d/s = 50$ cumecs, bed width $u/s/d/s = 28.0$ m, full supply level $u/s/d/s = 150.00/148.50$, bed level $u/s/d/s = 148.00/146.50$ m. What type of fall would you recommend for this canal. Design cistern of fall.	Understand	7
2	Why do we provide a fall on canal. Enumerate different types of falls.	Understand	7

3	Data refer to fall site, full supply discharge $u/s/d/s = 40$ cumecs, bed width $u/s/d/s = 25.0$ m, full supply level $u/s/d/s = 150.00/148.50$, bed level $u/s/d/s = 148.00/146.50$ m. What type of fall would you recommend for this canal. Design cistern of fall.	Understand	7
4	Design the size and number of notches required for a canal drop with the following particulars: Full supply discharge = 30 cumecs Bed width = 15 m. F.S. depth = 1.8 m. Assume any other data if required.	Understand	7
UNIT-V			
CANAL FALLS & CROSS DRAINAGE WORKS			
Part - A (Short Answer Questions)			
1	What are the different types of cross drainage works necessary on canal alignment?	Understand	8
2	What do you understand by the term level crossing?	Understand	8
3	Explain the necessity of cross drainage structure.	Understand	8
4	Explain various types of cross drainage works.	Understand	8
5	What is a cross drainage work?	Understand	8
6	How would you select suitable type of cross drainage work?	Remember	8
7	Explain super passage in detail with neat sketch.	Remember	8
8	What is an aqueduct? Explain with neat sketch.	Remember	8
9	Write short notes on siphon aqueduct.	Remember	8
10	Write short notes on canal siphon.	Remember	8
11	What is meant by the terms flexibility, setting and sensitivity as applied to modules?	Remember	8
12	What is meant by canal regulation?	Remember	8
13	What are modules? What are the requirements of good module?	Remember	8
14	Enumerate different types of outlets which are in common use on canal projects.	Remember	8
15	What is a head regulator?	Understand	8
16	List out various functions of a Distributory head regulator.	Understand	8
17	Define the terms proportionality and sensitivity.	Understand	8
18	What are the functions of head regulator?	Remember	8
19	What the functions are of cross regulator?	Understand	8
20	Distinguish between a modular, a non modular and a semi modular outlet.	Understand	8
Part - B (Long Answer Questions)			
1	Explain the procedure for the design of trapezoidal notch fall.	Understand	8
2	Describe the procedure for the design of a straight glacis fall when it is, (i) Unflumed and non-metered (ii) Flumed and metered.	Remember	8
3	Data refer to fall site, full supply discharge $u/s/d/s = 50$ cumecs, bed width $u/s/d/s = 28$ m, full supply level $u/s/d/s = 150/148.50$, bed level $u/s/d/s = 148/146.5$. What type of fall would you recommend for this canal. Design cistern of fall.	Understand	8
4	What are the functions of distributor head regulator and cross-regulator?	Understand	8
5	Define outlet. What are the essential requirements of a good outlet?	Remember	8
6	How would you select suitable type of cross drainage work?	Remember	8
7	Explain super passage in detail with neat sketch.	Remember	8
8	What is an aqueduct? Explain with neat sketch.	Remember	8
9	Write short notes on siphon aqueduct.	Remember	8

10	Write short notes on canal siphon.	Remember	8		
11	Explain the necessity of a cross-drainage structure how do you classify cross-drainage works.	Understand	8		
12	What points will you consider while selecting the site of a cross-drainage work?	Understand	8		
13	What points will you consider while selecting of a cross-drainage work.	Remember	8		
14	Discuss the methods for the estimation of the design discharge and waterway for drainage of an aqueduct.	Remember	8		
15	State how will you determine, (i) Contraction of canal waterway (ii) Waterway for the drain, and (iii) Thickness of floor for the drain in the transition reach in case of a siphon aqueduct	Remember	8		
16	List out various functions of a distributory head regulator.	Understand	8		
17	Define the terms proportionality and sensitivity.	Understand	8		
18	What are the functions of head regulator?	Remember	8		
19	What are the functions of cross regulator?	Understand	8		
20	Distinguish between a modular, a non modular and a semi modular outlet.	Understand	8		
Part – C (Problem Solving and Critical Thinking)					
1	Following data refers to a canal fall site		Understand	8	
	Item	Upstream			Downstream
	Full supply discharge	50 cumecs			50 cumecs
	Bed width	30 m			30 m
	Full supply level	270.00			268.50 m
	Bed level	268.00 m			266.50 m
	Recommend the fall to be used. Design and sketch the following elements of the fall. (a) Length and RL of crest (b) Length and RL of cistern.				
2	Discuss briefly the components of various types of falls with neat sketches. Also discuss the suitability of each type.	Understand	8		
3	Following data refers to a canal fall site.		Understand	8	
	Item	Upstream			Downstream
	Full supply discharge	40 cumecs			40 cumecs
	Bed width	20 m			20 m
	Full supply level	260.00			275.50 m
	Bed level	258.00 m			256.50 m
	Recommend the fall to be used. Design and sketch the following elements of the fall. (c) Length and RL of crest (d) Length and RL of cistern.				
4	Design 1 m Sarda type fall on a channel carrying 20 cumecs discharge whose bed width and water depth are 14 m and 1.5 m respectively.	Understand	10		

5	Sketch a siphon well drop to carry 0.3 cumec of water from the following data: Ground level =30.00m. B.L. of channel above drop =28.00m. F.S.L of channel above drop =30.00m. F.S.L of channel below drop =28.50m. B.L. of channel below drop = 26.50m. Provide a 4m cart track over the well drop. The earth work connections should be clearly	Understand	10
6	Data refer to fall site, full supply discharge $u/s/d/s = 50$ cumecs, bed width $u/s/d/s = 28.0$ m, full supply level $u/s/d/s = 150.00/148.50$, bed level $u/s/d/s = 148.00/146.50$ m. What type of fall would you recommend for this canal. Design cistern of fall.	Understand	10
7	Design a suitable section for the overflow portion of a concrete gravity dam having the d/s face sloping at 0.7H:1V. The design discharge for the spillway is 8000 cumecs. The height of the spillway crest is kept at RL 204.0m. The average river bed level at the site is 100.0m. The spillway length consists of 6 spans having a clear width of 10m, each. Thickness at each pier may be taken as 2.5m.	Understand	10
8	Data refer to fall site, full supply discharge $u/s/d/s = 40$ cumecs, bed width $u/s/d/s = 28.0$ m, full supply level $u/s/d/s = 150.00/148.50$, bed level $u/s/d/s = 148.00/146.50$ m. What type of fall would you recommend for this canal. Design cistern of fall.	Understand	10
9	Why do we provide a fall on canal? Enumerate different types falls.	Understand	10

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