

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2018

IRRIGATION ENGINEERING

[Time : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

I Answer *all* questions in one or two sentences. Each question carries 2 marks.

1. Define Crop period.
2. Define Storage Weir.
3. State the function of free board.
4. List main classification of dam according to Hydraulic Design.
5. Name the cross drainage work is provided, when canal water passes over drainage.

(5×2 = 10)

PART — B

(Maximum marks : 30)

II Answer any *five* of the following questions. Each question carries 6 marks.

1. List any six advantages of irrigation.
2. Derive an equation for Delta in terms of Duty & Base period.
3. List the factors suitable for selection of site for Head works.
4. Draw and explain different types of Barrages.
5. Describe the situations suitable for Earth Dams.
6. Describe different classification of canal based on the functioning of the canal.
7. Explain the methods are adopted to maintain an Irrigation Canal.

(5×6 = 30)

PART — C

(Maximum marks : 60)

(Answer *one* full question from each unit. Each full question carries 15 marks.)

UNIT — I

- III (a) Sketch and explain the working procedure of Symon's Rain gauges. 8
 (b) Describe the factors affecting runoff. 7

OR

- IV (a) Sketch and explain briefly the working of a current meter. 9
 (b) Write down the Rive's formula and Dicken's formula and explain the terms. 6

UNIT — II

- V (a) Explain the terms :
 (i) Percolation (ii) Uplift
 (iii) Scour (iv) Creep length 8
 (b) Describe the component parts of a weir. 7

OR

- VI (a) Explain the different discharge conditions in weir. 7
 (b) Write short note on the following :
 (i) Scouring Sluice (ii) Divide Wall
 (iii) Fish Ladder (iv) Head Regulator 8

UNIT — III

- VII (a) Enumerate the causes of failure of Earth dams. 8
 (b) Define Spillway. List out different types of Spillways. 7

OR

- VIII (a) Sketch the Elementary profile of a Gravity Dam. 6
 (b) Explain Different types of Dams. 9

UNIT — IV

- IX (a) Describe different classifications of canals based on carrying capacity. 9
 (b) List the advantages of canal lining. 6

OR

- X (a) List and explain cross drainage works. 9
 (b) Sketch and explain the function of Gibb's Module. 6

10

SCHEME OF VALUATION.
(Scoring Indicators.)

Ver Q II

Rev. (15)

Irrigation Engineering

Code: 4012

Qtn No:	Scoring Indicator.	split up.	Sub Total	Total.
I				
1	crop period: - No of days from sowing to that of its harvesting	2.		
2.	They are constructed purely for storing water also called low dam	2		
3	To prevent overtopping of a dam during period of peak flood	2.		
4.	1. Over flow Dam 2. Non over flow Dam.	2		
5.	Aqueduct	2.	10	
II				
1.	1. Prevent famines 2. Employment to people. 3. Valuable crops can be grown 4. Provide Navigation 5. Irrigation projects which are of multi purpose - Provide hydro-electric power 6. good return in form of Irrigation charges. 7. Growing ornamental timbers. 8. Recharge ground water table	1x6	6	

II 2.

D → Duty of Water in hectares/Cumec

B → Base period in no of days.

Δ → Depth of Water required in M

1 Cumec flowing for a base period 'B' days

Provide Volume of Water

$1 \times 60 \times 60 \times 24 \times B$ Cubic meters.

Qty of Water in cms for flooding 1 hectare of area with depth Δ Meters.

$1 \times 10,000 \times \Delta$ Cubic meters.

No of hectares that can be irrigated by 1 Cumec flowing for B days.

$$= \frac{1 \times 60 \times 60 \times 24 \times B}{1 \times 10,000 \times \Delta} = \frac{8.64 B}{\Delta}$$

Hence Duty $D = \frac{8.64 B}{\Delta}$

G

3. 1. Construction Material locally available.

2. Section of river should be narrow

3. Good Communication facility

4. Percolation loss minimum.

5. Demand of Water should be large.

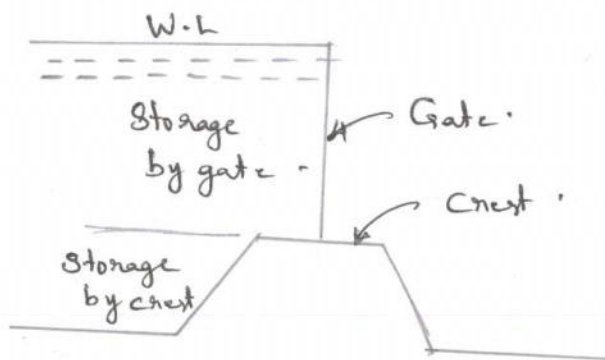
6. No of Cross drainage Work should be less

7. Economic line of Canal should be available

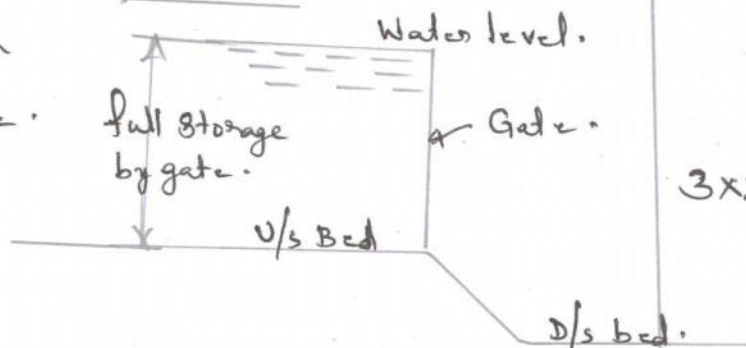
any 6

1x6

G



① Barrage with low crest & gate.



3x2 6

② Barrage having no raised crest.

(With description)

5.
 1. Where the valley to be covered is wide with gentle slope.
 2. Not much depth of water impounded.
 3. Where there is no prominence given for water tightness.
 4. Ample place for forming the section as the earth dam needs a wide space.
 5. Where the spillways need not be provided in the section.
 6. Where the durability is not a prime factor.
 7. Materials like stone, silt, clay and sand are available in plenty.

any size

1x6

6

- 6
1. Irrigation Canal.
 2. Feeder Canal.
 3. Navigation Canal
 4. Power Canal
 5. Link Canal

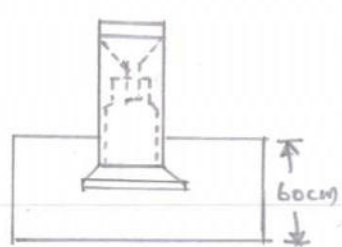
6. Carrier Canal. (with explanation) 1x6 6

- 7.
1. Controlling the Weed growth.
 2. Removal of Silt deposits.
 3. Strengthening the Canal banks.
 4. Closing the Canal breaches.

1/2x4 6

III a

It consists of a funnel and cylindrical zinc bottle mainly dia of bottle & funnel is 127mm



The capacity of bottle is such, as to measure the rainfall that is likely to occur in 24 hours time. The gauge is provided with one graduated jar smallest div 0.2mm.

The rain gauge is adjusted every day for measurement of rainfall and the rainfall is measured ~~down~~ every day at 8.30 AM. In case of heavy rainfall it is measured for more times and is recorded as the total rainfall of that day.

Process
fig-2

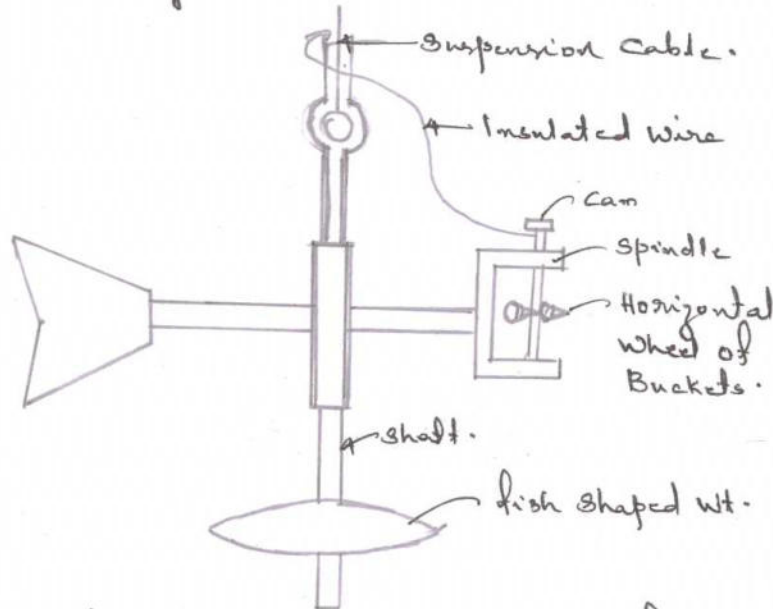
8

III b.

1. Pattern of rainfall
2. Character of catchment surface.
3. Topography
4. Shape and size of catchment ~~area~~.
5. Vegetation in the catchment
6. Geological features of the area.
7. Meteorological Conditions.

5

IV a.



IX 7

15

Current meter has a head in shape of a yoke which carries a wheel having six conical cups revolving round a vertical axis. When the meter is immersed in flowing water the cups and the wheel start rotating due to the velocity of flow. There is a commutator attached to the wheel at its top and an arrangement to record the number of revolutions of the wheel electrically. The recording arrangement consists of a sounder which has a telephone receiver attached to a battery cell. The tail of the meter is a stem with two vanes. It keeps the meter in the direction of the current and also balance the head portion. The wt. attach to the bottom keeps the meter steady against the current of flowing water.

Fig 3
prob 6

9

5

IV b

1. Ryve's Formula. $Q = CM^{2/3}$

Q → Max flood discharge in cumecs.

M → Catchment area in sq kms.

C → Ryve's co-efficient.

'C' value — Area within 25 KM from Coast — 6.75
 b/w 25 KM — 160 KM — 8.45
 near hill — 10.15 3

Suitable for South Indian catchments.

2. Dicken's formula $Q = CM^{3/4}$.
(Suitable for North Indian catchment)

C → Dicken's Co-efficient.

Value of C North Indian catchment — 11.4
 Central India 14 — 19.5 3
 Western Ghats 22.2 to 25

V a

1. Percolation: Movement of Water Under the foundation with certain amount of pressure

2. Uplift :- The upward pressure exerted by the percolating water is called Uplift

3. Scour :- Carry away particles of soil by the pressure of percolating water.

4. Creep length: Total length covered by percolating water till it emerges out at the downstream end 2x4 8

V_b

1. Body of the Weir
2. Upstream apron.
3. Up stream Curtain Wall
4. Down stream apron
5. Down stream Curtain Wall
6. Crest.
7. Shutters.

7

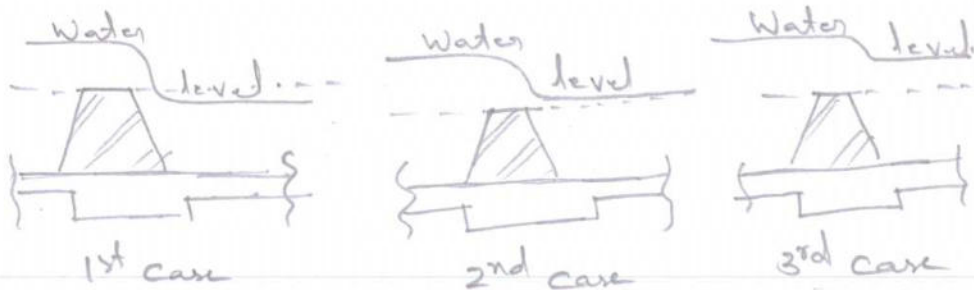
1x7

VI

a.

1. Weir with a free overfall.
2. Weir Under floatation.
3. Weir fully submerged.

7



VII

b.

1. Scouring sluice: - Opening provided body of a weir at low level, They are located in front of still pond. these are Used to remove the silt or to scow the deposited silt 2
2. Divide Wall: - Long solid wall constructed at ~~the~~ right angle to the Weir axis. It divide the river channel in to two 2
3. Fish ladders: - The str provided for the movement of fish from one side to other side. 2

4. Head Regulator :- Str. Constructed at the entrance of the canal where it take off the river for regulating flow of water entering the canal & prevent silt entry

2 8

8

VII a

1. Hydraulic failures
2. Failure due to slipping of the bund
3. Failure due to seepage.
4. Structural failures.

with figs.

4x2 8

VII b

The over flow sections provided in the body wall of the dam for disposing flood waters to the downstream side without endangering the stability of dam are called spill ways.

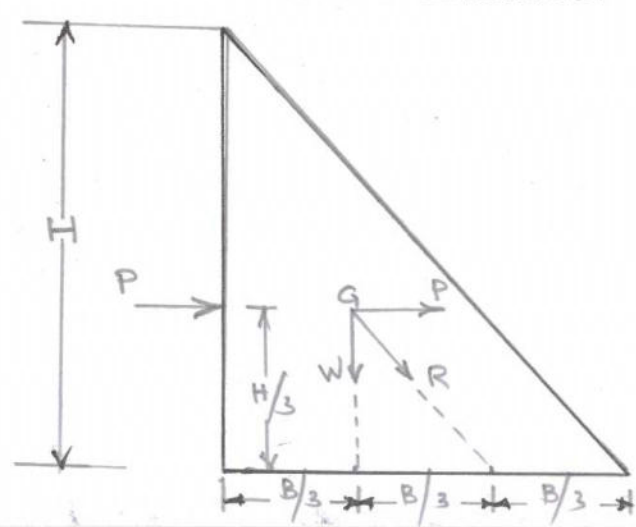
2

Types

1. Open spill way
2. Siphon spill way
3. Shaft spill way
4. Straight drop spill way
5. Trough spill way
6. Side channel spill way

7

VIII a



Elementary Profile.

1x5

6

8

VIII

Types

b.

According to Material Used for construction

- | | |
|-------------------|-------------------------|
| 1. <u>Rigid</u> | 2. <u>Non Rigid.</u> |
| Timber dam | Rock fill dam |
| Steel dam | Rock and earth fill dam |
| Arch dam | Earth dam. |
| Buttress dam | |
| Solid gravity dam | |

3+3

According to purpose Served.

1. Storage dam
2. Diversion dam
3. Detention dam.

3

9

(with explanation)

IX a.

1. Main canal
 2. Branch canal
 3. Major Distributaries.
 4. Minor Distributaries.
 5. Water course or field channel.
- Incl. Explanation

9

IX b

1. Saves water for extending irrigation.
2. Avoid water logging.
3. Reduce cost of Maintenance.
4. Increase Velocity
5. Checks growth of Weeds on Canal bed
6. Prevent Canal breaches.

6x1 6

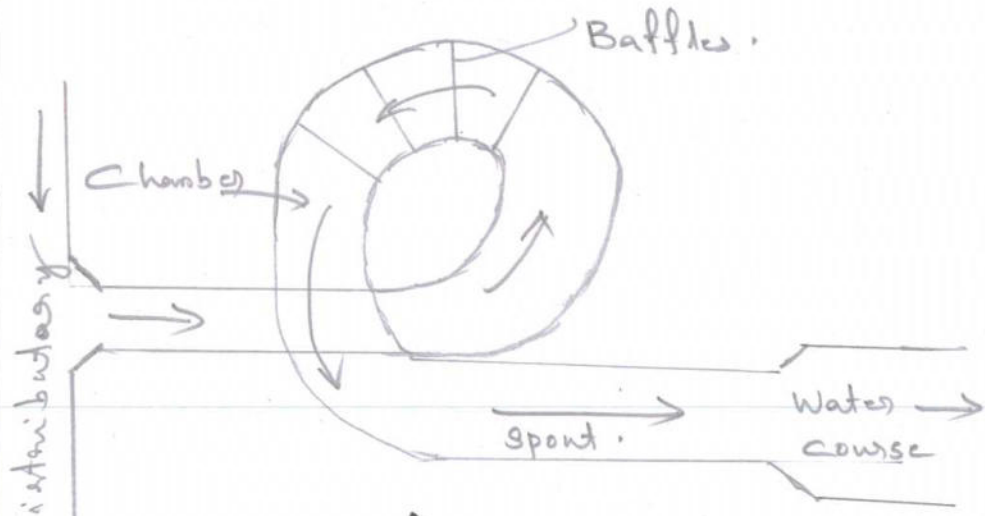
X a

1. Aqueduct. — Canal over drain
2. Syphon Aqueduct — Drain lowered and below Canal.
3. Super passage — Drain over Canal.
4. Syphon — Canal lowered under drain.
5. Level crossing — Drain and Canal same level.

6. Inlet & outlet.

6x1/2 9

X b.



It consist of an outlet having bellmouth
 Water is diverted to an eddy Chamber
 through a rising spiral pipe — free circular flow
 In eddy chamber baffle plates are fixed with
 their lower edges sloping at the required height
 above the sill of outlet. The discharge
 is kept constant. The Water discharge into
 a spout from the eddy Chamber and then
 into the Water course.

3+3 6