



17502

15162

3 Hours / 100 Marks

Seat No.

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- Instructions :**
- (1) *All questions are compulsory.*
 - (2) *Answer each next main question on a new page.*
 - (3) *Illustrate your answers with neat sketches wherever necessary.*
 - (4) *Figures to the right indicate full marks.*
 - (5) *Assume suitable data, if necessary.*
 - (6) *Use of Non-programmable Electronic Pocket Calculator is permissible.*
 - (7) *Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.*

Marks

1. A) Attempt **any three**:

(3×4=12)

- a) Define :
 - i) Rainfall
 - ii) Run off
 - iii) Rainfall intensity
 - iv) Yield.
- b) Explain the four factors affecting run off.
- c) Calculate the yield and maximum flood discharge from a catchment area 60 km², having average annual rainfall 760 mm by using Inglis formula.
- d) What is a crop season ? Name crop seasons adopted in Maharashtra with their respective periods.

B) Attempt **any one**:

(1×6=6)

- a) Calculate the average annual rainfall of a catchment, from following data by using Arithmetic mean method and Theissons polygon method.

Area of polygon (Ha)	100	150	200	75	125	400
Rainfall in mm	600	550	650	580	620	700

Also calculate dependable yield from above catchment at 60% dependability. Take runoff coefficient 0.45.

P.T.O.



b) Fix the control levels DSL, FRL, HFL and TBL from following data :

- i) Effective storage required 3000 Ha.m.
- ii) Carry over allowances and tank losses – 25%.
- iii) Dead storage – 10% of gross storage.

Contour RL (m)	580	582	584	610	612	614
Storage (Mm³)	3.0	4.5	6.0	30	40	50

Assume flood lift as 1.5 m and free board as 2.5 m.

2. Attempt **any four** :

(4×4=16)

- a) Explain the various engineering surveys to be conducted for an irrigation project. Enlist the data to be collected for the same.
- b) Describe the four factors affecting the rate of siltings with suggestive control measures.
- c) List the eight types of repairs and maintenance works for an earthen dam.
- d) Draw a neat labelled sketch of cross section of a zoned type earthen dam. Write names to component parts of earthen dam.
- e) Give four points of comparison between gravity dam and earthen dam with respect to foundation, seepage construction and maintenance.
- f) Define – spillway and write two functions of spillway. Also draw neat cross section of ogee spillway and bar type spillway.

3. Attempt **any four** :

(4×4=16)

- a) Differentiate between theoretical and practical profile of gravity dam.
- b) Explain the importance of drainage gallery and joints in gravity dams.
- c) Explain working of radial gate with the help of neat sketch showing names to component parts of it.
- d) Draw a plan and section of a Bandhara Irrigation System.
- e) Write the need and suitability of site for construction of percolation tanks.

4. A) Attempt **any three**:

(3×4=12)

- a) Explain the functioning of lift irrigation scheme with the help of layout showing components of it.
- b) Describe the operation of drip irrigation with help of neat layout showing essential component parts.
- c) Draw the neat layout of diversion head work and write functions of following components of it :
 - i) Head regulator
 - ii) Divide wall
 - iii) Fish ladder
 - iv) Scouring sluices.
- d) Differentiate between weir and barrage (any four points).

B) Solve **any one** :

(1×6=6)

- a) Classify the canals according to alignment and position in canal network. Show location plan of each.
- b) Explain the working barrage with the help of neat plan and elevation proposed across arriver having width 60 m.

5. Attempt **any two**:

(2×8=16)

- a) Find the design discharge of canal by using following data :

Sr. No.	Name of crop	Area irrigated (ha)	Duty (ha/cumec)
1	Paddy (KH)	200	600
2	Wheat (Rabi)	350	1200
3	Groundnut (KH)	600	800
4	Gram (Rabi)	400	1700
5	Vegetables (Rabi)	350	700

Assume :

- i) Base period as per season
- ii) Transit losses – 15%
- iii) Time factor – 7/12
- iv) Capacity factor – 0.8.



- b) Describe the types of failures of earthen dams and remedial measures.
- c) Suggest and draw line sketch of the type of cross drainage works under following four situations.

Case	Nallah Bed level (m) (RL)	Nallah HFL (m) (RL)	Canal Bed level (m) (RL)	FSL of Canal (m) RL
I	100.00	106.00	107.00	110.00
II	108.00	110.00	105.00	107.00
III	100.00	104.00	102.00	104.00
IV	100.00	104.00	100.00	102.00

6. Attempt **any four** :

(4×4=16)

- a) Explain the construction and operation of KT weir.
- b) Mention four advantages of sprinkler irrigation over canal irrigation.
- c) Draw the cross section of canal in embankment and partial cutting and embankment.
- d) Explain four causes and corresponding preventive measures of water logging.
- e) Compare between aqueduct and super passage.
