

17502

16172

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. Attempt any TEN of the following: **20****
- a) Define dependable yield from a catchment.
 - b) Enlist four purposes of galleries in gravity dam.
 - c) State situations in which Bandhara Irrigation is preferred.
 - d) State Inglis formula for MFD.
 - e) State the use of Area-capacity curve.
 - f) Define balancing depth in canals.
 - g) List eight components of diversion headworks.
 - h) Differentiate between Crop period and Base period.
 - i) Classify dams on the basis of methods of construction with examples.

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- j) State the importance of fish ladder.
- k) Define assessment of irrigation water. State the methods.
- l) State two advantages of lift irrigation over surface irrigation.
- m) Spillway is safety valve for dams; Justify.
- n) Enlist four materials used in canal-lining.

2. Attempt any FOUR of the following: 16

- a) Establish relation between Duty and Delta.
- b) Define emergency spillway. Compare emergency spillway with main spillway on four distinct parameters.
- c) Write advantages and limitations of (two each)
 - (i) Ridge Canal
 - (ii) Contour Canal
- d) Estimate MFD from 500 km² catchment area in Maharashtra state. (Assume $C = 14.5$, use Dicken's and Inglis formulae)
- e) Draw the layout diagram of diversion headworks. Write the purposes of any four components.
- f) Define waterlogging. State four causes of waterlogging with remedial measures.

3. Attempt any FOUR of the following: 16

- a) State the advantages and disadvantages of percolation tank. (four each)
- b) Draw neat labelled sketches of
 - (i) Vertical drop weir
 - (ii) Sloping weirState two purposes of each one.

- c) The base period, intensity of irrigation and duty of water for various crops under the canal system are given below. Determine design discharge at the head of main canal, if canal losses are 20% and CCA is 40,000 hectares.

Crop	Base period (days)	Duty at field (ha/cumec)	Intensity of Irrigation
Wheat (Rabi)	120	1500	20%
Sugarcane (Annual)	360	1400	20%
Cotton (Kharif)	120	1200	10%
Rice (Kharif)	120	800	15%
Vegetables (HW)	120	1000	15%

- d) Define lining of canals. State its eight advantages.
- e) Define computation of rainfall. Describe Thiessen's Polygon method with suitable sketch.
- f) Describe significance of phreatic line in earthen dam with neat sketch.

4. Attempt any FOUR of the following:

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- a) Suggest suitable type of cross drainage works with neat labelled sketches. (Any two)
- (i) Nallah bed level is well above Canal FSL.
- (ii) Nallah and canal bed levels are almost equal with heavy flood discharge in Nallah.
- (iii) Canal bed level = 435.0 m
Nallah bed level = 433.0 m
Nallah HFL = 436.0 m
- b) Duty varies at various points of measurement from head of watercourse to head of canal. Explain.
- c) State four important differences between diversion headworks and storage headworks.
- d) Describe Kolhapur type Bandhara with neat labelled section with reference to its location, function and working.

- e) Determine LSL, FRL, MRL and TBL from the data given below.

Effective storage required for crops = 5200 ha-m

Tank losses = 15% of effective storage

Carry over allowance = 10% of effective storage

Dead storage = 10% of gross storage

Contour R.L. (m)	51	54	57	110	113	116
Storage (mm ³)	3.0	5.5	7.5	50.0	70.0	90.0

- f) Differentiate between theoretical and practical profile of gravity dam.

5. Attempt any FOUR of the following:

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- a) Enlist the forces acting on gravity dams. Describe with neat labelled diagram any two of them.
- b) Draw a neat labelled diagram of Visvesvaraya gates. Describe their working.
- c) Life of dam can be increased reducing sedimentation in reservoir. Justify with measures to reduce sedimentation.
- d) Calculate the economical depth of cutting for the canal section. The bed width of the canal is 5m and top width of banks are 2m each. Side slope in cutting is 1:1 and in banking is $1\frac{1}{2}:1$ (H : V). Height of banks from bed is 2.92 m through.
- e) State the causes of failures of earth dams. Describe seepage failures with diagrams.
- f) Compare drip irrigation system with sprinkler irrigation on four distinct parameters.

6. Attempt any FOUR of the following:**16**

- a) Draw a typical cross section of zoned earth dam, showing all components. Write the purposes of any four components.
 - b) Design a most economical canal section to carry discharge of $4 \text{ m}^3/\text{s}$ with bed slope $1 \text{ in } 2000$, lined with concrete ($N = 0.015$) and having side slope $1:1$.
 - c) Draw a layout of lift irrigation scheme. Show all components. State purposes of any two.
 - d) Describe maintenance works for canals with respect to four parameters.
 - e) Suggest four suitable measures with justification to control cracking in gravity dams.
 - f) Define Runoff. State six factors affecting runoff mentioning their effects on run off.
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