

# 22501

**21222**

**3 Hours / 70 Marks**

Seat No.

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15 minutes extra for each hour

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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 FIVE of the following: **10****
- a) Define:
- i) Hydrology
- ii) Runoff
- b) Define Isohyte. State the use of Isohytal map.
- c) Determine delta of crop having duty 432 Ha/cumec on the field and base period 45 days.
- d) State the function of energy dissipator.
- e) Define and state limiting value of factor of safety against overturning for gravity dam.

P.T.O.

- f) State any four benefits of irrigation.
- g) Define:
  - i) Base period
  - ii) Crop period

**2. Attempt any THREE of the following: 12**

- a) The influence areas as observed by Thiessen's polygon are 360 km<sup>2</sup>, 275 km<sup>2</sup>, 420 km<sup>2</sup>, and 650 km<sup>2</sup> with rainfall of 62.5 cm, 75.8 cm, 103.2 cm and 85.8 cm respectively. Calculate average rainfall.
- b) Estimate maximum flood discharge from 315 km<sup>2</sup> catchment area of a proposed reservoir. Assume  $C = 15$ . Use
  - i) Inglis' formula and
  - ii) Dicken's formula
- c) Define silting of reservoir and state factors affecting silting of reservoir.
- d) List out the data required to be collected for an Irrigation project.

**3. Attempt any THREE of the following: 12**

- a) Draw a neat labeled typical section of earthen dam.
- b) Suggest suitable routine measures to maintain earthen dam, to serve its purpose.
- c) Compare earthen dam and gravity dam on the basis of
  - i) Foundation
  - ii) Earthquake zone suitability
  - iii) Seepage and
  - iv) Maintenance cost
- d) State the considerations which govern the selection of the site for Bandhara.

**4. Attempt any THREE of the following: 12**

- a) Describe drip irrigation system showing field layout of system.
- b) Describe Jalayukt Shivar Scheme
- c) State function of
  - i) Divide wall
  - ii) Fish ladder
  - iii) Scouring sluice and
  - iv) Stilling pond
- d) Explain canal head regulator with sketch.
- e) Differentiate between weir and barrage. (any eight points.)

**5. Attempt any TWO of the following: 12**

- a) The rainfall data over a catchment is as below:

Year	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Rainfall (mm)	1000	950	1400	1250	1175	1325	1410	1275	1390	1305

Size of catchment area is 550 sq.km., coefficient of runoff is 0.60. Calculate the yield of catchment at 60% dependability.

- b) Determine design discharge at the head of main canal, if canal losses are 20% and CCA is 45000 hectares.

Sr. No.	Crop	Base Period (Days)	Duty of field (Ha/cumec)	Intensity of Irrigation
1	Wheat (Rabi)	120	1600	20%
2	Sugarcane (Annual)	360	1300	20%
3	Cotton (Kharif)	120	1400	10%
4	Rice (Kharif)	120	800	15%
5	Vegetables (HW)	120	600	15%

- c) Fix the F.R.L., T.D.L. and H.F.L. from following data-
- i) D.S.L. = 210.00 m
  - ii) Effective Live Storage = 8500 m<sup>3</sup>
  - iii) Max. flood discharge = 500 m<sup>3</sup>
  - iv) Tank Losses = 450 m<sup>3</sup>/sec
  - v) Length of waste weir = 100 m
  - vi) Free board = 2.5 m
  - vii)  $Q = 1.8 L.H^{3/2}$  (Francis formula)

Contour R.L. (m)	210	212	214	216	218	220
Capacity (m <sup>3</sup> )	1500	3200	5000	6500	9000	12000

**6. Attempt any TWO of the following:**

**12**

- a) List the components of Lift Irrigation Scheme and state functions of each.
- b) Define balancing depth. Calculate the balancing depth for a section of canal having bed width 4 m, full supply depth 1.5 m, free board 0.5 m, slopes for cutting 1:1.5 and for banking 1:2. Take top width of banks as 2.5 m.
- c) Design the most economical canal section to carry a discharge of 4.5 m<sup>3</sup>/s, with bed slope 1:2500, lined with concrete. Take  $N = 0.0012$  and side slope 1:1.

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