

Water Resource Engineering (315314)

MSBTE Diploma · K-Scheme · Model Question Paper — Set A

Time: 3 Hours
Max. Marks: 70
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. Mobile phone, pager and any other electronic communication devices are not permissible in the examination hall.

Q.1 Attempt any FIVE of the following:
10

- a) Enlist the classification of irrigation projects on the basis of purpose.
- b) Define: i) Hydrology ii) Runoff.
- c) Define duty and delta. State the unit of each.
- d) State any four functions of a spillway.
- e) State any two purposes of providing galleries in a gravity dam.
- f) Define percolation tank and state its main purpose.
- g) Define: i) Aqueduct ii) Siphon aqueduct.

Q.2 Attempt any THREE of the following:
12

- a) Define rainfall. Explain Symon's rain gauge with a neat sketch.
- b) The Thiessen polygons of a catchment with five rain gauge stations A, B, C, D and E have areas 302 km², 273 km², 292 km², 328 km², 185 km² and the rainfall recorded during a storm is 96 mm, 112 mm, 128 mm, 104 mm, 88 mm respectively. Compute the average rainfall over the catchment.
- c) Estimate the maximum flood discharge for a catchment of 480 km² using: i) Dicken's formula (C = 14) ii) Ryve's formula (C = 6.8) iii) Inglis' formula.
- d) Derive the relation between duty, delta and base period.

Q.3 Attempt any THREE of the following:
12

- a) Find the discharge required at the head of the field channel and the volume of water required for the following crops:

Crop	Duty at field D (ha/cumec)	Base period B (days)	Area A (ha)
Wheat	1800	120	3600
Sugarcane	750	320	1200

- b) Differentiate between earthen dam and gravity dam (any four points).
- c) Explain with a neat sketch the various forces acting on a gravity dam.

- d) Draw a labelled cross-section of a zoned earthen dam and state the functions of:
i) Cut-off trench ii) Rock toe.

Q.4 Attempt any THREE of the following:

12

- Draw the layout of a lift irrigation scheme and state the functions of its components.
- Differentiate between drip irrigation and sprinkler irrigation (any four points).
- State the site selection criteria for a percolation tank.
- Differentiate between weir and barrage (any four points).
- State any three advantages of canal lining and name the materials used for lining.

Q.5 Attempt any TWO of the following:

12

- Fix the control levels (D.S.L., F.R.L., H.F.L. and T.B.L.) of a reservoir from the following data: effective storage required for crops = 22 Mm³; tank losses = 15 % of effective storage; carry-over allowance = 10 % of effective storage; dead storage = 10 % of gross storage; maximum flood discharge = 600 m³/s; length of waste weir = 120 m (use $Q = 1.84 L H^{3/2}$); free board = 2.0 m.

Contour R.L. (m)	600	603	606	609	612	615	618
Capacity (Mm ³)	0.8	2.6	6.2	11.5	18.8	27.4	37.9

- Find the design discharge and capacity of a canal from the data below. Transit losses = 15 % of discharge at the canal head, time factor = 0.75, capacity factor = 0.80.

Sr. No.	Crop	Season	Area (ha)	Duty at field (ha/cumec)
1	Sugarcane	Perennial	420	730
2	Rice	Kharif	600	800
3	Jowar	Kharif	900	1600
4	Wheat	Rabi	1500	1800
5	Gram	Rabi	700	2000
6	Groundnut	Hot weather	350	900

- Explain the failures of earthen dams with their preventive measures.

Q.6 Attempt any TWO of the following:

12

- Enlist the types of spillways and suggest the suitability of each according to site conditions.
- Draw a neat layout of diversion headworks and state the functions of: i) Weir ii) Divide wall iii) Silt excluder iv) Guide banks.
- Suggest the suitable type of cross drainage work and draw its sketch when: i) Canal bed level is much above the H.F.L. of the drain. ii) H.F.L. of the drain is above the canal bed level (canal over drain). iii) F.S.L. of the canal is below the bottom of the drain trough.

Note: This is a **model question paper prepared by Ananda Technologies** only for practice and exam preparation, based on the pattern of previous MSBTE question papers and the K-scheme syllabus. It is **not an official MSBTE paper**, and it does **not** mean that these questions will come in the exam. Answers follow standard textbook points; marks shown are indicative. Free for students — anandatechnologies.in

