

Paper-VI

CIVIL ENGINEERING (Paper-II)

Section-I: (Subjective)

Candidates should attempt nine questions in all including Questions No. 14. Eight of the remaining questions should be attempted selecting at least three from each Section A and B. Brief and to the point answer will attract special credit.

1. (a) Mention four main factors which govern particular type of lining.
(b) Which factors determine the size of an outlet area (Chak)?
(c) Design a lined canal with the following data:
Discharge = $35 \text{ m}^3/\text{s}$, Bed Slope = 1:1000
Manning's $n = 0.018$, Limiting velocity = 1.5 m/s
2. (a) Mention principal types of control structures (regulators)
(b) Discuss in brief utility of various types of falls.
(c) Enumerate salient points of control structures.
3. (a) Define uniform and non-uniform flows. Give at least one practical example in each case.
(b) Show that for an open channel flow discharge width is maximum for a given specific energy the flow is critical.
4. (a) What is total energy lost in a jump? Give numerical expression of relative height of a jump.
5. (a) What do you mean by a hydrograph? Sketch and explain briefly the different parts of a hydrograph.
(b) Explain the significance of inflection point on the falling side of a hydrograph of a run-off.
6. (a) Mention only the methods for estimation of a flood from a catchment.
(b) Give two empirical formulae for estimation of discharge.
7. (a) Establish the relation between duty and delta.
(b) Mention the important parameters that regulate the behaviour of a river.
(c) Discuss in brief the features for the design of surface and underground drainage channels.

Section—B

8. (a) What do you mean by super elevation? Why is it considered necessary for modern traffic?
(b) What is the principle underlying the design of transition curve? What curves are adopted in transition?
9. (a) Mention the salient points required for the design of a new flexible pavement. Give a neat sketch of it and mention the generally adopted in the flexible pavement design.
(b) Which tests are generally carried out to check the standard in a road constructed with bituminous materials?
10. Write short notes on (any two)
(a) Street lighting (b) Road classification
(c) Design hour volume.
11. (a) Discuss in brief how you will approach the design of a water supply system in a newly developed area.
(b) Mention the names of different methods of population forecasting.
12. (a) Which factors govern the type of water supply either continuous or intermittent in a city?
(b) Mention the difference between a slow sand filter and a rapid sand filter. What is the advantage of a rapid sand filter?
13. What is a trickling filter? Give a schematic representation with a neat sketch of the cross-section of a trickling filter.
14. (a) Define a septic tank. What features are considered in the design of a septic tank?
(b) (i) For average Indian condition at 25°C , what is the surface area required for every 10 liters per person per day in a septic tank?
(ii) What is the normal depth considered for a septic tank?
(iii) What normal length/breadth is considered for a septic tank?
(iv) What is the value of fresh sludge volume based on suspended contribution of 70 gms/cap/day tank?