



**R/J/E/C EXAM.  
2021  
CIVIL ENGINEERING**

300520

Time : 3 hours ]

[ Full Marks : 100

- Note** : (i) Attempt **all** the questions.  
(ii) The figures in the right-hand margin indicate full marks for the questions.

1. Answer *any ten* questions :

2×10=20

- (a) The bearing of a survey line is S 40° E and the declination is 2° E. What will be the bearing of the same survey line if the declination becomes 3° W?
- (b) State the requirements of a good foundation.
- (c) What is meant by anchorage length?
- (d) State Bernoulli's theorem.
- (e) Write down the methods of distribution of water in water supply system.
- (f) How do you quantify storm water runoff?
- (g) What is the necessity of hairpin bends in hill roads? Specify any two of their geometric design standards.
- (h) What is the purpose of providing trap in sanitary plumbing?
- (i) Define workability. What are the factors that affect the workability of concrete?
- (j) Enumerate the purpose of estimation in projects.
- (k) Differentiate between the intensity and the magnitude of an earthquake.
- (l) How is flood frequency analysis useful in flood protection?



2. Answer any **six** questions :

5×6=30

- (a) A chain having length of 20 m and weight 9 N is used at site where the following characteristics are available :

Standard pull to be applied ( $P_0$ ) = 80 N

Pull applied at the site ( $P$ ) = 140 N

Temperature during standardization ( $T_0$ ) = 20 °C

Mean temperature in the field during measurement ( $T$ ) = 45 °C

Rise in the ground surface = 300 mm

Determine the combined correction due to errors.

- (b) Name the various methods for the determination of permeability in laboratory with the soil type in which they are best suited and explain any one of them in detail.

- (c) Discuss the different types of tubewells in detail.

- (d) Water flows over a rectangular notch weir 1 m wide at a depth of 150 mm and afterwards passes through a triangular right-angled notch weir. Assuming the coefficient of discharge for the rectangular and triangular notch as 0.62 and 0.59 respectively, find out the depth over the triangular notch weir.

- (e) List out any four key differences between rapid sand filter and slow sand filter.

Design a slow sand filter for a village population of 60000 people with the following data :

(i) Water supply rate = 160 litres/head/day

(ii) Filtration rate = 2.5 litres/minute/m<sup>2</sup>

(iii) L/B ratio = 2

(iv) Maximum demand = 1.8 times of average demand

Assume only **one unit of slow sand filter** is allowed for construction at site.

- (f) Reciprocal levelling was conducted across a wide river to determine the difference in level of two points A and B. Point A is situated on one bank of the river whereas point B is situated on the other side of the river. The following results were obtained on the staff held vertically at point A and point B from level stations 1 and 2 respectively. The level station 1 was near to point A and station 2 was near to point B.

Instrument at	Staff reading on (in m)	
	A	B
1	1.485	1.725
2	1.190	1.415