2017-CE-14-26

EE24BTECH11035 - KOTHAPALLI AKHIL

1) The wastewater from a city, containing a high concentration of biodegradable organics, is being steadily discharged into a flowing river at a location S. If the rate of aeration of the river water is lower than the rate of degradation of the organics, then the dissolved oxygen of the river water
   a) is lowest at the location S.
   b) is lowest at a point upstream of the location S.
   c) remains constant all along the length of the river.
   d) is lowest at a point downstream of the location S.
2) Which one of the following is **NOT** present in the acid rain?
   a) HNO_3
   b) H_2SO_4
   c) H_2CO_3
   d) CH_3COOH
3) A super-elevation e is provided on a circular horizontal curve such that a vehicle can be stopped on the curve without sliding. Assuming a design speed v and maximum coefficient of side friction f_{max}, which one of the following criteria should be satisfied?
   a) $e \leq f_{max}$
   b) $e > f_{max}$
   c) no limit on e can be set
   d) $e = \frac{1-(f_{max})^2}{f_{max}}$
4) A runway is being constructed in a new airport as per the International Civil Aviation Organization (ICAO) recommendations. The elevation and the airport reference temperature of this airport are 535 m above the mean sea level and 22.65°C, respectively. Consider the effective gradient of runway as 1%. The length of runway required for a design-aircraft under the standard conditions is 2000 m. Within the framework of applying sequential corrections as per the ICAO recommendations, the length of runway corrected for the temperature is
   a) 2223 m
   b) 2250 m
   c) 2500 m
   d) 2750 m
5) The accuracy of an Electronic Distance Measuring Instrument (EDMI) is specified as $\pm(a\,\text{mm} + b\,\text{ppm})$. Which one of the following statements is correct?
   a) Both a and b remain constant, irrespective of the distance being measured.
   b) a remains constant and b varies in proportion to the distance being measured.
   c) a varies in proportion to the distance being measured and b remains constant.

d) Both a and b vary in proportion to the distance being measured.

6) The number of spectral bands in the Enhanced Thematic Mapper sensor on the remote sensing satellite Landsat-7 is:

(A) 64
(B) 10
(C) 8
(D) 15

7) Consider the following partial differential equation:

$$3\frac{\partial^2\phi}{\partial x^2} + B\frac{\partial^2\phi}{\partial x \partial y} + 3\frac{\partial^2\phi}{\partial y^2} + 4\phi = 0$$

For this equation to be classified as parabolic, the value of B^2 must be _____

8)

$$\lim_{x\to 0}\left(\frac{\tan x}{x^2 - x}\right) \tag{1}$$

is equal to _____

9) A 3 m thick clay layer is subjected to an initial uniform pore pressure of 145 kPa as shown in the figure.

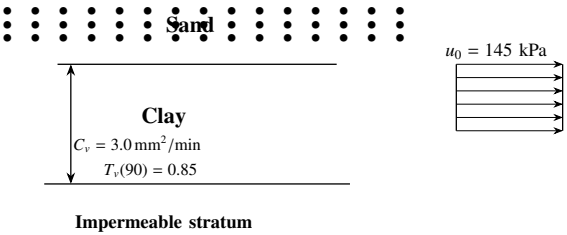
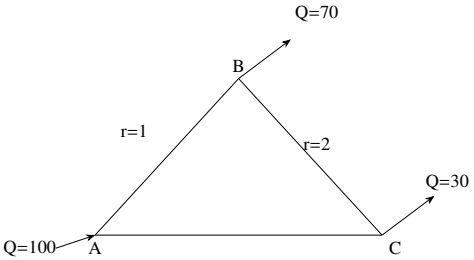


Fig. 9.1: Diagram of soil layers with pressure and parameters.

For the given ground conditions, the time (in days, rounded to the nearest integer) required for 90% consolidation would be _____

10) A triangular pipe network is shown in the figure.



11) The ordinates of a 2-hour unit hydrograph for a catchment are given as

Time (h)	Ordinate (m^3/s)
0	0
1	5
2	12
3	25
4	41

The ordinate (in m^3/s) of a 4-hour unit hydrograph for this catchment at the time of 3 h would be _____

12) Vehicles arriving at an intersection from one of the approach roads follow the Poisson distribution. The mean rate of arrival is 900 vehicles per hour. If a gap is defined as the time difference between two successive vehicle arrivals (with vehicles assumed to be points), the probability (up to four decimal places) that the gap is greater than 8 seconds is _____

13) For the function $f(x) = a + bx$, $0 \leq x \leq 1$, to be a valid probability density function, which one of the following statements is correct?

a) $a = 1, b = 4$
b) $a = 0.5, b = 1$
c) $a = 0, b = 1$
d) $a = 1, b = -1$