CE 2011 Q14-26

EE24BTECH11002 - Agamjot Singh

1) A soil is composed of solid spherical grains of identical specfic gravity and diameter between 0.075 mm and 0.0075 mm. If the terminal velocity of the largest particle falling through water without flocculation is 0.5 mm/s, that for the smallest particle would ne (2011-CE)
   a) 0.005 mm/s
   b) 0.05 mm/s
   c) 5 mm/s
   d) 50 mm/s

2) A watershed got transformed from rural to urban over a period of time. The effect of urbanization on storm runoff hydrograph from the watershed is to (2011-CE)
   a) decrease the volume of runoff
   b) increase the time to peak discharge
   c) decrease the time base
   d) decrease the peak discharge

3) For a given discharge, the critical flow depth in an open channel depends on (2011-CE)
   a) channel geometry only
   b) channel geometry and bed slope
   c) channel geometry, bed slope and roughness
   d) channel geometry, bed slope, roughness and Reynolds number

4) For a body completely submerged in a fluid, the centre of gravity (G) and centre of Buoyancy (O) are known. The body is considered to be in stable equilibrium if (2011-CE)
   a) O does not coincide with the centre of mass of the displaced fluid
   b) G coincides with the centre of mass of the displaced fluid
   c) O lies below G
   d) O lies above G

5) The flow in a horizontal, frictionless rectangular open channel is supercritical. A smooth hump is built on the channel floor. As the height of hump is increased, choked condition is attained. With further increase in the height of the hump, the water surface will (2011-CE)
   a) rise at a section upstream of the hump
   b) drop at a section upstream of the hump
   c) drop at the hump
   d) rise at the hump

6) Consider the fllowing unit processes commonly used in water treatment; rapid mixing (RM), flocculation (F), primary sedimentation (PS), secondary sedimentation (SS), chlorination (C) and rapid sand filtration (RSF). The order of these unit processes (first to last) in a conventional water treatment plant is (2011-CE)
   a) PS → RSF → F → RM → SS → C
   b) PS → F → RM → RSF → SS → C
   c) PS → F → SS → RSF → RM → C
   d) PS → RM → F → SS → RSF → C

7) Anaerobically treated effluent has MPN of total coliform as 10^6/100 mL. After chlorination, the MPN value declines to 10^2/100 mL. The percent removal ($\%R$) and log removal ($\log R$) of total coliform MPN is (2011-CE)
   a) $\%R = 99.90$; $\log R = 4$
   b) $\%R = 99.90$; $\log R = 2$
   c) $\%R = 99.99$; $\log R = 4$
   d) $\%R = 99.99$; $\log R = 2$

8) Consider four common air pollutants found in urban environments, NO, SO_2, Soot and O_3. Among these which one is the secondary air pollutant (2011-CE)
   a) O_3
   b) NO
   c) SO_2

d) Soot

9) The probability that k number of vehicles arrive (i.e. cross a predefined line) in time t is given as $\frac{(\lambda t)^k e^{-\lambda t}}{k!}$, where λ is the average vehicle arrival rate. What is the probablity that the time headway is greater than or equal to time t_1? (2011-CE)

a) $\lambda e^{\lambda t_1}$

b) λe^{-t_1}

c) $e^{\lambda t_1}$

d) $e^{-\lambda t_1}$

10) A vehicle negotiates a transition curve with unform speed v. If the radius of the horizonal curve and the allowable jerk are R and J, respectively, the minimum length of the transition curve is (2011-CE)

a) $\frac{R^3}{vJ}$

b) $\frac{J^3}{vR}$

c) $\frac{v^2 R}{J}$

d) $\frac{v^3}{RJ}$

11) In Marshall testing of bituminous mixes, as the bitumen content increases the flow value (2011-CE)

a) remains constant

b) decreases first and then increases

c) increases monotonically

d) increases first and then decreases

12) Curvature correction to a staff reading in a differential leveling survey is (2011-CE)

a) always subtractive

b) always zero

c) always additive

d) dependent on latitude

13) For an analytic function, $f(x + iy) = u(x, y) + iv(x, y)$, u is given by $u = 3x^2 - 3y^2$. The expression for v, considering K to be a constant is

(2011-CE)

a) $3y^2 - 3x^2 + K$

b) $6x - 6y + K$

c) $6y - 6x + K$

d) $6xy + K$