CE
2012

EE24BTECH11063 - Y.Harsha Vardhan Reddy

Q.1-Q.25 CARRY ONE MARK EACH

1) A smooth rigid retaining wall moves as shown1.1 in the sketch causing the backfill material to fail. The backfill material is homogeneous and isotropic, and obeys the Mohr-Coulomb failure criterion. The major principal stress is

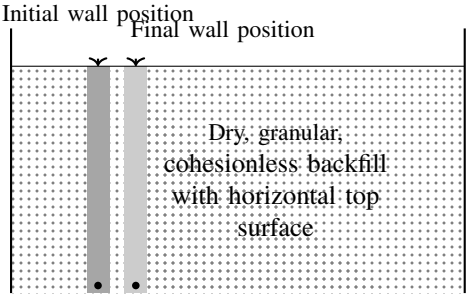

Fig. 1.1

a) parallel to the wall face and acting downwards
b) normal to the wall face
c) oblique to the wall face acting downwards
d) oblique to the wall face acting upwards

2) An embankment is to be constructed with a granular soil (bulk unit weight = 20 kN/m^3) on a saturated clayey silt deposit (undrained shear strength = 25 kPa). Assuming undrained general shear failure and bearing capacity factor of 5.7, the maximum height (in m) of the embankment at the point of failure is

a) 7.1 b) 5.0 c) 4.5 d) 2.5

3) A trapezoidal channel is 10.0 m wide at the base and has a side slope of 4 horizontal to 3 vertical. The bed slope is 0.002. The channel is lined with smooth concrete (Manning's n = 0.012). The hydraulic radius (in m) for a depth of flow of 3.0 m is

a) 20.0 b) 3.5 c) 3.0 d) 2.1

4) A rectangular open channel of width 5.0 m is carrying a discharge of 100 m^3/s. The Froude number of the flow is 0.8. The depth of flow (in m) in the channel is

a) 4 b) 5 c) 16 d) 20

5) The circular water pipes shown in the sketch5.1 are flowing full. The velocity of flow (in m/s) in the branch pipe "R" is

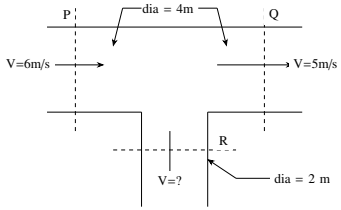

Fig. 5.1

a) 3 b) 4 c) 5 d) 6

6) The ratio of actual evapo-transpiration to potential evapo-transpiration is in the range

a) 0.0 to 0.4 b) 0.6 to 0.9 c) 0.0 to 1.0 d) 1.0 to 2.0

7) A sample of domestic sewage is digested with silver sulphate, sulphuric acid, potassium dichromate and mercuric sulphate in chemical oxygen demand (COD) test. The digested sample is then titrated with standard ferrous ammonium sulphate (FAS) to determine the un-reacted amount of

a) mercuric sulphate b) potassium dichromate

c) silver sulphate d) sulphuric acid

8) **Assertion [a]:** At a manhole, the crown of the outgoing sewer should not be higher than the crown of the incoming sewer.
Reason [r]: Transition from a larger diameter incoming sewer to a smaller diameter outgoing sewer at a manhole should not be made.
The **CORRECT** option evaluating the above statements is:
a) Both **[a]** and **[r]** are true and **[r]** is the correct reason for **[a]**
b) Both **[a]** and **[r]** are true but **[r]** is not the correct reason for **[a]**
c) Both **[a]** and **[r]** are false
d) **[a]** is true but **[r]** is false

9) Two major roads with two lanes each are crossing in an urban area to form an un-controlled intersection. The number of conflict points when both roads are two-way is X and when both roads are one-way is Y. The ratio of X to Y is

a) 4 b) 5 c) 16 d) 20

10) Two bitumen samples "X" and "Y" have softening points 45°C and 60°C, respectively. Consider the following statements:

I. Viscosity of "X" will be higher than that of "Y" at the same temperature.

II. Penetration value of "X" will be lesser than that of "Y" under standard conditions.

The **CORRECT** option evaluating the above statements is

a) Both I and II are TRUE
b) I is FALSE and II is TRUE
c) Both I and II are FALSE
d) I is TRUE and II is FALSE

11) Road roughness is measured using

a) Benkelman beam
b) Bump integrator
c) Dynamic cone penetrometer
d) Falling weight deflectometer

12) Which of the following errors can be eliminated by reciprocal measurements in differential leveling?

I Error due to earth's curvature
II Error due to atmospheric refraction

a) Both I and II b) I only c) II only d) Neither I nor II

1 Q.26-Q.55 CARRY TWO MARKS EACH.

13) The error in $\frac{d}{dx}f(x)\Big|_{x=x_0}$ for a continuous function estimated with $h = 0.03$ using the central difference formula

$$\frac{d}{dx}f(x)\Big|_{x=x_0} \approx \frac{f(x_0+h) - f(x_0-h)}{2h},$$

is 2×10^{-3}. The values of x_0 and $f(x_0)$ are 19.78 and 500.01, respectively. The corresponding error in the central difference estimate for $h = 0.02$ is approximately

a) 1.3×10^{-4} b) 3.0×10^{-4} c) 4.5×10^{-4} d) 9.0×10^{-4}