SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (DESCRIPTIVE)

Subject with Code : GE-II(13A01702) **Course & Branch**: B.Tech - CE

Year & Sem: IV-B.Tech & I-Sem **Regulation:** R13

UNIT –II
EARTH SLOPE STABILITY

1. For a c - Φ soil, derive an equation for F.S. by Swedish method of slices, describing to obtain the locations of most critical slip circle. **[10M]**
2. An embankment 6m high has a slope of a 1V:2H. The soil has *Á*=300. c = 5KPa and γ =19KN/m3. A trial slip circle has a radius of 8.8m and its centre is at the same level as the top of the embankment the slip circle passes through the toe. Find the F.S. with respect to this slip circle by the method of slices. **[10M]**
3. What do you understand by infinite slope and derive equation for F.S. of infinite slope in cohesion less soil. **[10M]**
4. Derive the equation for F.S. of infinite slope in a purely cohesive soil. **[10M]**
5. Explain in detail the Felonious method of locating centre of critical slip circle. **[10M]**
6. How many methods of testing could be made for the stability analysis of earth dam? Explain in detail the stability of upstream and downstream slopes immediately after construction. **[10M]**
7. How a slope is analyzed using Swedish circle method? Derive an expression for the factor of safety. **[10M]**
8. Calculate the safe height for an embankment rising 700 to the horizontal and to be made with a clayey soil having unit weight of 20 kN/*m*3, *Á*= 150 and a cohesion of 20 kN/*m*2. Factor of safety = 2.5. Value of stability number= 0.14. **[10M]**
9. Discuss the method for checking the stability of an infinite slope in a cohesive soil. What is critical height? **[10M]**
10. A) How a slope is analyzed using Swedish circle method **[2M]**
    B) What are the various methods for improving the stability of slopes? **[2M]**
    C) Describe Bishop's simplified method **[2M]**
    D) What is stability number? **[2M]**
    E) Discuss friction circle method for stability analysis of slopes **[2M]**

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QUESTION BANK (OBJECTIVE)

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1. The method of slices for the stability of slope [ ]
A) Can be used for stratified soils
B) Can be used when seepage occurs and the pore pressure exists within the soil
C) Gives the factor of safety based on moments and not the forces
D) All the above

2. Taylor's stability charts are based on total stresses using the [ ]
A) Friction circle method B) method of slices
C) $\phi_u = 0$ analysis D) none of the above

3. In stability analysis, the term mobilized shear strength is referred to as [ ]
A) shear strength B) maximum shear stress
C) applied shear stress D) none of the above

4. Bishop's simplified method of slices satisfies [ ]
A) Only the moments equilibrium
B) Only the vertical forces equilibrium
C) Only the horizontal forces equilibrium
D) All the static equations, except the horizontal forces equilibrium

5. The following assumption is not made for the friction circle method of slope stability analysis
A) Friction is fully mobilized [ ]
B) Total stress analysis is applicable
C) The resultant is tangential to the friction circle
D) The resultant passes through the centre of friction circle

6. The factor of safety of an infinite slope in a sand deposit is 1.732. If the angle of shearing resistance is 30^0 , the safe slope is [ ]
A) 19.45^o B) 75.4^o C) 18.4^o D) 71.6^o

7. The stability of slope is decreased by [ ]
A) Removal of a part of slope by excavation B) shock caused by an earthquake
C) pore water pressure in the soil D) All the above

8. For the computation of N – component for sudden drawdown conditions by approximate method, the weight is [ ]
A) Saturated unit weight B) submerged unit weight
C) Bulk unit weight D) Dry unit weight

9. If the depth, slope and soil properties are same throughout the length then the slope is known
A) Horizontal slope B) finite slope C) infinite slope D) horizontal slope [ ]

10. If the depth, slope and soil properties are not same throughout the length then the slope is known as [ ]
A) Horizontal slope B) finite slope C) infinite slope D) horizontal slope

11. A failure which occurs by rotation along a slip surface by downward and outward movement of soil mass is known as [ ]
A) Wedge failure B) translational failure C) compound failure D) rotational failure

12. A failure which occurs in an infinite slope along a long failure surface parallel to the slope is known as [ ]
A) Wedge failure B) translational failure C) compound failure D) rotational failure
13. A combination of rotational slip and translational slip is known as [ ]
A) Wedge failure B) translational failure C) compound failure D) rotational failure
14. A failure along an inclined plane is known as [ ]
A) Wedge failure B) translational failure C) compound failure D) rotational failure
15. Wedge failure is also known as [ ]
A) plane failure B) translational failure C) compound failure D) rotational failure
16. A failure which occurs only along infinite slope is [ ]
A) Wedge failure B) translational failure C) compound failure D) rotational failure
17. A failure which occurs due to the slope having cracks, joints, fissures known as [ ]
A) Wedge failure B) translational failure C) compound failure D) rotational failure
18. The factor of safety against shear failure for cohesion less soils is given by [ ]
A) $F_S = \frac{\tan\phi'}{\tan i}$ B) $F_S = \frac{\tan i'}{\tan i}$ C) $F_S = \frac{\tan\phi'}{\tan \phi}$ D) $F_S = \frac{\tan i'}{\tan \phi}$
19. The factor of safety against a steady seepage along the slope is given by [ ]
A) $F_S = \frac{\gamma' \tan\phi'}{\gamma_{sat}\gamma \tan i}$ B) $F_S = \frac{\gamma' \tan i'}{\gamma_{sat}\gamma \tan \phi}$ C) $F_S = \frac{\gamma' \tan i'}{\gamma_{sat}\gamma \tan i}$ D) $F_S = \frac{\gamma' \tan\phi'}{\gamma_{sat}\gamma \tan \phi}$
20. The reciprocal of stability number is known as [ ]
A) Wedge factor B) submerged factor C) stability factor D) rotational factor
21. The stability number is given by [ ]
A) $S_n = \frac{Cm}{\gamma H}$ B) $S_n = \frac{Cm\gamma}{H}$ C) $S_n = \frac{CmH}{\gamma}$ D) $S_n = \frac{Cm\gamma'}{\gamma H}$
22. The factor of safety based on Bishop's simplified method is [ ]
A) $F_s = \tau / \tau_m$ B) $F_s = S\tau / \tau_m$ C) $F_s = \tau_m / \tau$ D) $F_s = S / \tau_m$
23. For a cohesion less soil for stability of slope, relation between angle of slope i and angle of shearing resistance ϕ should be [ ]
A) $i = \phi$ B) $i < \phi$ C) $i > \phi$ D) $i << \phi$
24. For a cohesion less soil for stability of slope, relation between normal stress (σ), shear stress (τ) and shear strength (S) should be [ ]
A) $\sigma, S < \tau$ B) $\sigma, \tau < S$ C) $S, \tau < \sigma$ D) $\sigma, \tau > S$
25. The factor of safety against shear sliding for cohesion less soils is given by [ ]
A) $F_S = \frac{\tan\phi'}{\tan i}$ B) $F_S = \frac{\tan i'}{\tan i}$ C) $F_S = \frac{\tan\phi'}{\tan \psi}$ D) $F_S = \frac{\tan i'}{\tan \psi}$
26. Factor of safety with respect to cohesion assuming friction to be fully mobilized, is given by
A) $F_c = c/c_m$ B) $F_c = c_m/c$ C) $F_c = c_m'/c$ D) $F_c = c_m/c'$
27. Factor of safety with respect to friction assuming friction to be fully mobilized, is given by
A) $F_\phi = \phi/\phi_m$ B) $F_\phi = \phi_m/\phi$ C) $F_\phi = \phi_m'/\phi$ D) $F_c = \phi_m/\phi'$
28. Factor of safety with respect to shear strength is given by [ ]
A) $F = \tau/\sigma$ B) $F = \sigma/\tau$ C) $F = \tau/S$ D) $F = S/\tau$
29. Factor of safety with respect to height is given by [ ]
A) $F_H = H/H_m$ B) $F_H = H_m/H$ C) $F_H = H/H_c$ B) $F_H = H_c/H$
30. A slope 1 in 2 with a height of 8m has the properties: c = 28 kN/m^2, $\phi = 10^0$, Υ = 18 kN/m^3 calculate factor of safety with respect to cohesion [ ]
A) 1.08 B) 2.04 C) 3.04 D) 4.08
31. A slope 1 in 2 with a height of 8m has the properties: c = 28 kN/m^2, $\phi = 10^0$, Υ = 18 kN/m^3 calculate factor of safety with respect to critical height of slope [ ]
A) 20.32m B) 24.32m C) 28.32m D) 32.32m

32. A slope is to be laid at an angle of 30^0 with the horizontal. Find safe height of slope for a factor of safety 1.5 if the soil properties are: c = 15 kN/m^2, $\phi = 22^0$, Υ = 18 kN/m^3 [ ]

A) 10.1m B) 11.1m C) 12.1m D) 13.1m

33. A 5m deep channel has side slope 1:1. The properties of soil are c_u = 20kN/m^2, $\phi_u = 10^0$, e = 0.8 and G = 2.8. If Taylor's stability number is 0.108, what is factor of safety with respect to cohesion, when the canal runs full [ ]

A) 1.8 B) 2.8 C) 3.8 D) 4.8

34. A 5m deep channel has side slope 1:1. The properties of soil are c_u = 20kN/m^2, $\phi_u = 10^0$, e = 0.8 and G = 2.8. If Taylor's stability number is 0.108, what is factor of safety with respect to cohesion, when sudden drawdown, if Taylor's stability number for this condition is 0.137 [ ]

A) 1.5 B) 2.5 C) 3.5 D) 4.5

35. A canal with depth of 5m has banks with slope 1:1. The properties of soil are: c = 20 kN/m^2, $\phi = 15^0$, e = 0.7, G = 2.6. What is the Factor of safety with respect to cohesion when canal runs full

A) 2.22 B) 3.22 C) 4.22 D) 5.22 [ ]

36. A canal with depth of 5m has banks with slope 1:1. The properties of soil are: c = 20 kN/m^2, $\phi = 15^0$, e = 0.7, G = 2.6. What is the Factor of safety with respect to cohesion when canal completely emptied [ ]

A) 1.22 B) 1.32 C) 1.52 D) 1.72

37. Rotational failure is a type of _____ [ ]

A) Infinite slope B) finite slope C) Both A & B D) None of the above

38. Translational failure is a type of _____ [ ]

A) Infinite slope B) finite slope C) Both A & B D) None of the above

39. Compound failure is a type of _____ [ ]

A) Infinite slope B) finite slope C) Both A & B D) None of the above

40. Wedge failure is a type of _____ [ ]

A) Infinite slope B) finite slope C) Both A & B D) None of the above

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