M.E. First Semester (Civil Engg. (Geotechnical Engg.)) (Full Time) (C.G.S.- New)

13046 : Earth Dam Analysis and Design : 1 SFGE 5

P. Pages : 2 | **AW - 3917**

Time : Three Hours | Max. Marks : 80

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Notes :
1. Solve **any five** questions.
2. All question carry equal marks.
3. Due credit will be given to neatness and adequate dimensions.
4. Assume suitable data wherever necessary.
5. Diagrams and chemicals equations should be given wherever necessary.
6. Retain the construction lines.
7. Illustrate your answer necessary with the help of neat sketches.
8. Use of slide rule logarithmic tables, Steam tables, Moller's Chart, Drawing instrument, Thermodynamic table for moist air, Psychrometric Charts and Refrigeration charts is permitted.
9. Use of pen Blue/Black ink/refill only for writing the answer book.

1. a) Discuss the types of earth dam based on construction materials used. **8**

b) Draw a typical cross section of an earth dam showing following component with specifications of material used. **8**
- i) Previous cell
- ii) Impervious central core
- iii) Transition filter
- iv) Rock toe
- v) Horizontal filter blanket
- vi) Stone pitching and turting

2. a) Derive the Laplace equation for steady state seepage flow through porous media for three dimensional flow through anisotropic soils. **8**

b) Discuss various methods employed for seepage control through foundation of earth dam. **8**

3. a) Draw a typical diagram of zoned section of earth dam showing various filters provided in dam. Discuss the design criteria of each of them. **8**

b) Discuss the purpose of providing relief well in an embankment dam. Also draw a typical section diagram of relief well showing all components. **8**

4. a) Explain the concept of 'construction of pore pressure'. How it is to be computed. Discuss the critical hydraulic gradient and how does it effect the stability of embankment. **8**

b) An earth dam of height 25.0 m is constructed of soil of which the properties are $\gamma = 20.0\,kN/m^3$, $C = 44.0\,kN/m^2$, $\phi = 20°$. The faces of the dam are at 30° to the horizontal. The water in the reservoir drawn off very rapidly so that there is no time for appreciable drainage of water from dam itself. **8**
Compute the factor of safely immediately after draw down.
Take stability number as 0.025.

5. a) Discuss the Fellenius Method for leading centre of critical slip circle in Swedish Circle Method. **8**

b) In order to determine the factor of safety of the D/S slope during steady seepage, the section of a Homogeneous earth dam was drawn to a scale of 1cm = 10.0m and following results were obtained on trial slip circle. **8**

Area of N diagram $= 12.15 cm^2$

Area of T diagram $= 4.62 cm^2$

Area of U diagram $= 11.60 cm^2$

Length of arc $= 11.60 cm$

The dam material has the following properties.

Effective angle of Internal friction $= 26°$

Unit cohesion $= 20 kN / m^2$

Unit wt. of soil $= 20 kN / m^2$

Determine the factor of safety of slope.

6. a) Discuss various damages which may be caused to an earth dam due to earthquake. **8**

b) Discuss the constructional details of Rock fill dam. **8**

c) Discuss the design considerations of earth dam in seismic region. **8**

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