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ECE022

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 100656

Roll No.

B. Tech.

(SEM. VI) THEORY EXAMINATION, 2014-15

EARTH & EARTH RETAINING STRUCTURES

Time : 3 Hours] [Total Marks : 100

Note : Attempt all questions. All questions carry equal marks.

1 Attempt any two parts : 10×2=20

(i) What are various types of earth structures ? Name and explain them.

(ii) Draw a neat sketch of an earth dam and show all components.

(iii) Discuss safety factors in Earthen dams. For the dam shown in fig below. Soil A has $c' = 0, \phi' = 35^\circ$ r_d = 16kN/m^3 and V_{sat} = 19 kN/m^3. For both of dams for the downstreamslope, without carrying out any elaborate stability analysis, what are best estimats of safety factor for the end of construction and the steady state seepage condition ?

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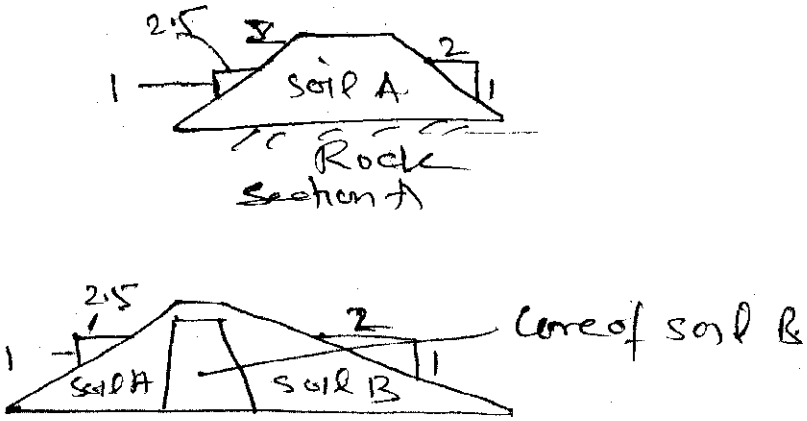

Fig. 1

2 Attempt any two parts : **10×2=20**

(i) Write notes on following :

(a) Cantilever wall

(b) Counterfort wall

(c) Reinforced earth retaining wall

(d) Back fill material properties

(ii) Check the stability of the cantilever wall shown below against sliding failure and overturning failure. Use Rankine Theory.

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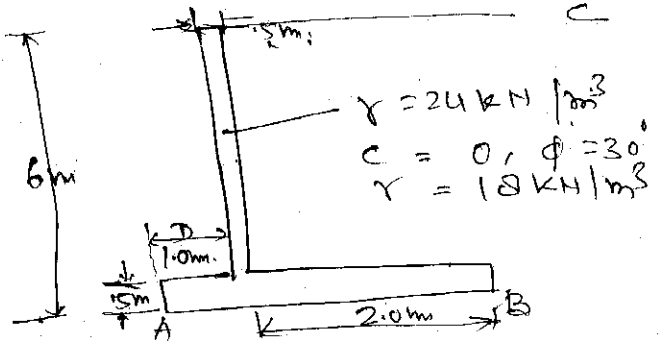

Fig. 2

(iii) Explain following :

(a) Metallic reinforcement

(b) Polymeric materials

(iv) Discuss stability considerations in earth retaining Walls. Show with sketch the forces acting in earth retaining walls.

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3 Attempt any two parts : **10×2=20**

(i) What is soil nailing? Write application of the techniques. Explain different types of nails and its advantages.

(ii) Consider a 10 m high near-vertical slope in urban setting in sandy soil. The ground water table is very deepened and beyond the bottom of excavation. The following parameters are given.The unit wt. of soil is 18 kN/m^3 surcharge pressure is 23 kN/m^2 and friction angle is 36.25°. It is proposed to use 20 mm dia steel bars of 6m length for soil nailing. The site requriements are that the line though which the nails end needs to be vertical and the vertical spacing shall be 1.0 m. The wall will have inclination of 10^o.

(iii) How is behaviour of soil nailed systems in seismic conditions. Write desig steps in soil nailed retaining structure.

4 Attempt any two parts : **10×2=20**

(i) What are different types of failures of reinforced earth foundations and reinforced retaining walls.

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(ii) Explain the following :

(i) Stages of construction of reinforced earth wall

(ii) Gablon walls

(iii) Design considerations of RE walls

(iv) Drainage provisions in RE walls.

(iii) A 8 m wall is to be built using sand fill and polymer grid reinforcement. The sand has $\phi' = 30^{\circ}$, r = 18 kN/m^3 and is to be used for the wall and backfill. A surcharge loading of 15 kPa is to be allowed for the medium safe bearing pressure for the foundation soil is 300 KPa.

The fill will be compacted in layers 250 mm thick. Take factor of safety of 2.0 for sliding. Check for external internal stability and overturning.

5 Attempt two parts : **10×2=20**

(i) Explain following :

(a) Pressure Ratio

(b) Fibre reinforced soils

(ii) Give design criterion of foundation reinforced soil bed.

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(iii) Why sufficient length of reinforcement is required beyond the loaded region of the footing or beyond the failure surface. Also explain why the bearing capacity of foundation increases due to application of geosynthetic reinforcement below foundation.
