B. TECH.
THEORY EXAMINATION (SEM–VI) 2016-17
EARTH AND EARTH RETAINING STRUCTURES

Time : 3 Hours   *Max. Marks : 100*

Note : *Be precise in your answer. In case of numerical problem assume data wherever not provided.*

SECTION-A

1   **Attempt all of the following:**   **(10×2=20)**
   a)   Enumerate different types of dams.
   b)   What do you mean by piping in dams?
   c)   List the types of earth retaining walls.
   d)   Write down the expression for calculating seepage discharge of an earth dam made from isotropic soils.
   e)   What do you mean by stability analysis of an earth retaining structures?
   f)   What do you understand by soil nailing?
   g)   What do you mean by preliminary section of an earth dam?.
   h)   What is pressure ratio?
   i)   Explain the soil-reinforcement interface friction.
   j)   Explain briefly fibre reinforced soil.

SECTION-B

2   **Attempt any five of the following:**   **(10×5=50)**
   a)   What is a mechanically stabilized retaining wall? How a stabilized wall resists earth pressure?
   b)   What are the causes of failure of mechanically stabilized walls? Discuss various checks in internal and external stability of such walls.
   c)   Discuss about the components and embankment details of an earth dam. Draw neat sketch also.
   d)   How do excess seepage and excess pore water pressure and gradients affect stability and performance of an earth dam?
   e)   Discuss how the stability and performance of an earth retaining structure is affected by submergence.
   f)   What are different types of failure of reinforced earth foundations and reinforced retaining walls?
   g)   Explain design criteria of foundation reinforced soil bed.
   h)   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 geo synthetic reinforcement below foundation.

SECTION-C

Attempt any two of the following: **(15×2=30)**

3   An embankment is to be made of a soil which has the following shear strength parameter under the existing conditions. The valves of c' and ϕ are 28 kN/m^3 and 15° respectively. If it is assumed that different margins of safety are available for cohesion component and friction component of shearing strength and the mobilized valves of cohesion and friction are $c_m = 20$ kN/m^2 , $\phi = 12°$, what is the factor of safety with respect to (i) cohesion and (ii) friction?

If the average valve of normal effective stress on the failure surface is 120 kN/m^2, what is the valve of (i) true factor of safety, F_s (ii) F_ϕ when $F_c = 1$ and (ii) F_c when $F_\phi = 1$.

4   What factors govern the effectiveness of a reinforcing element in soil? Explain each in detail giving suitable examples.

5   What are the failure modes of a reinforced foundation soil? How the bearing capacity of shallow foundations can be improved by reinforcing the foundation soil? Compare the load-settlement behaviour of a reinforced soil with that for unreinforced soil.