TECHNICAL TUESDAYS

TECHNICAL TEXTILES – PART V

REF: TT/ DEC 2021/ WK 2

GeoTech

Geotech or Geo textile is the segment of technical textile products used in geotechnical applications pertaining to soil, rock, earth etc. The principal functions performed by Geotextiles are confinement/separation, reinforcement, filtration and drainage, and protection.

Evolution of the geotextiles can mainly be divided into three generations. The first generation of geotextiles was used for applications like carpet or industrial sackings. The second generation of geotextiles was made by selecting specific textiles with consideration of their appropriate geotechnical use and the third generation textiles were built up for the purpose of geotechnical uses using specifically Directionally Structured Fibers (DSF), Directionally Oriented Structures (DOS) and composite products.

Geotextiles are then progressively used in civil engineering construction. In recent years, the geotextiles have been specially used in road and airport flexible pavements and in overlays.

Different application areas of geotextile include:

- Geo-textiles are used most commonly in the transportation market for construction of roadways for their **separation, reinforcement, and filtration** functions. The **separation** means, the separation of two different soils, by avoiding intermixing of the two soils during the life of the structure. Geotextiles, when placed between fine soil and a coarse material such as gravel, stone, etc, it prevents the soil from blending and entering into the coarse material under the proceedings of repeated applied loads, confirming the retention of mechanical nature of the coarse-grained soil. Geotextiles are generally applied for separation when applied in roadway pavement sections. For separation, a proper geotextile must be settled yet deformable; have a mass per unit area and strength that can resist mechanical stresses while installation without any damages and at the same time acts as a filter.
  As a **filter**, geo-textile permits liquid to pass to its own plane while avoiding the largest part of the soil particles. For this geotextile can either be put across the flow of liquid in the associated region between two types of soils having diverse grain sizes or a geotextile may be positioned in contact with soil permits water leaking from the soil to pass through, while preventing any transfer of soil particles, such as in drainage pipes.

The volume of water transferring through the fabric is an important mechanism in the filtration process. Therefore, over a long period of time geotextile must have high access for water permeability. It must have a capable space width, which restrain any eroding granules. The mass per unit area and strength should oppose mechanical loading from the soil without being spoiled during laying.

While set to below the subbase or base courses, geotextiles give **reinforcement** by lateral resistance, by increasing bearing capacity and by tensioned membrane effect. The geotextile is focused to a sustained tensile force at the functioning of the reinforcement. As a result, it gives tensile modulus and strength to a soil, which is working together through interface shear strength. Soil and rock materials are distinguished for their capability to withstand compressive forces and their comparative low ability for continual tensile forces. Geotextiles are applied for reinforcement of walls/steep slopes, soft soil and concrete. Soil up-gradation by reinforcement with geotextile is very popular.

- It provides better ground stabilization, drainage, and soil erosion control and embankment protection. Geo-textiles are placed at the tension surface to strengthen the soil. These textiles are also used for sand dune to protect upland coastal property from storm surge, wave action and flooding. A large sand-filled container within the dune system prevents storm erosion from proceeding beyond the container.
- Geotextiles allow planting on steep slopes, further securing the slope.
- It is used in landfill projects and waste management.
- In building demolition, geotextile fabrics in combination with steel wire fencing can contain explosive debris.
- Coconut fiber geotextiles are popular for erosion control, slope stabilization and bioengineering, due to high mechanical strength of these fabrics. The product degrades into humus, enriching the soil.

References:

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4. http://www.ittaindia.org/

.....To be continued.....

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Last week`s Answers: 1) LEATHER 2) FURNITURE 3) VENTILATING 4) VELVET

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