System Concept in Geomorphology:

The system concept was adopted in the explanation of geomorphic problems of the postulation of 'General System Theory' by **Von Bertalanffy in 1950.**

The system concept is a beneficial tool for studying any level of environmental condition on Earth, from global to micro-scopic. Systems can be divided into sub-system, or units that demonstrate strong internal connections. For example, the whole Earth System (super system), consists of the atmosphere, hydrosphere, lithosphere and biosphere, each a sub-system of the whole. Similarly, the human body is a system that is composed of many sub-systems (for example, the respiratory system, blood circulatory system, digestive system etc.). These sub-systems can also be sub-divided and so on.

The main aim of dividing a large system into smaller sub-systems is to focus the attention on a particular part of the whole. Thus, Geographers often divide the earth into smaller sub-system in order to focus their attention on a particular part of the whole Earth. Examples of sub-systems examined by geographers include the water cycle, climatic system, storm-systems, stream systems, Ecosystems, transport systems, industrial systems, agricultural systems, trade system etc.

In a system, geographers can trace the movement of energy or matter into the system (input), their storage in the system and their movements out of the system (output), as well as the interactions between components within the system.

Geographers often divide the system into two broad groups- **(a) Closed system (b) Open system.** A *closed system* is one in which no substantial amount of matter crosses its boundaries, although energy can go in and out of a closed system. Planet Earth or the earth system as a whole, is essentially a closed system. Except for meteorites that reach Earth's surface the escape of gas molecules or spacecraft from the atmosphere the earth system is essentially a closed system to the input or output of matter. The hydrosphere is another good example of a closed system. Water may exist in the system in all three of its states-liquid, gas or solid ice and they may be transformed from one state to another many times, but there is virtually no gain or no loss of water (output matter) in the system.

Most of earth's sub-systems are however, *open system* because both energy and matter move freely across the boundaries. For example, in a river system there is continuous input of energy and matter and also there is continuous output (outflow) of energy and matter.

The parts, or variables, of a system have a tendency to reach a balance with one another and with the external factors that influence that system. If the inputs entering the system are balanced by outputs, the system is said to have reached a state of equilibrium. Most of the natural systems have tendency toward stability (equilibrium), which is often called "**balance of nature".**

Geomorphic system Concept:

A geomorphic system is an integrated complex of mosaic of geomorphic features and this system functions under definite conditions through the input of energy (precipitation, insolation, upliftment etc.) and output of matter. A critical balance between the input of energy and output of matter is pre-requisite condition for the successful functioning of a geomorphic system. In fact, a geomorphic system is a structure of interacting processes and landforms that function individually and jointly to form a landscape complex. A super geomorphic system consists of several subsystems of different suits of landforms and these sub-systems are inter-connected through the input-output linkages.

Geomorphic systems are also divided into closed and open systems. A closed system has well defined boundary wherein neither energy nor matter can cross their boundary. Davisian geographical system is an example of closed geomorphic system which begins to function with the input of initial potential energy through short period rapid rate upliftment. With the march of time both height and energy decrease progressively due to denudation resulting into minimum height and energy at the attainment of peneplain stage. Sometimes there may be temporary increase in energy due to rejuvenation caused either by upliftment or by negative change in sea-level but ultimately the system runs down when the land is eroded down to peneplain and the sum of available energy and work to be done equal zero. On the other hand, an open geomorphic system is characterised by continuous renewable of energy and removal of matter from the system which functions in such a way that it attains steady state. A drainage basin is an example of an open geomorphic system which receives energy through insolation and rainfall and releases water and eroded material from its mouth.

The interactions that cause change or adjustment between parts of a system are called **'feedback'**. Two kinds of feedbacks are possible in a system- **Negative and Positive.**

It is apparent that closed geomorphic system is regulated through positive feedback mechanism and leads to progressive changes in landforms through time in such a way that a featureless plain with minimum relief (peneplain) is produced in the end while an open geomorphic system operates according to negative feedback mechanism and thus the geomorphic system remains in equilibrium.

Negative feedback: A profile of equilibrium of a stream means equilibrium of works of stream pertaining to erosion, transportation and deposition. A graded stream having attained the profile of equilibrium is such that there is equilibrium between transporting capacity of the stream and total load to be transported and thus a graded stream neither erodes or deposits in short term. Suppose, there is sudden increase in the sediment load of the stream due to accelerated rate of erosion consequent upon increased rainfall. This situation disturbs the equilibrium condition because the work to be done exceeds the transporting capacity of the stream. This change forces the stream to deposit extra load till the channel gradients becomes such that it provides required velocity and hence required energy to transport increased sediment load so that equilibrium condition is re attained and the stream is regraded.