**Examine the general composition and characteristics of any one soil type that you have studied (80 marks)**

In this answer the composition and characteristics of the brown earth soil will be examined. Brown earth soils are zonal soils. This means that they have developed in response to a climatic zone and its natural vegetation. In the case of brown earths they have responded to the cool temperate oceanic climate and decidious woodlands like in Midlands Ireland.

**Composition of brown earth soils.**

Brown earth conain; mineral matter, air, water,living things and humus. Brown earth soils contain mineral matter that has developed in response to mechanical and chemical weathering of its bedrock. In the cool temperate climate, freeze thaw action in uplands and sheltered lowlands supply mineral grains for soil. Chemical weathering of rock grains releases nutrients and clay minerals into the soil.

 Brown earths also hold air and water held in the pore spaces. The water comes from the moderate rainfall (1000mm). The pore spaces are provided by the actions of burrowing animals like badgers and plant roots.

 Organic matter and humus are present in brown earth soils. Because the cool temperate climate is a mild climate, brown earth soils contain lots of living things such as earthworms, fungi, bacteria and insects. These are active for most of the year and decompose organic matter providing humus for the soil. Humus is a black gel that is produced by the actions of fungi and bacteria on dead organic matter. Leave fall from the decidious trees adds organic matter to the soils and this is also converted to humus.

**Characteristics of brown earth soils**

The bowns earths main characteristics are; texture, structure, PH humus content and colour.

1 Texture- Texture refers to the proportions of sand, silt and clay present. Texture determines the percolation and water retention qualities of the soil which influences the ability of the soil to retain nutrients. Brown earth soils have a loam texture. Loam soils have a roughly equal mix of sand, silt and clay particles. Brown earth soils have this texture because they have developed on a variety of parent rocks such as limestone, slate and sandstone. In Ireland most brown earths developed on glacial till deposited at the end of the last ice age.

2 Structure- The structure of soil refers to the shape of the peds that make up the soil. Brown earth soils have a crumb structure. In this structure the peds of soils are clumped together in round grains or crumbs. Peds are clumps of soil grains stuck together by humus and plant roots. Rounded peds give the soil a crumb structure. A crumb structure develops in soils rich in living things, organic matter and humus. Water, air and organisms can pass through crumby soils easily. Roots can spread out into the soil easily so agricultural is good.

3 PH- The PH of brown earth varies from mildly acidic and mildly alkaline. This is due to the moderate rainfall that only mildly leaches the soil as well as the variation of parent material that can occur in the cool temperate region. Acid brown soils form on acid rocks such as sandstone while more alkaline brown earths form on lime rich parent material.

4 Humus content- brown earth soil have a high humus content because of the action of humification. Humification is a soil- forming process that occurs when dead organic matter is converted into humus by the actions of fungi and bacteria and other micro organisms. The rain washes the humus into the soil and raises its fertility.

5 Colour- Brown earths are uniformly brown in colour due to the amount of humus present as well as being well mixed by plant roots and animal activity. They have no distinct A or B horizon because of the action of living things mixing the soil grains together, the high humus content which is well mixed into the soil by the moderate amount of rainfall and the burrowing action of worms and insects.

**Variations of brown earth soils**

In Ireland local variations in relief and rainfall have caused the development of three types ofbrown soils. Acidic brown earths,shallow brown earths and podzolised brown soils.

Acidic brown earths have developed in upland areas over 500 meters in altitude where the parent rock is acidic (ie granite). The increased rainfall on upland areas also make these soils more acidic.

Shallow brown earths; these have developed in limestone areas such as the Burren. These soils are very thin dark black soils

Podzolised brown earths are found on areas of lowlands where podzolisation has occured. These are common in some parts of the midlands.