With reference to *one* biome that you have studied, account for the type of climate experienced in this biome and explain how this climate impacts on soils and vegetation within the biome.

(80 marks)

Marking Scheme:

Number of aspects discussed:	3 @ 20 marks each	4 @ 15 marks each
For each aspect:		
Identifying aspect	4 marks	3 marks
Discussion	8 x SRPs	6 x SRPs

Overall Coherence 20 marks graded* 20 marks graded*

In this answer, I choose 3 aspects to discuss (1. Climate, 2. Climate's impact on soil and, 3. Climate's impact on vegetation). Overall coherence means how well your answer is structured (Introduction, main section, conclusion – well-structured and coherent) and do you keep to the point/ answer the question directly.

Introduction:

In this answer I am going to discuss the type of climate experienced in the hot desert biome and how this climate impacts on soils and vegetation within this biome. Biomes are classified according to the predominant vegetation and characterized by adaptations of organisms to that particular environment. They are a *large geographical area controlled by climate*. Therefore the climate of a particular region will affect what type of soil is formed in that biome as well as what types of plants (flora) grow there. The hot desert that I have studied is the North American Desert Biome.

Body of Topic:

A desert biome can be defined as an arid region that is characterised by little or no rainfall, in which vegetation is scarce or absent, unless it has specially adapted. As a result of its location, between 15º and 30º north of the Equator, the climate of the hot desert biome is hot and dry. This area is under the influence of a global high pressure belt. This results in the air mass of the area descending and warming. As the air descends, it becomes warm and has a greater ability to absorb moisture. This results in dry winds that blows over the area, bringing desert conditions. Temperatures are very high during the day, reaching 30ºC. The diurnal range may be 30ºC as temperatures may fall to 0ºC at night, which is considered the *winter of the desert*. The dry air above the desert lacks moisture for cloud formation and so the heat from the surface radiates rapidly out into space, cooling the desert at night. During the day the sun is high in the sky and with little cloud cover, there is very little protection from the

sun. Evaporation rates are high and rainfall occurs infrequently. Rainfall totals may vary from 0 to 500mm.

The main types of soils in these Desert and semi-desert conditions are known as Aridsols. Aridsols are zonal soils. There is a diverse range of soil types ranging from sandy and coarse textured to gravel textured. The parent material with which the majority of NADB aridsols originate is gravelly alluvium from old granite rocks, thus influencing the red colour of the soil. Aridsols are blocky in structure and mainly gravelly and sandy in texture. These soils suffer extensively from Aeolian erosion. As precipitation is low in volume, Aridisols are poorly developed with a high degree of mineral matter but little organic matter. In fact the pebble layer present in most of the NADB is referred to a desert pavement, containing extensive clays, calcium, silica, and salts which have built up on the surface. Thus, the soils A Horizon is very shallow. The soil is light grey in colour due to little Humification to darken the colour. This results in poor water retention, and as very little vegetation exists in the first place and no roots to bind the soil, the texture remains sandy. Aridosols lack organic matter because there are so few plants that can grow in the hot desert climate to provide it. Humus is found around the roots of plants but is not widely distributed across the soil. Few micro-organisms are present to make humus and this further contributes to the soil's pale colour. These soils are predominantly Alkaline as intense evaporation occurs resulting in high rates of calcite, gypsum and sodium within the limited topsoil. Calcification is the most important process as nutrients are drawn back upward due to capillary action, also known as 'reverse leaching'. As a result, the ph value of aridsols in the NADB are alkaline due to the high calcium carbonate and sodium in the south west USA, where the NADB is located. This leads to a solid, calcite rich hardpan forming, which is impermeable. In the NADB, Salinisation is also present but not as extensive as it is in the Andes of South America. This can produce salt flaps, which have formed within the Mojave and Sonora deserts in this Desert Biome.

Climate also impacts on vegetation in the hot desert biome. As stated, the lack of rainfall results in very little vegetation in the desert biome. The climate has influenced the types of plants that are found in the desert biome. Plant life in the hot desert biome has had to adapt to extremes of heat and drought. The plants are well spread out to prevent competition for limited resources. Desert plants have adapted their life cycle to make the most of the short periods of rainfall available in the region. Seeds of fast growing plants (ephemerals) can lie dormant for many years, protected by a waxy coating. Once the rain arrives, these seeds burst into life, germinate, flower and produce seeds. This can happen in two to three weeks following heavy rains. Examples of ephemerals are the creosote bush and the desert poppy. Another group of flora which have adapted to the desert climate are 'succulents'. These are plants that have developed various ways to store precious water found in the desert. Some plants, such as the cactus, can store water in its fleshy interior, which acts like a sponge. The cactus has grooves on its trunk, which allows it to expand to store more water. These grooves also act as vertical channels, bringing water directly to the root system below. Water can also be stored in roots and underground bulbs. Desert plants also have thick waxy leaves and dense hairs that prevent loss of moisture. A dense coating of hairs, known as trichomes, slow air moving over the surface of the plant. Since air in the desert is very dry, any air movement tends to increase evaporation. The trichomes create a layer of still, humid air around the plant, thereby reducing water loss. Two root systems have developed in plants of the desert region. The cactus has a radial root system. It has shallow roots that are close to the surface and spread out in a radial pattern around the plant for great distances to create a large moisture-collecting area. Many desert plants use large root systems to find their water with some plants having which extend for over 50 meters underground. These include the Mesquite bush. These plants have extensive root systems close to the

surface and are radial in formation ensuring a quick acquisition of water in rainstorms. Other plants produce fruits that are eaten by birds. The birds' droppings are then spread over very large areas. Trees such as the Sodom apple produce poisonous or unpleasant material that ensures animals do not feed off them, thereby allowing these plants to survive in this harsh arid climate. Finally, flora such as Cereus bloom only at night ensuring minimum vapour/moisture is required.

Conclusion:

Therefore the impact which climate has on the vegetation and soil within the North American Desert Biome has been shown to be dramatic and profound.