Part 1 — Network Design of VTG Network **(Marks: 40)**

This part has 4 activities and at the end of this part, you should be able to design the network blueprints required for the actual practical implementation as listed in the activity table below.

Activity 1	Designing an IP Address Plan	10 marks
Activity 2	Designing a hierarchal Switch Topology	10 marks
Activity 3	Designing Network diagram	10 marks
Activity 4	Designing an Active directory Logical diagram	10 marks
TASK TOTAL		**40 marks**

Activity 1

The sites will be using the following IP address blocks on their internal networks

Johannesburg LAN IP address block	192.168.10.0/24
Johannesburg Wireless IP address block	192.168.20.0/24
Pretoria LAN IP address block	192.168.10.0/24
Pretoria Wireless IP address block	192.168.20.0/24

Based on the IP address blocks, design an efficient IP address for EACH site scheme assigning subnets to each department based on the number of required IP addresses for each department and fill in the following table as to show your IP Address plan.

NB* Also take into consideration a separate subnet for your Servers on each site, and any other special VLANs or subnets that may be required.

Department	Subnet ID	IP Address Range	Broadcast	Subnet Mask	No of IPs

IP Address Criteria for Pretoria	Mark allocation
Correct Subnet ID represented with CIDR notation	1
Correct IP address range defined from start to last IP address	1
Correct Broadcast Address	1
Correct Subnet Mask in Dotted Decimal Notation	1
Correct number of IP address suitable for the devices in the department	1
TOTAL	**5 marks**

192.168.20.0/24 - Wireless

IP Address Criteria for Johannesburg	Mark allocation
Correct Subnet ID represented with CIDR notation	1
Correct IP address range defined from start to last IP address	1
Correct Broadcast Address	1
Correct Subnet Mask in Dotted Decimal Notation	1
Correct number of IP address suitable for the devices in the department	1
TOTAL	**5 marks**

Activity 2

Question 1

To ensure redundancy and fault tolerance, design a three-layer hierarchal switching topology that consists of core, distribution, and access layers. Both sites are to use the same topology, so you only need but submit one diagram. As part of the core layer also include a routing implementation with fault tolerant access to the Internet and VPN access.

Microsoft Visio MUST be used to draw the diagram and need not show end devices

Question 2

With multiple redundant data paths in the switching topology design causing loops discuss how the spanning tree protocol will prevent loops and broadcast storms that could essentially devastate the network?

Marking Rubric for Switch Topology diagram

IP Address Criteria for Johannesburg	Mark allocation
Correct design layout of access layer	2
Correct design layout of distribution layer	2
Correct design layout of core layer	2
Redundancy between layers and Router redundancy to Internet	2
Microsoft Visio used for drawing diagram	2
TOTAL	**10 marks**

Activity 3

Design a Network blueprint to clearly showing the interconnectivity between network devices on both sites and assigned subnets.

NB* The switching topology design has already been addressed in Activity 2, so this network diagram need not duplicate the switch topology diagram but rather be a depiction of the logical connection paths between the network devices allowing for the tracing of data paths

Marking Rubric for Network diagram

IP Address Criteria for Johannesburg	Mark allocation
Network end devices correctly depicted on network diagram	2
Network Servers correctly depicted in network diagram	2
Security devices and appliances correctly placed on network diagram	2
Demarcation points of Internal, External and DMZ clearly defined	2
Wireless connectivity taken into consideration	2
TOTAL	**10 marks**

Activity 4

Draw an Active Directory Logical diagram clearly showing the structure of the Active directory domain including but not limited to the VTG forest, domain, sites, subnets, organisational units, groups users and gpo objects.

Marking Rubric for Active Directory Logical diagram

IP Address Criteria for Johannesburg	Mark allocation
Correct presentation of VTG Forest and Domain	2
Correct presentation of VTG Active Directory Sites and Subnets	2
Correct presentation of VTG Active Directory Group Policy Objects	2
Correct presentation of VTG Active Directory Organisational Units	2
Correct presentation of VTG Active Directory Users and Groups	2
TOTAL	**10 marks**

END OF PART 1