Republic of Rwanda
City of Kigali

GASABO DISTRICT

DISTRICT COMPREHENSIVE ASSESSMENT, RTQF LEVEL_4 2023-2024

SECTOR: ICT AND MULTIMEDIA
TRADE: SOFTWARE DEVELOPMENT
MODULE CODE: SWDWS401
MODULE NAME: **BASIC WINDOWS SERVER ADMINISTRATION**
DATE OF EXAM: 15-3-2024
DURATION: 3 HRS
SCHOOL YEAR: 2023-2024
TERM: 2

MARKING GUIDE (MG)

Instructions:

1. **Attempt all questions in section A (55 Marks)**
2. **Attempt three questions in section B (30 Marks)**
3. **Attempt one question in section C (15 Marks)**

SECTION A (Attempt all Questions) / 55 Marks

Q1. Define the following terminologies used in windows server administration **/ 5 Marks**

ANS:

a) **Server :** refers to a computer or a system that provides services or resources to other computers or devices on the network and It is designed to handle and respond to requests from clients, such as serving web pages, managing files, or hosting applications

b) Client : is a computer or device that accesses and utilizes services or resources provided by a server. It can be a desktop computer, laptop, smartphone, or any other network-enabled device

c) **A hypervisor:** A hypervisor, also known as a virtual machine monitor (VMM), is software or firmware that enables the creation and management of virtual machines (VMs)

d) **Active directory (AD) :** is a directory service developed by Microsoft for Windows domain networks and it's works as a centralized database that stores and manages information about network resources such as users, computers, groups, and other objects within an organization's network

e) **Network operating system :** is an operating system that is designed to provide network services and manage network resources. It allows multiple computers to communicate with each other and share resources such as files, printers, and applications over a network

Q2. choose the correct answer **/ 4 Marks**

A. RAID is stands for

I. Redundant Arithmetic Independent Disk

II. Repeated Array Independent Disk

III. **Redundant Array Independent Disk**

IV. All above are correct answer

B. The window server role that involve in providing IP Address dynamically to client is:

I. DNS Server

II. DHCP Server

III. ADDS

IV. Print Server

C. a server role that ensures the user accessibility and authenticate user over windows server is called

I. DHCP Server

II. DNS Server

III. ADDS

IV. No correct answer

D. A server role that translates domain into IP Addresses and vice-versa during user requesting services from server is

a) HTTP Server

b) **DNS Server**

c) IIS Server

d) No correct answers

Q3. Match the following windows server a terminologies(A) with their description (B) **/ 5 Marks**

Answer	Windows server terminologies (A)	Description (B)
A.....III	A. Virtualization	I. a container within a Microsoft Windows Active Directory (AD) domain that can hold users, groups and computers
B.....I	B. Organization Units	II. a logical grouping of network objects that share a common

		directory database, security policies, and trust relationships
C……II	C. Domain	III. a technology that allows the creation of virtual instances or representations of various computing resources, such as servers, storage, networks, or operating systems
D……V	D. User Account	IV. a technology that combines multiple physical hard drives into a single logical unit to improve performance, data protection, and storage efficiency.
E……IV	E. RAID Technology	V.accounts created for individual users in a computer system or

		network and allow users to log in, access resources, and perform various actions on the system / server

Q4. List three advantages or function of Network Operating System**/3 Marks**

ANS: the following are some function of NOS

- File sharing,
- printer sharing,
- user authentication
- network administration.
- NOS enables multiple computers or devices to communicate and share resources within a network effectively.

Q5. Enumerate Three (3) Importance / advantages of RAID technology **/ 3 Marks**

ANS: some importance of RAID technology are

1. **Improved Performance**: RAID can enhance read and write performance by distributing data across multiple drives. This allows

for parallel access to data, resulting in faster data transfer rates and improved overall system performance.

2. **Data Redundancy and Fault Tolerance:** RAID provides data redundancy, which protects against drive failures. In certain RAID levels, such as RAID 1, RAID 5, RAID 6, and RAID 10, data is mirrored or parity information is stored to allow for data reconstruction in case of a drive failure. This ensures that data remains accessible and minimizes the risk of data loss

3. **Increased Storage Capacity:** RAID allows for combining the storage capacity of multiple drives into a single logical volume. This enables the creation of larger storage spaces without relying on a single drive. It offers efficient utilization of storage capacity and scalability options for future expansion.

4. **Flexibility and Customization:** With different RAID levels available, organizations have the flexibility to choose the level that best suits their specific needs. RAID configurations can be customized based on performance requirements, fault tolerance, and capacity considerations.

5. **High Availability and Data Access**: RAID technology provides high availability by allowing the system to continue functioning even if one or more drives fail. This ensures uninterrupted access to data and minimizes downtime in critical environments

Q6. Illustrate three (3) importance of server virtualization **/ 3 Marks**

ANS:

Server virtualization has different importance that include

- **Security:** We can use virtual firewalls to secure data and isolate our apps so they're protected from various threats. Virtualization enables automated provisioning, which allows for more security and visibility across physical or virtual applications.
- **Reliability:** We can rely on our virtual environments to efficiently handle disaster recovery operations and perform any necessary backups or retrieval operations.
- **Cost savings:** Virtualization software is less expensive and requires less hardware to run

- **Testing**: With virtualization, our environment is split into various VMs. We can replicate those VMs to perform any necessary testing without affecting the actual production environment.
- **Efficiency:** Since we have fewer physical servers, we don't have to spend as much time maintaining physical machines. We can perform any operations we need to within our virtual environment, which boosts productivity.
- **Scalability:** With virtualization, it's easy to scale our virtual cloud environment. We can automate scaling as needed to accommodate for growth to ensure that the appropriate resources are available.
- **Disaster recovery and downtime:** We can replicate VMs in case of a disaster, which enhances resiliency and reduces downtime

Q7. Identify Three (3) hypervisor technologies that you know **/ 3 Marks**

ANS: hypervisor has different technologies that include

- **Type 1 Hypervisor (Bare Metal Hypervisor):** This hypervisor runs directly on the physical hardware, without the need for an underlying operating system. It provides direct access to hardware resources and manages the virtual machines (VMs) independently.

Examples of type 1 hypervisors include: VMware ESXi, Microsoft Hyper-V, and Citrix XenServer.

- **Type 2 Hypervisor (Hosted Hypervisor):** This hypervisor runs on top of an existing operating system. It relies on the underlying operating system for hardware access and manages the VMs as processes within the host operating system.

Examples of type 2 hypervisors include: Oracle VirtualBox, VMware Workstation, and Parallels Desktop

- **Full Virtualization:** This hypervisor technology allows for the emulation of complete hardware environments, enabling the execution of multiple operating systems on a single physical machine. It provides isolation and allows different operating systems to run simultaneously without modification. Type 1 hypervisors typically support full virtualization.

4. **Para-virtualization:** In para-virtualization, the guest operating systems are modified to be aware of the virtualization layer. This allows for more efficient communication between the guest operating systems and the hypervisor, resulting in improved performance compared to full virtualization.

Xen is an example of a hypervisor that supports para-virtualization

Q8. List any three (3) windows server role that you know **/ 3 Marks**

ANS:

Windows has many Different server roles include

- DNS server
- PRINT and document services
- DHCP SERVER
- ADDS
- Web server (IIS , APache tomcat etc)

Q9. what the two types of user account in windows server Administration **/ 3 Marks**

ANS:

In windows server we have two types of user account which are :

- Administrator account
- Standard account (Guest account)

Q10. what are three (3) types of Group policy objects **/ 3 Marks**

ANS:

The types of Group policy Object are :

- **Local GPO:** A Local GPO is a policy applied directly to a specific computer and is stored locally on that computer's file system.
- Local GPOs are typically used to configure settings that apply only to that specific computer and are not managed through the Active Directory domain.
- Administrators can use tools such as the Local Group Policy Editor (gpedit.msc) to configure Local GPO settings on individual computers.
- Local GPOs are useful for enforcing security policies or configuring system settings on standalone computers or computers that are not part of an Active Directory domain.

- **Non-Local GPO:** Non-Local GPOs are policies that are stored in the Active Directory domain and are applied to users or computers based on their membership in Active Directory organizational units (OUs).These GPOs are managed centrally through the Group Policy Management Console (GPMC) and are applied to multiple computers and users within the domain.

- **Starter GPO:**A Starter GPO is a template or baseline GPO that can be used as a starting point for creating new GPOs.

- Starter GPOs contain predefined settings and configurations that can be customized by administrators to meet the specific needs of their organization.

Q11. Give three (3) different between work group from domain **/ 3 Marks**

ANS:

- **Centralized Management:** Domains have a central server (domain controller) that manages user accounts, security policies, and resources. **Workgroups** lack central management, requiring individual configuration on each device.
- **Security: Domains** offer enhanced security through centralized authentication and authorization. Each user has a unique account with assigned permissions, making it easier to control resource access. **Workgroups** rely on local accounts on each device, potentially creating security vulnerabilities due to non-standard configurations.
- **Scalability:** Domains are better suited for large environments with many users and devices due to their centralized management and scalability. **Workgroups** become cumbersome to manage as the

number of devices grows, making them more appropriate for smaller, simpler networks

Q12. Mention are the steps to join domain in windows server **/ 5 Marks**

ANS:

Steps to Join a Domain in Windows Server

- **Right-click "This PC" or "Computer" and select "Properties."**
- **Click "Change settings" under "Computer name, domain, and workgroup settings."**
- **Select "Join a domain" and click "Next."**
- **Enter the domain name and click "Next."**
- **Provide the domain administrator credentials and click "OK."**
- **Click "Finish" to complete the joining process.**

Q13. what is delegation in windows server **/ 1 Marks**

ANS:

Delegation allows you to grant specific permissions to user accounts or groups to manage specific objects (e.g., folders, printers, user accounts) in Active Directory. This helps distribute administrative

tasks and reduce the workload for the main administrator while maintaining control over security and access

Q14. Differentiate Group policy object from group policy management **/ 2 Marks**

ANS:

Differences :

- **Group Policy Object (GPO):** A container that stores settings and policies that can be applied to user and computer accounts in Active Directory. GPOs define configurations for security, software deployment, network settings, and more.

- **Group Policy Management Console (GPMC):** A tool used to create, edit, link, and manage GPOs. It provides a central interface for managing group policies across your domain.

Q15. What are three server types of virtualization **/ 3 Marks**

ANS:

- **Full Virtualization:** also known as native virtualization, allows multiple virtual machines (VMs) to run on a single physical server while emulating the complete hardware environment. Each VM operates as if it has its own dedicated hardware resources, including CPU, memory, storage, and network interfaces.

Examples of hypervisors that support full virtualization include: VMware ESXi, Microsoft Hyper-V, and KVM (Kernel-based Virtual Machine).

- **Para-virtualization:** its involves modifying the guest operating systems to be aware of the virtualization layer and This allows for more efficient communication between the guest operating systems and the hypervisor, resulting in better performance compared to full virtualization. Para-virtualization requires specific guest operating system support.

Ex:

Xen is a popular hypervisor that supports para-virtualization

- **Container-based Virtualization**: also known as operating system-level virtualization is a lightweight virtualization technique that allows for the creation and running of multiple isolated user-space instances, called containers, on a single host operating system and that Containers share the host's operating system kernel, libraries, and resources, making them more efficient and lightweight than full virtualization.

Ex: Docker and Kubernetes are examples of popular containerization platforms

Q16. list steps to create Organization Units in Active Directory **/ 5 Marks**

ANS:

Steps to Create Organizational Units (OUs) in Active Directory

- **Open the Active Directory Users and Computers (ADUC) console.**
- **Right-click on the container where you want to create the OU (e.g., domain name, another OU).**
- **Select "New" and then "Organizational Unit."**
- **Provide a name for the OU and click "OK."**
- **(Optional) You can customize the description and delegate control over the OU.**

Q17. Give two software application used in Virtualization process **/2 Marks**

ANS:

Some software application used in virtualization are

- VMware vSphere/VMware ESXi
- Microsoft Hyper-V
- Oracle VM VirtualBox
- KVM (Kernel-based Virtual Machine

SECTION B (Choose three Questions) / 30 Marks

Q18. Explain any Five (5) RAID levels that you know **/ 10 Marks**

RAID Level are :

- **RAID 0 (Striping):** RAID 0 provides increased performance and capacity by striping data across multiple drives. It does not offer any fault tolerance or redundancy. Data is divided into blocks and distributed across the drives, allowing for parallel read/write operations. However, if one drive fails, all data is lost.
- **RAID 1 (Mirroring):** RAID 1 provides data redundancy by creating an exact copy (mirror) of data on two or more drives. It offers high read performance and fault tolerance, as data can be read from any of the mirrored drives. If one drive fails, data remains accessible from the remaining drives. However, it has lower capacity due to the need for duplicating data
- **RAID 5 (Striping with Parity):** RAID 5 combines striping and parity to provide both performance and fault tolerance. Data is striped across multiple drives, and parity information is distributed across the drives as well. Parity allows for data reconstruction in case of a single drive failure. RAID 5 requires at least three drives and offers a good balance between performance, capacity, and fault tolerance.
- **RAID 6 (Striping with Dual Parity):** RAID 6 is similar to RAID 5 but provides higher fault tolerance by using dual parity. It requires at least four drives and can withstand the failure of two drives

simultaneously. RAID 6 offers better data protection but has slightly lower write performance compared to RAID 5

- **RAID 10 (Mirrored Striping):** RAID 10 combines mirroring (RAID 1) and striping (RAID 0). It requires at least four drives, where data is mirrored across pairs of drives, and then the mirrored pairs are striped. RAID 10 offers high performance, fault tolerance, and capacity utilization. It can withstand the failure of one or more drives in each mirrored pair.
- **RAID 50 and RAID 60:** RAID 50 and RAID 60 are combinations of RAID 5 and RAID 0 (RAID 50) or RAID 6 and RAID 0 (RAID 60). They provide better performance and fault tolerance by striping data across multiple RAID 5 or RAID 6 arrays
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Q19. Discuss on five components of DHCP Scope in windows server **/ 10 Marks**

ANS:

The DHCP scope components are :

- **Start and End IP Addresses:** The range of IP addresses that the DHCP server can allocate to devices. For example, if the start IP address is 192.168.1.100 and the end IP address is 192.168.1.200, the DHCP server can assign addresses in that range.
- **Sub net Mask:** Specifies the sub net to which the IP addresses in the scope belong. The sub net mask defines the network portion of an IP address and the host portion.

- **Default Gateway:** The IP address of the default gateway (router) that devices use to reach destinations outside the local network.
- **DNS Servers:** The IP addresses of Domain Name System (DNS) servers that devices use to resolve domain names to IP addresses.
- **Lease Duration:** The amount of time for which an IP address is leased to a device. After this period, the device must renew its lease or request a new IP address
- **Etc**

Q20. Explain Five (5) types of DNS queries in windows server administration **/ 10 Marks**

ANS:

TYPES / CATEGORIES OF DNS QUERRIES

- **Recursive Query:** here A client (usually a user's device or a local DNS resolver) makes a request to a DNS server and expects a complete answer. If the queried DNS server does not have the information, it will perform additional queries on behalf of the client until it obtains a final answer or determines that the requested information does not exist
- **Iterative Query:** here A client or DNS resolver requests information from a DNS server but does not expect a complete answer. The queried DNS server either provides the requested information or refers the client to another DNS server that might

have the necessary information. The client or resolver continues to query other servers until it receives a complete answer or determines that the information is not available

- **Non-Recursive Query:** here A client or DNS resolver requests information from a DNS server without expecting the server to provide a complete answer then The queried DNS server either provides the requested information or refers/ send the client to another DNS server having the responsibility of obtaining a complete answer to the client or resolver.
- **DNS Resolver Query:** is a component of DNS client software responsible for initiating DNS queries and It interacts with DNS servers to obtain IP addresses corresponding to domain names. DNS resolvers can perform both recursive and iterative queries as part of the DNS resolution process
- **DNS Root Server Query:** During the DNS resolution process, a query may be directed to the DNS root servers. These servers provide referrals to top-level domain (TLD) servers, helping to guide the DNS query toward the authoritative DNS server for the requested domain.
- **Authoritative DNS Server Query:** When resolving a domain name, a DNS query may be directed to the authoritative DNS server for that domain. The authoritative server holds the official and up-to-date DNS records for the specified domain and provides the definitive answer to the query

Q21. Explain four stages does DHCP operate through to provide IP Addresses dynamically to clients **/ 10 Marks**

ANS:

The four stage that DHCP operate through to provide IP addresses dynamically to a client are are simply summarized in table below

Steps / message sent	Detail/ explanation
Discover	This is message sent by DHCP client to discover a DHCP server.
Offer	Sent by DHCP server to lease unique IP address and other parameters needed to client.
Request	Sent by DHCP client asking server to lea se parameters listed in Offer message.
Acknowledgement	Sent by DHCP server to assign IP addres s, mask, default router & DNS server ad dress to client.

Q22. Give and explain any five windows server role and features in windows server **/ 10 Marks**

ANS:

Server role and feature are :

- **Active Directory Domain Services (AD DS):** The foundation of Windows Server domains. AD DS provides centralized authentication, authorization, and management of users, computers, and resources within a domain network.
- **DHCP Server:** Automatically assigns and manages IP addresses and other network configuration settings to client devices.
- **DNS Server :** Resolves domain names to IP addresses and vice versa, forming the backbone of name resolution on the internet and internal networks.
- **File and Storage Services :** Provides technologies and features for file sharing, storage management, and data replication. Features include Network File System (NFS), Distributed File System (DFS), Storage Spaces, and more.
- **Hyper-V:** Microsoft's virtualization technology, allowing you to create and manage virtual machines (VMs) on a physical server.

SECTION C (Choose one question) / 15 Marks

Q23. Explain Four(4) types of DNS zone in windows server **/ 15 Marks**

ANS:

Types of DNS zone are :

DNS zones are portions of the DNS namespace that are managed by a specific DNS server.

- **Forward Lookup Zone:** is a DNS zone that translates domain names to IP addresses. And It contains records such as A (Address) records, CNAME (Canonical Name) records, MX (Mail Exchange) records, and others. It is the most common type of DNS zone and is used for standard domain name resolution.
- **Reverse Lookup Zone :** is a DNS zone used to map IP addresses back to domain names. It contains PTR (Pointer) records that associate IP addresses with corresponding domain names. Reverse lookup zones are essential for tasks like logging and security, where identifying the domain associated with an IP address is required.
- **Standard Primary Zone :** In a standard primary zone, DNS information is stored in a text file (zone file) on a DNS server. This server is considered authoritative for the zone, meaning it has the original, read-write copy of the zone data. Changes to the zone are made directly in the zone file on the primary DNS server.
- **Standard Secondary Zone:** is a read-only copy of a DNS zone that is hosted on another DNS server. The secondary server periodically updates its copy of the zone data through zone transfers initiated by the primary DNS server. Secondary zones provide fault tolerance and load balancing by distributing DNS queries across multiple servers and its store all zone file from primary zone

Q24. Give and Explain Five(5) types of DNS record that you know in windows server **/ 15 Marks**

ANS:

Types of DNS RECORD are

DNS records are individual entries within a DNS zone, containing information that maps domain names to IP addresses or provides other DNS-related data. DNS records provide specific details about how domain names should be resolved.

Types are :

- **A (Address) Record:** its Maps a domain or subdomain to an IPv4 address

Example : example.com. IN A 192.168.1.1

- **CNAME (Canonical Name) Record:** its Creates an alias for a domain or subdomain, pointing to another domain's A or AAAA record

Example : www.example.com. IN CNAME example.com.

- **MX (Mail Exchange) Record :** its Specifies mail servers responsible for receiving emails on behalf of a domain.

Example : example.com. IN MX 10 mailserver.example.com.

- **PTR (Pointer) Record**: its Used for reverse DNS lookups, mapping an IP address to a domain name.

Example : 1.1.168.192.in-addr.arpa. IN PTR example.com

- **NS (Name Server) Record**: its Identifies authoritative DNS servers for a domain

Example : example.com. IN NS ns1.example.com.

- **SOA (Start of Authority) Record**: its Contains essential information about the domain, including the primary DNS server, the email of the domain administrator, domain serial number, and timers for refreshing the zone.

Example: example.com. : IN SOA ns1.example.com. admin.example.com. (

2023111901 ; Serial

7200 ; Refresh (2 hours)

3600 ; Retry (1 hour)

1209600 ; Expire (2 weeks)

86400 ; Minimum TTL (1 day)

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- **Reverse-lookup Pointer records (PTR Record):** allows a DNS resolver to provide an IP address and receive a hostname (reverse DNS lookup).
- **Certificate record (CERT Record):** stores encryption certificates—PKIX, SPKI, PGP, and so on.
- **Service Location (SRV Record)**: a service location record, like MX but for other communication protocols.

- **Text Record (TXT Record):** typically carries machine-readable data such as opportunistic encryption, sender policy framework, DKIM, DMARC

END OF COMPREHENSIVE ASSESSMENT !!!