DIVINE WORD COLLEGE OF CALAPAN
SCHOOL OF INFORMATION AND TECHNOLOGY
DATA COMMUNICATION AND NETWORKING 2
EXERCISE 9

NAME _____ **SCORE** _____ **RATING** _____%
ID# _____ **COURSE**_____ **DATE** _____

ROUTER-ON-A-STICK (ROAS)

Objectives

1. Configure multiple VLANs across two switches.
2. Implement trunking between switches and from switch to router.
3. Configure router subinterfaces to enable inter-VLAN routing.
4. Verify communication across VLANs using Router-on-a-Stick.
5. Apply troubleshooting techniques to correct misconfigurations.

Topology

You will build a network with **two switches (S1 and S2)** connected to **one router (R1)** and six PCs.

1. PCs: PC1, PC2, PC3, PC4, PC5, PC6
2. VLANs to be created:
    a. VLAN 10: Faculty
    b. VLAN 20: Students
    c. VLAN 30: Admin
    d. VLAN 40: Guests
    e. VLAN 99: Management

Distribution
S1:

a. F0/2 → PC1 (VLAN 10)
b. F0/3 → PC2 (VLAN 20)
c. F0/4 → PC3 (VLAN 30)

S2:

a. F0/2 → PC4 (VLAN 10)
b. F0/3 → PC5 (VLAN 20)
c. F0/4 → PC6 (VLAN 40)

Trunks:

a. S1 F0/1 ↔ S2 F0/1
b. S1 F0/5 ↔ R1 G0/0

Router Subinterface Assignments (R1 G0/0):

a. G0/0.10 → 192.168.10.1/24
b. G0/0.20 → 192.168.20.1/24
c. G0/0.30 → 192.168.30.1/24
d. G0/0.40 → 192.168.40.1/24
e. G0/0.99 → 192.168.99.254/24 (native VLAN)

Tasks:

1. Basic Switch Configuration
    a. Configure hostnames: S1 and S2
    b. Console password: cisco
    c. VTY 0–4 password: class
    d. Encrypt all passwords

    e. Set history size to 20
    f. Save configuration
2. VLAN Configuration
    a. On both switches, create VLANs 10, 20, 30, 40, and 99.
    b. Assign access ports as listed in topology.
    c. Configure VLAN 99 as management VLAN:
        i. S1: 192.168.99.1/24
        ii. S2: 192.168.99.2/24
3. Trunk Configuration
    a. Configure S1–S2 link (F0/1) as trunk.
    b. Configure S1–R1 link (F0/5 ↔ G0/0) as trunk.
    c. Allow VLANs 10, 20, 30, 40, 99.
    d. Set VLAN 99 as native VLAN.
4. Router Configuration (R1)
    a. Encapsulation dot1q 10 → IP 192.168.10.1/24
    b. Encapsulation dot1q 20 → IP 192.168.20.1/24
    c. Encapsulation dot1q 30 → IP 192.168.30.1/24
    d. Encapsulation dot1q 40 → IP 192.168.40.1/24
    e. Encapsulation dot1q 99 native → IP 192.168.99.254/24
5. Host Configuration
    a. PC1 → 192.168.10.10 / Gateway 192.168.10.1
    b. PC2 → 192.168.20.10 / Gateway 192.168.20.1
    c. PC3 → 192.168.30.10 / Gateway 192.168.30.1
    d. PC4 → 192.168.10.11 / Gateway 192.168.10.1
    e. PC5 → 192.168.20.11 / Gateway 192.168.20.1
    f. PC6 → 192.168.40.10 / Gateway 192.168.40.1
6. Connectivity Test
    a. Verify that devices in the same VLAN can ping each other.
    b. Verify inter-VLAN routing (PC1 ↔ PC5, PC3 ↔ PC6, etc.).
    c. Confirm router is routing correctly across all VLANs.

Documentation (Required Screenshots)

1. VLAN creation (show vlan brief).
2. Trunk configuration (show interfaces trunk).
3. Router subinterfaces (show running-config)
4. Successful ping results (intra- and inter-VLAN)
5. Troubleshooting if errors occur

Rubric

Criteria	Description	Points	Score
Topology Setup & Cabling	Correct cabling between 2 switches, router, and PCs	10	
Basic Switch Configuration	Hostname, passwords, history size, save command	8	
VLAN & Port Assignments	VLAN creation, access port configuration, Mgmt VLAN	10	
Trunk Setup	Correct trunk config on S1–S2 and S1–R1 links	8	
Router Subinterfaces	Accurate ROAS subinterface configuration	9	
Connectivity Test	Pings within VLAN and across VLANs successful	5	
Documentation	Screenshots, verification outputs, organized logs	5	
Total		**55**	