

POS Example Exam

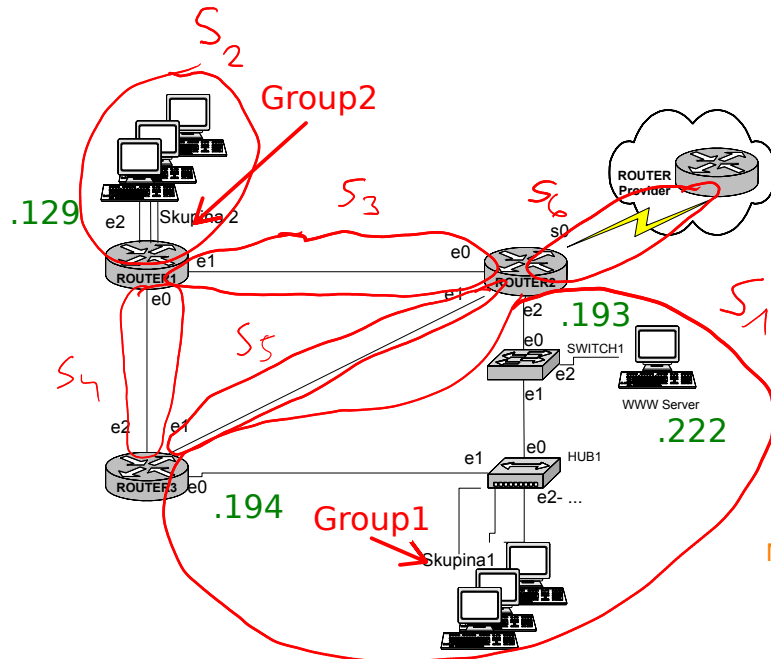
Name:.....

Login:.....

Maximum number of points for the exam is 55, minimum number of points you need to get to pass the exam is 30. If you get between 25 and 30 points, the decision about passing or failing the exam is made upon the oral examination, which grants no additional points. See last page for explanation of images used in this document.

1) – 6b

I-SUB-06-EX-0



Work out the address scheme for network shown in the figure above (use VLSM – Variable Length Subnet Mask). You were assigned prefix 116.250.242.128/25 from the provider. Mind the number of hosts on all segments (based on number of stations in groups).

Use one subnet for the connection between your network and provider's router. Don't use any unnumbered interfaces in the network.

Mark individual subnets in the figure (make a circle around each subnet). Name the subnets by letters A, B, C etc. Write down the IP addresses of router interfaces in the figure. **Do not mark or write down anything else there!**

For each subnet write down network address with its subnet mask, broadcast address and the range of all usable addresses to the table shown below (the usable address range includes all host addresses and router interface addresses).

Group1: 33

Group2: 18

Group3:

Group4:

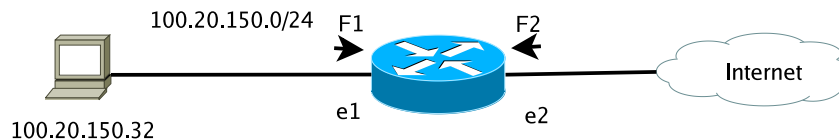
Subnet	Network address/mask	Lowest usable IP add.	Highest usable IP add.	Broadcast

⇒ Solution: 6 subnets.

ID	Subnet/mask	Lowest usable addr.	Highest usable addr.	Broadcast
S1	116.250.242.128/26	116.250.242.129	116.250.242.190	116.250.242.191
S2	116.250.242.192/27	116.250.242.193	116.250.242.222	116.250.242.223
S3	116.250.242.224/30	116.250.242.225	116.250.242.226	116.250.242.227
S4	116.250.242.228/30	116.250.242.229	116.250.242.230	116.250.242.231
S5	116.250.242.232/30	116.250.242.233	116.250.242.234	116.250.242.235
S6	116.250.242.236/30	116.250.242.237	116.250.242.238	116.250.242.239

2) – 6b

A-ACL-16



Stateless packet filters (ACLs) F1 and F2 are configured on firewall interfaces e1 and e2. They filter incoming traffic to the corresponding interface. Define the content of the filters F1 and F2 according to following conditions:

- Machines in the internal network (100.20.150.0/24) can be reached from the provider's monitoring server 17.44.1.12 by using the ping command, but they are not reachable from the rest of the Internet.
- The server with IP address 100.20.150.32 is not permitted to connect to the Internet with TCP protocol, the rest of the LAN stations (100.20.150.0/24) may access the Internet without other limitations.

Assume that traffic which is not explicitly permitted by you, is dropped. Write down only the OSI RM layer 3 or 4 protocols in "Protocol" column.

F1:

Protocol	Permit/Deny	Source IP/Mask	Dest. IP/Mask	Source port	Dest. port	Other Limitations
ICMP	P	100.20.150.0/24	17.44.1.12/32	-	-	echo reply
TCP	D	100.20.150.32/32	*	*	*	
TCP	P	100.20.150.0/24	*	*	*	

F2:

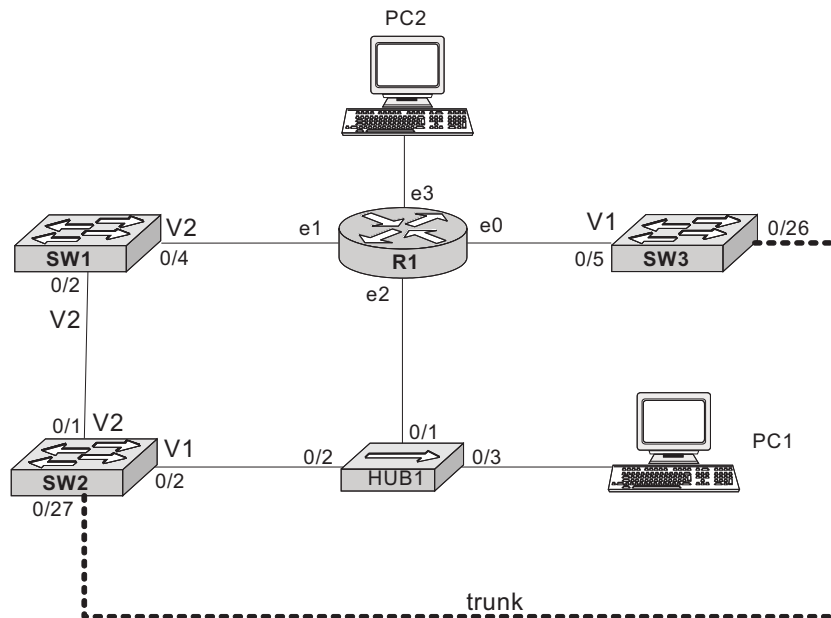
Protocol	Permit/Deny	Source IP/Mask	Dest. IP/Mask	Source port	Dest. port	Other Limitations
ICMP	P	17.44.1.12/32	100.20.150.0/24	-	-	echo request
TCP	D	*	100.20.150.32/32	*	*	established
TCP	P	*	100.20.150.0/24	*	*	established

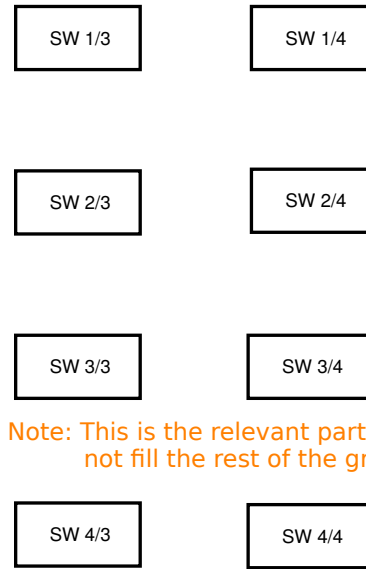
⇒

Complete:

3) – 6b

V-VLN-13 The picture shows virtual LANs (VLAN) named V1, V2 etc. Slashed numbers stand for port numbers to which the links are connected (labeled as module/port). Draw equivalent L3 topology of the network (i.e. from the perspective of the 3rd layer of ISO-OSI model). Ports of switches belonging to VLAN X on switch Y from the real topology belong to SW Y/X in equivalent L3 topology. Draw the lines representing trunk links in the pre-printed scheme dashed. Also mark the port numbers of switches from the original topology in the scheme (you may write down just the port numbers without the '0/' prefix). Please note that the port numbers of trunk links can appear multiple times. Ignore unused devices/VLANs in the pre-printed scheme, draw the missing devices, if necessary.





4) – 6b

D-MS-01 Assign the correct ISO-OSI layers to following terms:

switch		hub	
router		NIC (network interface card)	
UDP datagram		patch panel	
IP packet		Ethernet frame	
bridge		file server	
TCP		MAC address	

switch	2	hub	1
router	3	NIC (network interface card)	2
UDP datagram	4	patch panel	1
IP packet	3	Ethernet frame	2
bridge	2	file server	7
TCP	4	MAC address	2

Mark all true (correct) statements with X. At least one statement is true and at least one is false in each question. You will start with full amount of points for each question and two points will be deducted for every incorrectly marked statement (the minimum number of points for each question stops at -3). If you do not wish to answer a question, cross its number. In such case, the question will be graded with 0 points.

5) – 5b

M-OL1 For the Ethernet-based LAN network (at least 10 Mbit/s) we can use following cabling systems:

- ☐ Supermode optical fiber
- ☒ Thin coaxial cable
- ☒ ScTP/FTP (Screened/foiled twisted pair)
- ☐ CAT-1 UTP
- ☒ with parameters described in EIA/TIA 568A/B
- ☐ with parameters described in ISO 8859-1

6) – 5b

M-RL3 We can classify the LSA (link state algorithm) routing method as

- ☒ being represented by the OSPF protocol
- ☐ being represented by the RIP protocol
- ☒ a method, where all routers have the knowledge of network topology
- ☒ an example of dynamic routing
- ☐ a method, where routing tables are sent only to the neighbours
- ☐ a method with slow convergence rate

7) – 5b

L3 TCP header has following properties:

- ✓ It contains the destination and source port numbers
- ☐ It contains the optional header checksum
- ✓ It contains several bit flags used for the connection management
- ☐ It contains application layer protocol ID, identifying the higher-level protocol carried in the TCP segment
- ✓ It may contain the ACK number informing about the next octet which can be sent.
- ☐ Is placed directly in the beginning of the data field in L2 frames

8) – 5b

basics Switch

- ✓ Sends Ethernet frame with FF:FF:FF:FF:FF:FF MAC address on all active ports excluding the one where the frame was received
- ✓ Selects the outgoing interface by the destination MAC address
- ☐ Routes IP packets according to the destination IP address
- ☐ Has a mandatory IP address assigned on each port
- ✓ Can be used to define the virtual LAN networks (VLANs)
- ✓ May forward frames of different VLANs to another switch through a TRUNK port.

9) – 5b

L7 SMTP server may communicate with

- ☐ a POP3 server, which sends the E-mails to the SMTP server
 - ✓ a SMTP client (user agent)
 - ☐ both POP3 and IMAP servers using POP3 and IMAP protocols to upload messages
 - ✓ other SMTP servers
 - ☐ an IMAP server
 - ☐ an IMAP client
-

Mark the single correct answer:

10) – 3b

S-OL2 What can be said about following MAC addresses: 00:BB:BB:BB:BB:00 and 00:BB:BB:BB:BB:01 ?

- (a) They are two broadcast addresses.
- (b) They are two multicast addresses.
- (c) Both of them are addresses of stations on the same network segment.
- ✓ Both of these addresses were assigned to the same manufacturer.
- (e) These addresses are reserved for the ARP protocol.
- (f) These addresses are reserved for the Spanning Tree protocol.

11) – 3b

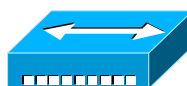
S-OL2 Fragmented packets are put back together based on following fields: Identification, Fragment Offset and ...

- (a) ...source MAC address on the destination station.
- (b) ...source MAC address on any router on the way.
- (c) ...destination MAC address on any router on the way.
- ✓ ...source IP address on the recipient station.
- (e) ...source IP address on any router on the way.
- (f) ...destination IP address on any router on the way.

LEGENDA



SWITCH



HUB



ROUTER

No switch used in this document is an L3 switch.