Registration Number: | | | | | | | | | |

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

III SEMESTER MCA INTERNAL EXAMINATIONS AUG 2022

TEST - 2

SUBJECT: Computer Networks [MCA 5151]

Date of Exam: **17/10/2022** Time of Exam: **08:15 AM – 09:15 AM** Max. Marks: **15**

Instructions to Candidates:

- Answer ALL the questions & missing data may be suitably assumed

1.	A process is generating packets with 127.18.110.5 as source IP address. But device does not forward the packets. Specify the reason? **ANSWER:** Loopback IP address	**1**
2.	The size of the option field of an IP datagram is 20 bytes. What will be the value of HLEN in binary? **ANSWER:** 1010	**1**
3.	A host IP address is 128.2.3.2. Identify the following from given host IP address. a. Direct Broadcast address b. Limited Broadcast address **ANSWER:** a. Direct Broadcast address = 128.2.255.255 b. Limited Broadcast address = 255.255.255.255	**1**
4.	Is it possible to assign 18.0.10.16/26 as a first address for a block of 16 addresses? **ANSWER:** No	**1**
5.	In an IPv4 datagram, the M bit is 0, the value of HLEN is 7, the value of total length is 200 bytes, and the offset value is 200. What is the number of the first byte and number of the last byte in this datagram? Is this the last fragment, the first fragment, or a middle fragment? **ANSWER:** Given Header Length = 7 X 4 = 28 bytes Total length = 200bytes Thus, data size is 200 – 28 = 172 bytes Given offset is 200. Thus, the number of first byte is 200 x 8 = 1600 The number of last bytes is 1600 + 172 – 1 = 1771	**1**

Since the M-bit is 0 this is the last fragment.

6. An ISP is granted a block of addresses starting with 120.60.4.0/22. The ISP wants to distribute these blocks to 5 organizations with each organization receiving just 15 addresses. Design the sub blocks and give the slash notation for each sub block. Find out how many addresses are still available after these allocations. **2**

ANSWER:

Total number of addresses available is $2^{(32-22)} = 2^{10} = 1024$ address
15 means 16 addresses are to be assigned
n11=n1+log (1024/16) =22+6=28
since all organization take 16(same) addresses n12=n13=n14=n15=n11=28
Sub net Mask= 255.255.255.240
Not of Subnet mask = 0.0.0.15
Org 1
1st address 120.60.4.0/28 divisible by 16 ? YES
Last address 120.60.4.0 **OR** 0.0.0.15 = 120.60.4.15
Thus, the first and last address of each organization is
120.60.4.0/28----------120.60.4.15/28

Similarly other organization 1st and last address can be calculated.

Org 2
120.60.4.16/28----------120.60.4.31/28
Org 3
120.60.4.32/28----------120.60.4.47/28
Org 4
120.60.4.48/28----------120.60.4.63/28
Org 5
120.60.4.64/28----------120.60.4.79/28

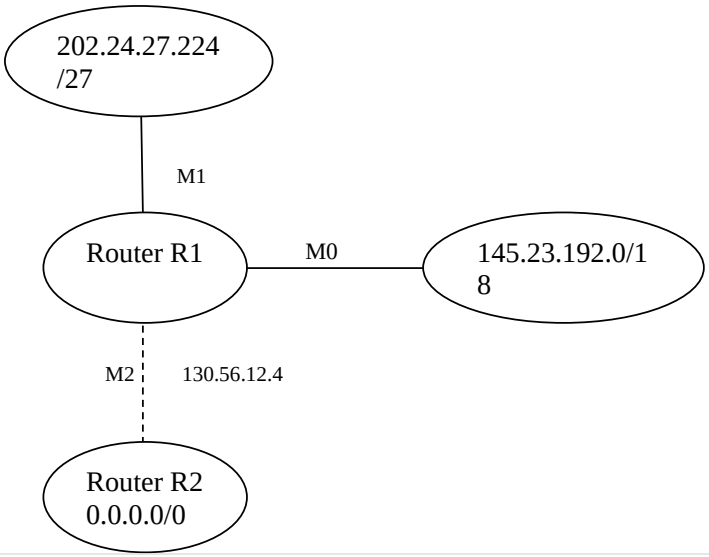
The number of addresses that are still available are 1024 – 80 = 944

7. Find the topology of the network if Table Q7 is the routing table for router R1. **2**

Table Q7

Mask	*Network Address*	*Next-Hop Address*	*Interface*
/27	202.14.17.224	-	m1
/18	145.23.192.0	-	m0
Default	Default	130.56.12.4	m2

ANSWER:



8. Calculate the number of fragments which are sent when an IP datagram with payload of 3096 bytes is sent from a computer on network A via 2 routers to a destination computer C. The MTU of network A is 4040 bytes, the MTU of network B is 1140 bytes and that of C is 1500 bytes. Show the total length, Identification, DF, MF and fragmentation offset fields of the IP header in each packet. Consider the Identification field for the first fragment is 0x12. **3**

ANSWER:

Source ⇨ Network A ⇨ Router 1⇨ Network B⇨ Router 2⇨ Network c ⇨ Destination

Source ⇨ Network A

Total Length	Identification	DF	MF	Fragmentation Offset
3096	0x12	0	0	0

Router 1⇨ Network B

Each fragment can contain 1140 – 20 bytes of data = 1120 bytes

Total number of fragments = 3096/1140 = 3 fragments

Total Length	Identification	DF	MF	Fragmentation Offset
1140	0x12	0	1	0
1140	0x12	0	1	140
856	0x12	0	0	280

Router 2⇨ Network c

Total Length	Identification	DF	MF	Fragmentation Offset
1140	0x12	0	0	0
1140	0x12	0	0	140
856	0x12	0	0	280

9. An IP datagram has arrived with the following information in the Header (in Hexadecimal) **4A 00 00 5E 00 03 00 00 20 06 00 00 7C 4E 03 02 B4 0E 0F 02** **3**

a) Are there any options?
b) Is the packet fragmented?
c) How many more routers can the packet travel to?
d) What is the identification number of the packet?
e) What is the source IP address?

f) What is the destination IP address?

ANSWER:

VER = 0x4 = 4
HLEN =0x~~5~~ = 5 → 5 · 4 = 20 bytes
Service =0x00 = 0 (Normal/routine)
Total Length = 0x005**4** = 84 bytes
Identification = 0x0003 = 3
Flags and Fragmentation = **0x~~5850~~** → D = 1 M= 0 offset = 6224
Time to live = 0x20 = 32
Protocol = 0x06 = 6
Checksum = 0x0000
Source Address: 0x7C4E0302 = 124.78.3.2
Destination Address: 0xB40E0F02 = 180.14.15.2

We can then answer the questions:

a) If we see the checksum, we get **0x0000**. The packet is likely to be corrupted.
b) Since the length of the header is **20 bytes, there are no options.**
c) Since **D = 1** and M = 0 and **offset = 6224**, the packet is **not permitted** to be fragmented.
d) The total length is 84. Data size is 64 bytes (84 – 20 = 64 bytes).
e) Since the value of time to live = 32, the packet may visit up to 32 more routers.
f) The identification number of the packet is 3.
g) The type of service is normal.

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