

**ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)**  
**ORGANISATION OF ISLAMIC COOPERATION (OIC)**  
**Department of Computer Science and Engineering (CSE)**

QUIZ 2

DURATION: 25 MINUTES

SUMMER SEMESTER, 2023-2024

FULL MARKS: 20

**CSE 4411: Data Communication and Networking****Programmable calculators are not allowed. Do not write anything on the question paper.**Answer **all 2 (two)** questions. Figures in the right margin indicate full marks of questions with corresponding COs and POs in parentheses.

1. Consider a datagram network using 32-bit host addresses. Suppose a router has four links, numbered 0 through 3, and packets are to be forwarded to the link interfaces as follows:

**Table 1:** Forwarding Table for 32-bit Host Addresses

Destination Address Range	Link Interface
11100000 00000000 00000000 00000000 through	
11100000 00111111 11111111 11111111	0
11100000 01000000 00000000 00000000 through	
11100000 01000000 11111111 11111111	1
11100000 01000001 00000000 00000000 through	
11100001 01111111 11111111 11111111	2
otherwise	3

- a) Provide a forwarding table that has five entries, uses longest prefix matching, and forwards packets to the correct link interfaces. 5 × 1  
(CO3)  
(PO2)

**Solution:**

There can be different answers. Below is one of the answers:

**Table 2:** Mapping from IP-prefix match to link interface

Prefix Match	Link Interface
11100000 00	0
11100000 01000000	1
11100000	2
11100001 0	2
otherwise	3

**Rubric:**

- 1 point for each correct entry

- b) Rewrite this forwarding table using the a.b.c.d/x notation instead of the binary string notation. 5 × 1  
(CO3)  
(PO1)

**Solution:**

**Table 3:** Forwarding table in a.b.c.d/x notation

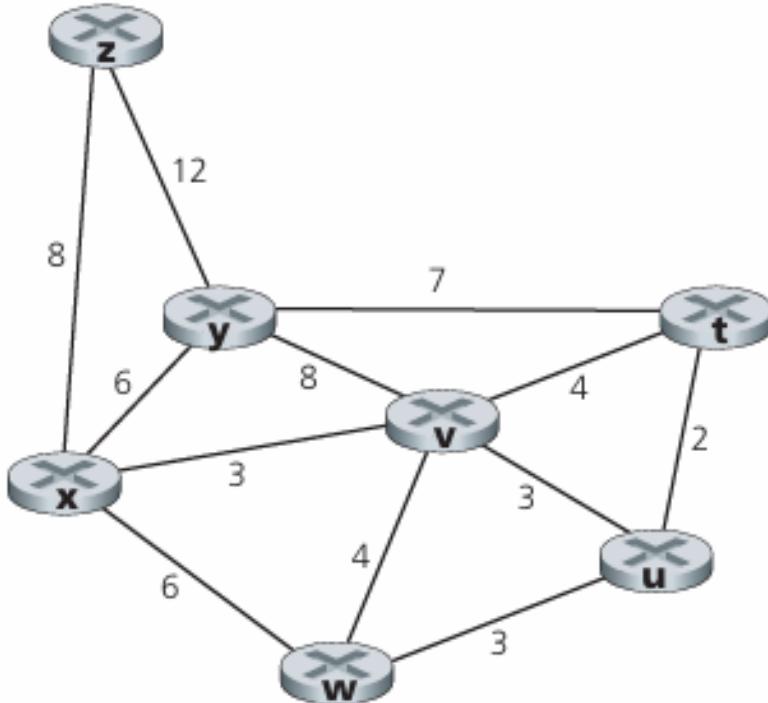
Network (a.b.c.d/x)	Link Interface
224.0.0.0/10	0
224.64.0.0/16	1
224.0.0.0/8	2
225.0.0.0/9	2
0.0.0.0/0	3

**Rubric:**

- 1 point for each correct entry

2. a) Consider the following network. With the indicated link costs, use Dijkstras shortest-path algorithm to compute the shortest path from x to all network nodes. Show the illustration.

10  
(CO3)  
(PO2)



**Figure 1:** Topology for Question 2.a

**Solution:**

**Table 4:** Dijkstras shortestpath trace from x

Step	$N'$	$D(t), p(t)$	$D(u), p(u)$	$D(v), p(v)$	$D(w), p(w)$	$D(y), p(y)$	$D(z), p(z)$
0	x	$\infty, -$	$\infty, -$	$3, x$	$6, x$	$6, x$	$8, x$
1	xv	$7, v$	$6, v$	$3, x$	$6, x$	$6, x$	$8, x$
2	xvu	$7, v$	$6, v$	$3, x$	$6, x$	$6, x$	$8, x$
3	xvuw	$7, v$	$6, v$	$3, x$	$6, x$	$6, x$	$8, x$
4	xuwyt	$7, v$	$6, v$	$3, x$	$6, x$	$6, x$	$8, x$
5	xwytz	$7, v$	$6, v$	$3, x$	$6, x$	$6, x$	$8, x$
6	xwyzt	$7, v$	$6, v$	$3, x$	$6, x$	$6, x$	$8, x$