Computer Networks Final Exam

Khulani Dlamini 411021348

Part A:

1. False	6. False	11. True	16. False
2. True	7. False	12. False	17. True
3. True	8. True	13. False	18. False
4. True	9. True	14. True	19. True
5. False	10. False	15. False	20. True.

Part B.

Question 1.

There are several differences between Go-Back-N and Selective Repeat. One of them is that In Go-Back-N, when a frame is found to be corrupted or lost, the reciever discards that frame and all future frames until the missing fame is restransmitted and recieved succesfully. However in Selective Repeat, the reciever can accept and buffer out-of-order frames. This Means that if a frame is lost or corrupted, only that specific frame needs to be transmitted, not all frames that were sent after it.

Another difference is that the receiver in Go-Back-N protocol only needs a buffer space for one frame because it can ~~at~~ only accept frames in order. In Selective Repeat protocol needs to have a buffer space for more than one frame because it can accept frames that arrive out of order.

day month

Question 2:

TCP flow control is like a conversation where you tell the other person to slow down if they're speaking too fast for you to understand. In TCP, the reciever tells the sender how much data it can accept, using a 'window size'. If the reciever can't process data quickly enough, it reduces the window size, telling the sender to slow down.

TCP congestion is like driving a car where you slow down in heavy traffic to avoil collisions. In TCP, if the network is congested and data packets are being lost, the sender slows down the data transmission to prevent further packed loss. Once the network is less congested, the sender can ~~spf~~ speed up again.

day month

Question 3 :

```
1011 ) 101110
       -1011
       01100
      -1011
       0110
      -1011
       0110 0
      -1011
         011
```

The CRC result is 011

Question 4

Vertices $V = \{u, v, w, x, y, z\}$

Edges $E = \{(u,v), (u,w), (u,x), (v,w), (v,x), (w,x),$
$(w,y), (w,z), (x,y), (y,z)\}$

We use BFS:

Dequeue $(u, [u])$:
- Visit neighbours of u: v, w, x
- ~~Ext~~ Enqueue $(v, [u,v]), (w, [u,w]), (x, [u,x])$.
- Visited: $\{u, v, w, x\}$

* Dequeue $(v, [u, v])$;
- visited neighbours of V: w, x (already visited)
- This time no new vertices.

Dequeue $(w, [u, w])$:
- Visited neighbours of w: x, y, z
- Enqueue $(y, [u, w, y])$, $(z, [u, w, z])$
- Visited: $\{u, v, w, x, y, z\}$

Since we already reach z the path obtained is $[u, w, z]$

$\Rightarrow$ $u \to w \to z$ is the shortest path from u to z.

• day • month

Question 5:

Vertices $V = \{u, v, w, x, y, z\}$

Edges with costs: $c(u,v) = 2$
$c(u,w) = 5$
$c(u,x) = 1$
$c(v,w) = 3$
$c(v,x) = 2$
$c(w,x) = 3$
$c(w,y) = 1$
$c(w,z) = 5$
$c(x,y) = 1$
$c(y,z) = 2$.

Path reconstruction:

From z, backtrack using vertices $z \leftarrow y \leftarrow x \leftarrow u$

$u \rightarrow x \rightarrow y \rightarrow z$

Total cost $1(u \rightarrow x) + 1(x \rightarrow y) + 2(y \rightarrow z) = 4$

4 is total cost

day month

Question 6

Possible paths from u to z

- $u \to v \to w \to x \to y \to z$
- $u \to v \to w \to y \to z$
- $u \to w \to x \to y \to z$
- $u \to x \to y \to z$.

Cost per path:

$u \to v \to w \to x \to y \to z$.

$Cost = 2(u \to v) + 3(v \to w) + 3(w \to x) + 1(x \to y) + 2(y \to z) = 11$

$u \to v \to w \to y \to z$

$cost = 2(u \to v) + 3(v \to w) + 1(w \to y) + 2(y \to z) = 8$

$u \to w \to x \to y \to z$

$Cost = 5(u \to w) + 3(w \to x) + 1(x \to y) + 2(y \to z) = 11$

$u \to x \to y \to z$:

$Cost = 1(u \to x) + 1(x \to y) + 2(y \to z) = 4$

The largest path is $u \to v \to w \to x \to y \to z$ whith cost 11 each.
OR $u \to w \to x \to y \to z$