Test 3 Cheat Sheet: Key Concepts (Further Elaborated)

1. IP Fragmentation: Large packets split at routers/sender; reassembled at destination. Fields: Identification, Fragment Offset, MF.
2. Header Checksum: Verifies IP header; updated at each router due to TTL changes.
3. NAT: Translates private IP to public; keeps IP:Port map. Drawbacks: breaks peer-to-peer, affects VoIP.
4. 223.13.1/29 Invalid IPs: Usable range .1 to .6; others outside subnet are invalid.
5. Per-router Control Plane: Each router uses local info + updates; actions include sharing costs, local decisions.
6. IPv6 vs IPv4: 128-bit, no NAT, simpler headers, built-in IPSec, autoconfig (SLAAC).
7. IPv6 Header Fields: Flow Label (QoS), Next Header (protocol), Hop Limit (like TTL).
8. SDN Match-Action: Matches headers (IP/MAC); actions = forward/drop/modify; uses OpenFlow.
9. Generalized Forwarding: Matches on multiple fields beyond just dest IP; more flexible.
10. Bellman-Ford: D(x) = min[c(x,v) + D(v)]; vector exchange between neighbors.
11. Dijkstra (from U): Shortest path to Z = 5 (via W), X = 1 (via U), W = 3 (via X).
12. Link Cost: Can't determine if data missing; e.g., X-K or Y.
13. Distance Vector: Final from V = 7,0,6,11,15,20; X initial = inf,inf,5,0,4,inf; Problem = count-to-infinity.
14. Link Layer: Services = framing, error detection (CRC), MAC.
15. CRC: Polynomial-based; detects errors; drop on mismatch.
16. OSPF: Link-state protocol; uses LSAs; Dijkstra applied to full topology.
17. BGP AS-PATH: Lists ASes; avoids loops; path-based policy.
18. TDMA/FDMA/CDMA: Time slot / Freq band / Code-based channel sharing.
19. MAC Protocol: Uncoordinated access -> Pure Aloha.
20. Link Layer Recap: Framing = boundary markers; CRC = integrity check.
21. SDN Controller Layers: Comm = device link; State = topology; App = logic like routing/firewall.
22. Intra-AS Routing: Each AS may use different protocols (e.g., OSPF, RIP).
23. Extra Checksum: Link-layer CRC checks full frame; TCP/UDP only covers payload.
24. Oscillations: Avoid by thresholding, hold-down timers, and smoothing metrics.
25. Error Detection: Parity (bit count), Checksum (sum compare), CRC (burst detection).