BCNS/25B/FT CONTROLLED ASSIGNMENT

Deadline: Monday 20th July 2026 @ 9am

Email your answers as attachment with filename as <your_student_id>_ctrl_ass.docx or .pdf at
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Section A

(Note: There could be more than one correct response per question)

1. StevieG needs to assign **699** IPv4 addresses in his company. Which of the networks below could he use?
   a. 198.47.32.0 and 198.47.42.0 and 198.47.52.0 and 198.47.62.0
   b. 128.47.0.0
   c. 218.47.32.0 and 218.47.42.0
   d. None of the above

2. Given network id: **177.177.0.0** and subnet mask **255.0.0.0**, which of the following could be correct?
   a. You are subnetting for a class A network
   b. You are subnetting for a class C network
   c. That is an invalid subnetting assignment
   d. None of the above

3. A local area network (**LAN**) is defined by _____ .
   a. the geometric size of the network
   b. the maximum number of hosts in the network
   c. the maximum number of subnets in the network
   d. the topology of the network

4. A segment carries data belonging to the _____ layer and the header belonging to the _____ layer.
   a. fifth; third
   b. fifth; fourth
   c. fourth; third
   d. fourth; fifth

5. The number of links present in a partial-mesh network topology of N nodes can be calculated by:
   a. $(N^2 – 1)/2$
   b. $N(N-1) / 2$
   c. $(N^2/2) – (N/2)$
   d. None of the above

6. One most commonly finds data compression for network communication at the:
   a. Application Layer
   b. Session Layer
   c. OSI Layer 6
   d. Compression Layer

7. What is the theoretical maximum size of an TCP segment?
   a. 65,535 bytes
   b. 65,515 bytes
   c. 20 bytes
   d. 32 bytes

8. Which **best** describes the structure of a Layer 4 encapsulated protocol data unit?
   a. Segment header, network header, data, frame trailer
   b. Segment header, session header, presentation header, application header, data
   c. Frame header, network header, segment header, application header, data, frame trailer
   d. None of the above

9. Check all that apply to SMTP?
    a. It uses port 25
    b. It uses a “best-effort” service
    c. It is a time-sensitive protocol
    d. It is a connection-oriented protocol

10. In HTTP, _____ well-known port(s) is (are) used?
    a. one
    b. two
    c. three
    d. None of the above

11. Which are responsible for flow control and reliability of service?
    a. TCP
    b. OSI Layer 4
    c. IP
    d. Session Layer

12. In a _____ connection, one TCP connection is created for each request/response
    a. persistent
    b. non-persistent
    c. both persistent and non-persistent
    d. none of the above

13. Your ISP has provided you with the following address 168.169.0.0 with 255.255.255.0 subnet mask. Which of the following statement(s) is(are) true about the network?
    a. There are 254 usable hosts per subnet
    b. There is one usable network
    c. There are 255 usable hosts per subnet
    d. There are 254 usable subnets

14. The network layer is to provide _____ communication.
    a. host-to-host
    b. socket-to-socket
    c. process-to-process
    d. node-to-node

15. In a Class A address where 6 bits are used for subnetting. ____ bits are left for host addresses.
    a. 12
    b. 20
    c. 18
    d. 5

16. The broadcast address of the **ninth** usable subnet in Class B network where **11 bits** are borrowed is?
    a. x.x.9.255
    b. x.x.144.255
    c. x.x.9.31
    d. x.x.1.31

17. The destination address appears in an IP’s datagram _____.
    a. Footer
    b. Header
    c. Trailer
    d. Payload

18. Given a host with IP: 201.17.78.65 and /27 subnet mask, what is the host's subnet broadcast address?
    a. 201.17.78.61
    b. 201.17.78.95
    c. 201.17.78.33
    d. 201.17.78.31

19. In Cyclic Redundancy Check, what can be the checksum?
    a. the divisor
    b. the quotient
    c. the polynomial generator
    d. None of the above

20. You need 5 subnets with a maximum of 17 hosts on each of those subnets. Which Class C network subnet mask could you use?
    a. 255.255.255.224
    b. 255.255.255.240
    c. 255.255.255.248
    d. 255.255.255.128

21. A single parity-check code can detect _____ error(s).
    a. an even number of
    b. exactly one
    c. an odd number of
    d. any number of

22. Transmission media are usually categorized as _____.
    a. fixed or mobile
    b. guided or unguided
    c. conducted or radiated
    d. wired or wireless

23. What must be done by a web browser prior to sending an HTTP request to a web server?
    a. Open a TCP connection with the web server
    b. Close the TCP connection with the webserver
    c. Decode the HTML code received
    d. Resolve the domain name of the web server by sending a DNS query

24. Given a class B network; you want at least 2000 subnets with up to 20 hosts per subnet?
    a. You can use subnet mask: 255.255.255.240
    b. You can use subnet mask /27
    c. You can use subnet mask: /16
    d. Not possible

25. Wireless networks advantage(s) over wired networks is (are):
    a. Wireless networks offers more mobility.
    b. Wireless networks offer more security.
    c. Wireless networks are more reliable and less prone to interference.
    d. Wireless networks can be deployed faster.

26. Which of the following provides the strongest wireless LAN security?
    a. WPA
    b. WAP
    c. WEP
    d. PAW

[26 x 2 marks]

Section B

TRUE (T) or FALSE (F)

27. _____ DNS is a connectionless-oriented application layer protocol.
28. _____ An email address is not necessarily unique on the Internet.
29. _____ A Wide Area Network usually span over one hundred metres.
30. _____ A Hamming Code can only detect an odd number of errors.
31. _____ IEEE 802.11a has a faster speed than IEEE 802.11g.
32. _____ A MAC address is larger than an IPv4 address.
33. _____ In a mesh topology, each node is directly connected to every other in the network.
34. _____ An Access Point is also referred to as a Wi-Fi Hotspot.
35. _____ An USB cable is an example of an unguided medium.
36. _____ IP fragmentation occurs whenever a datagram is smaller than the MTU size of a network.

[10x1.5 marks]

37. Suppose that the information content of a packet is the bit pattern **1111000010100101** and an even parity scheme is being used:
    a) What would be the checksum field in a single parity bit scheme?
    b) What would be the value of the checksum field for the case of a two-dimensional parity scheme?
    c) What would be the percentage efficiency of the latter scheme?

[2+5+2 Marks]

38. Calculate the CRC for the frame below:
    Frame data: **1101011011** Generator Polynomial: x^5+1

[7 Marks]

39. Match the terms below with the best corresponding concepts or definitions:

Datagram	a. Dynamically assigned IP addresses to hosts
DHCP	b. A measure of capacity on a physical transmission system
Transport	c. A OSI layer which defines end-to-end flow control
Bandwidth	d. TCP/IP's term for an internet packet
UDP	e. A transport layer protocol
Presentation	f. The organization which defined the OSI Reference Model
ISO	g. resolves domain name to IP address
Bps	h. The opposite of NAK
DNS	i. A measure of data throughput in a computer network
ACK	j. A OSI layer that describes how to represent data

[10 Marks]

40. Two popular Mail Access Protocols used nowadays are **POP3** and **IMAP4**.

    a. What is the main function of a Mail Access Protocol?
    b. What do the POP3 and IMAP4 acronyms stand for?
    c. Give two properties of POP3.
    d. Susan does not have her own PC. So, in order to check her email, she regularly connects to her mail server from different PCs at her workplace. Which Mail Access Protocol is she more likely to use, and why?

[1+2+2+2 marks]

Total: 100 Marks