BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – BCA-2022
Course Name – Computer Networks
Course Code - BCAE502B
(Semester V)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Which of the following describes a key difference between a LAN (Local Area Network) and a WAN (Wide Area Network)?

a) A LAN is used to connect devices within a limited area, such as a building, while a WAN covers a broader geographic area.
b) A LAN and a WAN both use the same data transmission technologies.
c) A WAN typically has higher data transfer speeds compared to a LAN.
d) A WAN typically has higher data transfer speeds compared to a LAN.

(ii) Which term best describes the maximum amount of data that can be transmitted over a communication channel in a given amount of time?

a) Signal-to-noise ratio
b) Bandwidth
c) Throughput
d) Latency

(iii) Which of the following describes a data transmission mode where data is sent in both directions, but not simultaneously?

a) Simplex
b) Half-Duplex
c) Full-Duplex
d) Multiplex

(iv) Which communication system performance metric measures the number of bits transmitted per unit time?

a) Latency
b) Bandwidth
c) Throughput
d) Jitter

(v) What is the primary function of a TDM bus in a circuit-switched network?

a) To synchronize signals
b) To combine multiple signals into one channel
c) To route calls between different telephone lines
d) To allocate time slots for each signal

(vi) Which device can filter traffic based on MAC addresses and operate at both the Physical and Data Link Layers?

a) Hub
b) Bridge
c) Repeater
d) Router

(vii) Mark the components of a communication system.

a) Transmitter, Receiver, and Channel
b) Router, Switch, and Hub
c) Signal, Data, and Transmission
d) OSI Model Layers

(viii) Identify what differentiates IPv4 and IPv6 protocol.

a) IPv6 supports more devices
b) IPv4 has more security features
c) IPv6 is slower
d) IPv4 has 128-bit addresses

(ix) Which of the following is true about the bandwidth requirement for analog and digital signals?

a) Analog signals generally require more bandwidth than digital signals.
b) Digital signals generally require more bandwidth than analog signals.
c) Both analog and digital signals require the same amount of bandwidth.
d) Digital signals never require more bandwidth than analog signals.

(x) Choose that explains the main function of a router in a network:

a) A router connects devices within the same network and broadcasts data to all devices.
b) A router amplifies signals to extend the range of a network.
c) A router directs data packets between different networks, ensuring they reach their correct destination.
d) A router stores data temporarily for faster access.

(xi) Indicate how many addresses are contained by each block in class A ?

a) 2^16
b) 2^24
c) 2^8
d) 2^14

(xii) The Last Address of a network is defined by-

a) 180.8.255.255.
b) 180.8.255.0.
c) 180.12.0.255.
d) 180.0.256.255.

(xiii) Name the system that translates domain names into IP addresses.

a) FTP
b) HTTP
c) DNS
d) SMTP

(xiv) What is classful addressing?

a) A method that divides IP addresses into classes A, B, C, D, and E
b) A method that combines multiple IP addresses
c) A method that does not use subnet masks
d) A method used only in IPv6

(xv) Which IEEE 802.11 standard is introduced to support 5 GHz frequency band?

a) 802.11b
b) 802.11g
c) 802.11n
d) 802.11ac

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Compare the characteristics, advantages and disadvantages of star, bus, and mesh topologies in network design. (3)
3. State the working principle of Hub and Switch. (3)
4. Summarize the key differences between CSMA/CD and CSMA/CA in terms of their working principles, operational layers, and collision handling mechanisms. (3)
5. Examine the function of the Transport layer in the OSI model. (3)

6. How does TCP handle network congestion? Discuss the mechanisms and strategies employed by TCP to manage congestion effectively. (3)

OR

Assess the role of UDP in streaming services and online gaming, focusing on latency and data loss tolerance. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Examine the different types of firewalls based on their technologies and applications. How do these firewalls operate to secure networks, and in what real-world scenarios would each type be most effectively implemented? (5)
8. Define simplex, half-duplex, and full-duplex modes of communication. (5)
9. Identify the differences between IPV4 and IPv6. (5)
10. Explain how the HTTP protocol facilitates communication between a web browser and a web server, and justify the importance of statelessness in HTTP. (5)
11. Prove how digital signatures ensure the authenticity and integrity of a message, and recommend their application in legal or financial transactions. (5)
12. Estimate the time required to send 1 million bits of data using the Stop-and-Wait ARQ Protocol, where each packet carries 1000 bits. Consider a distance of 5000 km between the sender and receiver with a propagation speed of 2×10^8 m/s. Ignore transmission, waiting, and processing delays. (5)

OR

Estimate the actual bit string transmitted for the bit stream 10011101 using the standard CRC method with the generator polynomial x^3+1. Suppose the third bit from the left is inverted during transmission. Show that this error was detected at the receiver's end. (5)

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