Registration No.: | | | | | | | | | | |

Total Number of Pages: 02 **B.Tech/ IDD**
RCS4D004

6th Semester Regular/Back Examination: 2024-25
SUBJECT: Data Communication and Computer Networks
BRANCH(S): BIOMED, ECE, ETC
Time: 3 Hours
Max Marks: 100
Q.Code: S030

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) Differentiate between guided and unguided transmission media.
b) What is the purpose of CRC in error detection?
c) Name two advantages of IPv6 over IPv4.
d) Explain the term "Multiplexing" and list its types.
e) What is the role of a router in a network?
f) Explain packet-switched networks.
g) What are the types of ARQ protocols?
h) Differentiate between SMTP and FTP.
i) What is the significance of the Hamming code in error correction?
j) What are the use cases of Dynamic Domain Name System (DDNS)?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 x 8)**

a) Explain the working of Frequency Division Multiplexing (FDM) and Time Division Multiplexing (TDM) with examples.
b) Compare circuit-switched, datagram, and virtual-circuit networks.
c) Describe the architecture of IEEE 802.11 (Wi-Fi) and its key features.
d) How does Frame Relay differ from X.25 in terms of architecture?
e) Discuss the Stop-and-Wait ARQ protocol and its limitations.
f) How does the HDLC protocol ensure flow and error control?
g) Compare traditional Ethernet, Fast Ethernet, and Gigabit Ethernet.
h) Compare Wi-Fi and Li-Fi technologies in terms of medium, speed, and applications.
i) Describe the structure and advantages of ATM cells in Virtual Circuit Networks.
j) Discuss the differences between UDP and TCP in terms of reliability and speed.
k) Explain the role of DNS in the internet and its resolution process.
l) Analyze the differences between CSMA/CD and CSMA/CA.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four) **(16 x 2)**

Q3 Critically analyze the OSI and TCP/IP models, highlighting their similarities, differences, and practical relevance. **(16)**

Q4 Design a detailed comparison of error detection and correction techniques (CRC, Checksum, and Hamming Code) with mathematical examples and use cases. **(16)**

Q5 A digital signal is transmitted over a twisted-pair cable. The transmission speed is 1 Mbps. Calculate the maximum theoretical distance for transmission, considering the following: **(16)**

- The signal-to-noise ratio (SNR) is 35 dB.
- Use the Shannon-Hartley theorem to calculate the channel capacity.

Q6 A network has the following IPV4 addresses: **(16)**

- Host 1: 192.168.1.5/24
- Host 2: 192.168.2.10/24
- Router A: 192.168.1.1/24
- Router B: 192.168.2.1/24

Determine the routing information required for Host 1 to communicate with Host 2. Calculate the subnet mask and address for both hosts and routers, and explain how routing works between the two networks.