Graphic Era
HILL UNIVERSITY
Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)
University under section 2(f) of UGC Act, 1956

End Term (Odd) Semester Examination NOV 2025

Roll no................................

Name of the Program and semester: MCA
Name of the Course: Computer Networks
Course Code: TMC 102 (Tmc-102)

Time: 3-hour   Maximum Marks: 100

Note:
- *(i)* All the questions are compulsory.
- *(ii)* Answer any two sub questions from a, b and c in each main question.
- *(iii)* Total marks for each question are 20 (twenty).
- *(iv)* Each sub-question carries 10 marks.

Q1.   (2X10=20 Marks)
a. In "Network Layer", how congestion control is accomplished. Explain few points or advantages after applying "Congestion Control" in it.   CO2

b. What is the role of "Guided media" in Computer Network. Is it important in Computer network? If "Yes" then justify it in detail.   CO1

c. Critically analyze the OSI Reference Model by evaluating its theoretical significance and practical limitations in modern Internet architecture. How does this model influence protocol design today? CO2

Q2.   (2X10=20 Marks)
a. Describe the TCP/IP protocol stack and compare it with the OSI model.   CO1

b. Explain circuit switching and packet switching. Compare them based on performance and applications.
CO2
c. Discuss the evolution and history of computer networking and the Internet. How have protocols evolved over time?   CO1

Q3.   (2X10=20 Marks)
a. Analyze the evolution of Ethernet technologies. Explain how CSMA/CD influenced early Ethernet designs and why it became obsolete in modern switched networks.   CO1

b. Provide an in-depth analysis of analog vs digital signals. Discuss how signal characteristics such as frequency, phase, and amplitude influence data transmission reliability.   CO3

c. Discuss the principles underlying reliable data transfer. How does TCP integrate flow control, congestion control, and error control into a unified mechanism for end-to-end reliability?   CO2

Q4.   (2X10=20 Marks)
a. Conduct a comparative analysis of SMTP, POP3, IMAP and MIME in the context of distributed email systems. How do these protocols address reliability, security, and interoperability challenges?   CO3

b. HTTP was originally designed as a stateless protocol. Examine how persistent connections, cookies, caching and proxy architectures fundamentally alter HTTP's semantics and performance characteristics.
CO4

c. The Internet's evolution is marked by a shift from centralized to distributed control. Trace this evolution

and assess how protocol innovations enabled global scalability.   CO5

Q5.
                                                                          (2X10=20 Marks)
a. Provide a detailed critique of Stop-and-Wait, Go-Back-N, and Selective Repeat protocols. Evaluate their throughput and latency behavior.
                                                                                    CO5

b. Explain IPv4 datagram structure and fragmentation. Critically assess why fragmentation negatively impacts network performance. Explain.
                                                                                    CO5

c. Analyze the evolution of Ethernet technologies. Explain how CSMA/CD influenced early Ethernet designs and why it became obsolete in modern switched networks.
                                                                                    CO4