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

Term Evaluation (Odd) Semester Examination September 2025

Roll no.....

Name of the Course: B.Tech.
Semester: V
Name of the Paper: Computer Networks
Paper Code: TCS-511
Time: 1.5 hour **Maximum Marks: 50**

Note:
(i) Answer all the questions by choosing any one of the sub-questions
(ii) Each question carries 10 marks.

Q1	(10 Marks)	
(a)	"An e-commerce website 'ShopEase' tracks user sessions, cart items, and login preferences using HTTP cookies. Users can add products to the cart, login/logout, and browse personalized recommendations. The website uses cookies for session management, tracking, and personalization." For the given case-study context, answer the following questions. i. Identify the different types of cookies ShopEase could use and give an example for each. ii. A user reports that their shopping cart disappears after closing the browser. Identify the type of cookie causing this behavior and suggest a solution. iii. Explain how **cookies improve user experience** on ShopEase. iv. ShopEase wants to set a cookie that expires in 7 days. Write the **Set-Cookie header** that the server might send.	CO3
	OR	
(b)	(i) Consider a packet of 1,000 bytes transmitted over a link with 1 Mbps bandwidth, 10 ms propagation delay, and 2 ms processing delay per hop for 3 hops. Find the end-to-end delay assuming negligible queuing delay. (ii) Compare the performance of packet switching and circuit switching in terms of bandwidth utilization during peak hours.	CO1
Q2	(10 Marks)	
(a)	(i) Compare the OSI model with the TCP/IP protocol stack. (ii) We want to send 100 packets, each having 1500 B, across 3 store-and-forward links with capacities 5,8,4 Mbps. Ignoring propagation/queueing delay, find total time and achieved throughput.	CO1
	OR	
(b)	(i) A streaming service uses DASH (Dynamic Adaptive Streaming over HTTP). Explain how it adapts video quality to network conditions. (ii) Suppose a university website has recently shifted to a new hosting provider, but students still reach the old IP. Analyze the role of DNS caching and TTL in this issue.	CO3
Q3	(10 Marks)	
(a)	Draw the format of HTTP request message and explain the semantics of each field. How does HTTP message format affect server response time?	CO3
	OR	
(b)	(i) A financial website wants to migrate from HTTP/2 to HTTP/3. Discuss how QUIC can improve performance and reduce latency. (ii) A browser opens 5 images and 2 CSS files from a server using HTTP/1.1. If the RTT is 100 ms and each file takes 50 ms to transfer, calculate total time assuming non-persistent connections.	CO3

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Q4	(10 Marks)	
(a)	(i) Explain how a DNS resolver resolves the domain www.example.com using recursive and iterative queries. (ii) Explain how BitTorrent distributes a large file among multiple peers efficiently.	CO3 CO2
	OR	
(b)	(i) Calculate the UDP checksum for a segment with following information: **Source IP-** 192.168.0.31 **Destination IP-** 192.168.0.30 **UDP Source Port-** 20 **UDP Destination Port-** 10 **Data-** "Hi" **UDP Length-** 10 bytes (ii) A company wants to implement a new application layer protocol. Explain how it interacts with transport and network layers.	CO4 CO2
Q5	(10 Marks)	
(a)	(i) Compare SMTP, POP3 and IMAP4 in terms of use cases and message handling with a real email client example. (ii) Describe the working of a CDN. How does it deliver content from origin servers to end-users efficiently?	CO3
	OR	
(b)	(i) Differentiate between persistent and non-persistent HTTP connections. A DNS resolver has cached the A record for example.com with TTL = 60 seconds. If a client queries the domain 5 times in 2 minutes, how many recursive queries are sent to the authoritative server? (ii) In a smart city, traffic cameras send real-time video to control center. Analyze which network delays will dominate and how protocol layering helps maintain smooth data flow.	CO3 CO1