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 December 2024

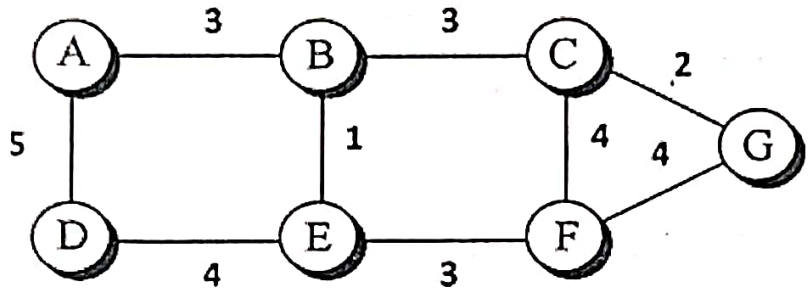
Roll no.....

Name of the Course and semester: **B. Tech Computer Science and Engineering Vth semester**
Name of the Paper: **Computer Networks**
Paper Code: **TCS-511**
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 is 20 (twenty).
(iv) Each sub-question carries 10 marks.

Q1. (20 Marks)

a. For the network provided in the figure with given link costs, apply Dijkstra's shortest-path algorithm as used in link-state routing to compute the shortest paths from node A to all other network nodes (CO 3)



b. Consider a message that is $10x10^6$ bits long, that is to be sent from source to destination (connected via 3 routers and assume links are uncongested), the transmission rate of all the links present in between is 4Mbps each, how long does it take to move the complete file from source to destination using message segmentation with each packet size 10000 bits long (disregard processing and propagation delay)? (CO 1 and 2)

c. Apply the concept of NAT protocol in Graphic Era Hill University to avoid the miss use Public IP address for accessing Internet in the University and explain the difference between public and private IP address.(CO 4)

Q2. (20 Marks)

a. Explain in detail the functionalities, characteristics, and differences of the BGP, OSPF, and RIP routing protocols? (CO 4)

b. An organization is granted a block 125.238.0.0/16. The administrator wants to create 512 subnets: (CO 2)
   (i) Find the subnet mask required
   (ii) Find the number of addresses in each subnet
   (iii) Find the first and last allocatable addresses in the 1st subnet
   (iv) Find the first and last allocatable addresses in the 14th subnet (CO 2 and 3)

c. How does the vulnerability window differ in Pure ALOHA and Slotted ALOHA, and what are the implications? (C0 3)

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Q3. (20 Marks)

a. Compare the effectiveness of CRC with other error detection techniques, such as checksums or parity checking. Highlight the advantages and limitations of CRC in ensuring data integrity. (CO 4)

b. Explain the **HTTP protocol** with a focus on **persistent** and **non-persistent connections**. Which type is more efficient for modern web traffic and also explain Conditional GET method used by HTTP using a scenario? (CO 3)

c. What is **DNS**? Describe how the **Domain Name System** resolves domain names to IP addresses using both the approaches and DNS data base hierarchy. (CO 2)

Q4. (10 Marks)

a. A packet has arrived in which the offset value is 100, the value of HLEN is 15, and the value of the total length is 200. What are the numbers of the first byte and the last byte? How did CSMA/CD contribute to the early success of Ethernet networks?

b. Describe the **peer-to-peer (P2P) architecture** used by BitTorrent and how it differs from traditional client-server models and also explain how a newly joined peer gets its first chunk. (CO 3)

c. Explain the architecture of electronic mail application and Compare **POP3** and **IMAP** protocols. In what scenarios would you prefer using one over the other for email management? (CO 2 and 3)

Q5. (10 Marks)

a. (i) Which subnet does this IP (131.107.32.1, 255.255.224.0) belong to?
(ii) How many subnets and hosts per subnet can you get from the network 192.168.89.0/28? (CO 3)

b. Briefly describe TWO possible methods for enabling a smooth transition from IPv4 to IPv6. Briefly comment on their suitability. (CO 3)

c. Explain the **Go-Back N ARQ protocol**. How does it ensure reliable data transmission, and what are its limitations compared to other ARQ protocols? (CO 2 and 3)