Ref. No.: Ex/ET/PC/H/T/322/2024

B.E. ELECTRONICS AND TELE-COMMUNICATION ENGINEERING

THIRD YEAR SECOND SEMESTER EXAM 2024

DIGITAL SWITCHING AND COMPUTER NETWORKS (HONS.)

Time: 3 hours **Full Marks: 100**

Answer any five questions. **All questions carry equal marks:**

1.	(a) Compare between circuit switching, message switching and packet switching. (b) Explain in brief the Flat Addressing and Hierarchical Addressing schemes in network design. What do we understand by encapsulation and decapsulation in such a design strategy.	12 + (4 + 4)
2.	(a) Enlist the three components of a browser. What is a URL and what are its components? How is HTTP related to WWW? Why do we need POP3 or IMAP4 for electronic main? (b) Explain in brief the protocols associated with the application and session layers in a secured computer communication.	10 + 10
3.	(a) What are the different signaling links and signaling modes in common channel signaling scheme? Illustrate the different modes with proper schematic presentations. (b) What are the various sources of impulse noise that may corrupt the transmission in telephone network?	(4 + 4) + 5 + 7
4.	(a) Illustrate human speech strength at various frequencies with the help of a speech spectrum when the electrical oscillations of the voice are so designed to be transmitted over the telephone channel. (b) If input power is 16 μW and output power is 30 mW, find the power ratio and express it in decibel and nepers. (c) With reference to the Grade of Service (GOS) in traffic engineering assess the importance of the concept of the blocking criteria, delay criteria, and congestion in the determination of the same.	8 + 4 + 8
5.	(a) Compare between: (i) LAN, WAN and MAN Architectures (ii) Bus, Star and Ring topologies (iii) Hub, switch and router (b) Present a comparative analysis of HOTP and TOTP authentication algorithms. Suggest the best choice between the two under different cases.	(4 + 4 + 3) + 9
6.	(a) If a group of 20 trunk carries 10 erlangs and the average call duration is 3 minutes, calculate (i) average number of calls in progress (ii) total number of calls originating per hour. (b) Consider a trunk group with an offered load 4.5 erlangs and a blocking probability of 0.01. If the offered traffic increased to 13 erlangs, to keep same blocking probability, find the number of trunks needed. Also calculate the trunk occupancies. (c) A message switching network is to be designed for 90% utilization of its transmission link. Assuming exponentially distributed message lengths and an arrivals rate of 10 messages per min. What is the average waiting time and what is the probability that the waiting time exceeds 3 minutes? (d) Present a touch tone dialing system and compute the frequencies selected to interpret the tone represented when the digit '7' is selected. What is the feasible maximum rate with an inter-digit pause of 40ms?	5 + 5 + 5 + 5
7.	(a) Explain the operation of the Data Link Layer with its sublayers and the Network layer highlighting the Protocol Data Units involved in each case. (b) Comment on the differences between TCP and UDP Protocols. Mention the various services addressed by TCP. Explain the TCP header format.	10 + (4 + 3 + 3)