R18

Code No: 155AV

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, January - 2025

DATA COMMUNICATIONS AND NETWORKS

(Electronics and Communication Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	Determine the number of physical links required for 100 nodes to be connected in mesh and star topologies.	[2]
b)	Write a short note on encapsulation of data in OSI model.	[3]
c)	What is sampling and explain its importance.	[2]
d)	Discuss Hamming code.	[3]
e)	Derive the complete IPv6 address from the following abbreviated form: C::B0F:0:FF.	[2]
f)	What are the responsibilities of Network Layer? Discuss.	[3]
g)	Mention the specific applications that exclusively use UDP.	[2]
h)	Mention the QOS parameters of network service.	[3]
i)	Write short notes on FTP.	[2]
j)	How does MIME enhance SMTP?	[3]

PART – B

(50 Marks)

2.a) What is Data Communication? With a neat diagram, explain the three basic topologies.
b) Explain how the communication takes place between layers of OSI model. [5+5]

OR

3.a) What are the different types of networks? Explain in detail.
b) Differentiate between the working of Data link layer, Network layer and Transport layer. [5+5]

4.a) Explain the need for flow control in the data link layer.
b) The following code vectors (1001011, 0101101 and 0011110) are generated from a (7, 3) parity check code. Assume the pattern of the code vector is (C_i = m2m1m0p3p2p1p0). Find the rule for generating each of the parity checks. Determine all valid code vectors. What is the minimum distance of this code? What is the error detection and correction capability of this code? When the errors will be missed out, and illustrate the same by taking the example code vectors from the above coding scheme. [5+5]

OR

5.a) What is meant by bit-stuffing in the context of framing at DLC layer. For the given data (N/W layer packet + header + trailer), prepare the frame, mark the flags (frame boundaries) and mark the locations where bit-stuffing has been incorporated.
Data: 0 0 0 1 1 1 1 1 1 1 0 0 1 1 1 1 1 0 1 0 0 0 1 1 1 1 1 1 1 1 1 1 1 0 0 0 0 1 1 1 1 1

b) With an example, explain the computation of internet checksum. List the steps undertaken by the sender and receiver for error detection. [5+5]

6.a) Give an example to explain any one of the multicasting routing algorithm.

b) For each of the following IP addresses (i) determine the class, (ii) address range of the class in dotted decimal notation, (iii) network mask (iv) indicate the network and host ids in dotted decimal form.
(1) 11000110001011010100100011100111,
(2) 11100011010100110011100000101010,
(3) 10111000010000100101110010000101 and
(4) 11011111101001111100000000010111 [5+5]

OR

7.a) With neat IPv6 datagram figure provide all control fields in the header, and explain the functionality of each field.

b) What is the role of ICMP in Network layer? Mention various error reporting messages generated by ICMP and briefly discuss about each of them. Indicate the format (contents) of ICMP packet in case of error reporting. [5+5]

8.a) Explain the various methods used by TCP for congestion control.

b) Frames of 1000 bits are sent over a 100 Kbps channel between 2 nodes, where the propagation time from one node to other node is 250 ms. Assume that headers are short and acknowledgements are sent soon after receiving the frame. What is the maximum achievable channel utilization using stop-and-wait, Go-back-N and selective-repeat protocols with 5-bit sequence numbers? For achieving 100% channel utilization, what will be the size of sequence numbers in case of Go-back-N and selective-repeat protocols. [5+5]

OR

9.a) Compare and contrast between integrated services and Differential Services.

b) Explain the features and applications of UDP. [5+5]

10.a) What is SNMP? Briefly discuss the SNMP model components.

b) What is the essence of DNS (Domain Name System)? How does it map to IP address? Explain. [5+5]

OR

11.a) Write a brief note on working of E-mail using SMTP.

b) What is an Electronic mail? Explain the two scenarios of architecture of E-Mail. [5+5]

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