



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2019/2020**

COURSE NAME : DATA COMMUNICATION NETWORK
COURSE CODE : BEB 40102
PROGRAMME CODE : BEJ
EXAMINATION DATE : DECEMBER 2019/ JANUARY 2020
DURATION : 2 HOURS 30 MINUTES
INSTRUCTION : ANSWER ALL QUESTIONS.

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

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- Q1** (a) Describe the function of a router. Identify which layer of the OSI model it operates. (5 marks)
- (b) Explain and show an example how bit scrambling is used when transmitting data. (6 marks)
- (c) Explain why the Medium Access Control (MAC) of the IEEE 802.11 uses CSMA/CA instead of CSMA/CD. (5 marks)
- (d) Analyse the blocking condition of the three-stage space division switch shown in **Figure Q1(d)**. The heavier lines indicate the lines that are already in use. (4 marks)
- Q2** (a) Differentiate between the Manchester and Differential Manchester encoding scheme. (7 marks)
- (b) By using an appropriate examples, discuss if there is a synchronization problem when a long stream of bit 1 and long stream of bit 0 are sent using the Pseudoternary encoding scheme. (6 marks)
- (c) A stream of 10011011101001 is received at the receiver. The generator polynomial is $x^4 + x^3 + 1$. Evaluate if this stream of data contains any error. (7 marks)
- Q3** (a) Differentiate between the TCP and UDP protocols in terms of reliability, connection, efficiency and flow control. (6 marks)
- (b) Compare the datagram and the virtual circuit. (4 marks)
- (c) A 20 kByte file is to be transferred across a packet-switching network from node A to node F. The path from node A to node F passes through 5 links, and 4 intermediate nodes. Each of the links is a 10 km optical fiber with a rate of 10 Mbps. The propagation speed through optical fiber is 2×10^8 m/s. The 4 intermediate nodes are store-and-forward devices and each intermediate node performs 50 μ s routing table look up after receiving a packet before it can begin sending it on the outgoing link. Analyse the total time taken to send the entire file across the network if the packet size is
- (i) 1 kByte
- (ii) 4 kByte
- Ignore the size of the packet header.

(10 marks)

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- Q4** (a) Explain why IP is considered as a best-effort protocol. (3 marks)
- (b) Suppose a protocol architecture has defined four layers for communication: base layer, net layer, transport layer, and max layer. The header length of the base layer, 2 bytes; the net layer, 2 bytes; the transport layer, 3 bytes; and max layer, 4 bytes. In addition, each layer has a 4-bit trailer. If a 50-byte packet is received, calculate the size of the actual data (in bytes). (4 marks)
- (c) “Both Ethernet and 802.11 use Carrier Sense with Collision Detection to ensure fair media access for multiple parties on a LAN.” Discuss if the statement above is true or false. (4 marks)
- (d) Consider the packet-switching network of **Figure Q4(d)**. Suggest and illustrate possible routes for 3 packet transmissions from Node 1 (N1) to Node 6 (N6) on the network based on the following routing strategies:
(i) Fixed
(ii) Flooding
(iii) Random (9 marks)
- Q5** (a) For each of the following items, identify the layer of the OSI protocol stack with which the item is associated:
(i) Adaptive Routing Algorithm
(ii) Stop-and-Wait Flow Control
(iii) Half-duplex Transmission Mode
(iv) Cyclic Redundancy Check
(v) High-Level Data Link Control Protocol
(vi) User Datagram Protocol (6 marks)
- (b) On a certain network 1,000,000 bytes of data needs to be transmitted using asynchronous transmission, using 7 data bits, 1 start bit, 2 stop bits and 1 parity bit. If the transmission is at 56 kbps, determine how long it would take to complete the transmission and what is the overhead in time. (6 marks)
- (c) A router interface has been assigned an IP address of 172.16.192.166 with a mask of 255.255.255.248. Determine the subnet that the IP address belongs to. (4 marks)
- (d) In a sliding window Go-Back-N ARQ system, A sends packets 0,1,2,3,4,5 and 6. Packet 3 arrives at B corrupted. Determine what do A and B send to each other next. (4 marks)

- END OF QUESTIONS -

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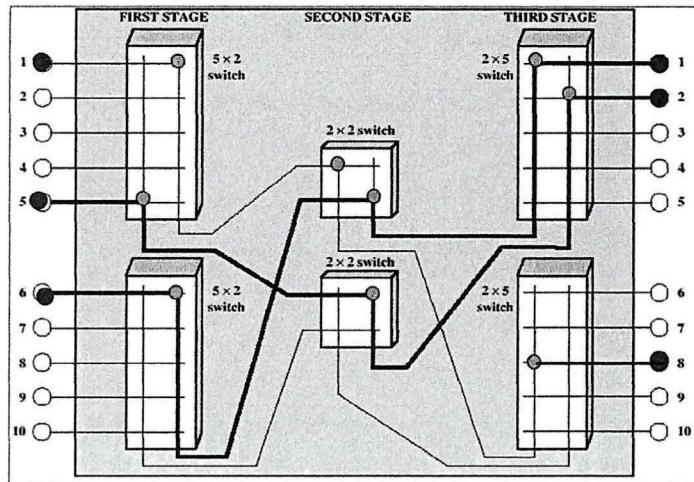


Figure Q1(d)

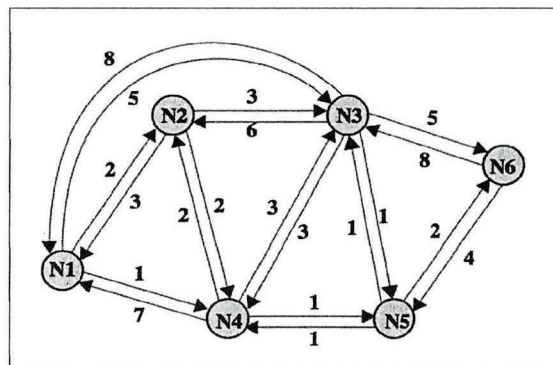


Figure Q4(d)

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