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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2017/2018**

**COURSE NAME : DATA COMMUNICATION
NETWORKS**

COURSE CODE : BEB 40903

PROGRAMME CODE : BEJ

EXAMINATION DATE : JUNE/ JULY 2018

DURATION : 3 HOURS

**INSTRUCTION : ANSWER FIVE (5) QUESTIONS
ONLY.**

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THIS QUESTION PAPER CONSISTS OF FIVE (5) 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) Explain the differences between the Manchester and Differential Manchester encoding scheme. (6 marks)
- (b) By using an appropriate example, 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. (7 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) Discuss the differences 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)

- Q4** (a) Explain why IP is considered as a best-effort protocol. (4 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 and of the net layer is 2 bytes; and 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) Apply Dijkstra’s routing algorithm to the network in **Figure Q4(d)** for node 5 to all other nodes. (8 marks)
- Q5** (a) For each of the following items, identify the layer of the OSI protocol stack with which the item is associated:
(i) Routing
(ii) Telnet
(iii) Manchester encoding
(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)

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- Q6** (a) With regards to the IP version 4 addresses, provide:
- (i) the number of bits for the Network ID and the total number of networks allowed in class A, B and C.
 - (ii) the number of bit for Host ID and the total number of hosts per network allowed in class A, B and C.
- (6 marks)
- (b) Recommend a suitable change to the network design in **Figure Q6(b)**. Explain your answer.
- (4 marks)
- (c) For the network 172.48.24.0/21, determine:
- (i) the subnet mask,
 - (ii) the total number of IP addresses per subnet,
 - (iii) the first usable IP address on the first subnet, and
 - (iv) the last usable IP address on the first subnet.
- (10 marks)

- END OF QUESTIONS -



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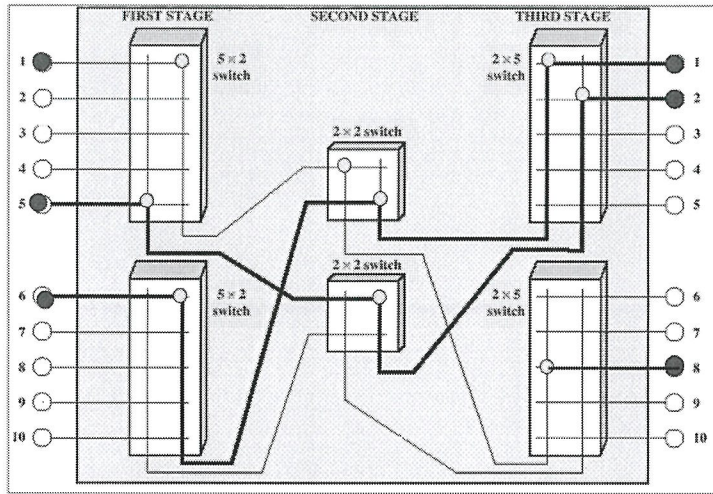


Figure Q1(d)

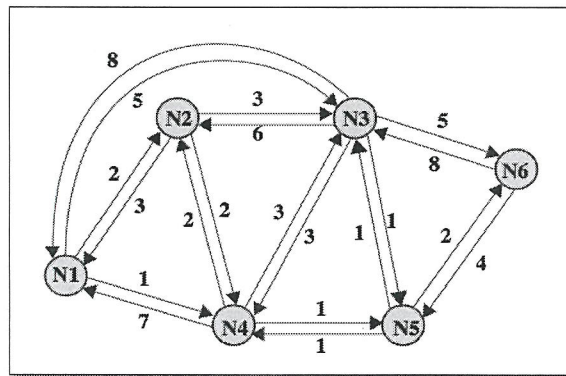


Figure Q3(d)

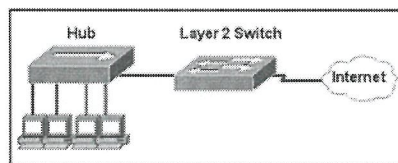


Figure Q6(b)

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