THE UNIVERSITY OF THE WEST INDIES

Semester I ■ Semester II ☐ Supplemental/Summer School ☐

Examinations of December ■ April/May ☐ July ☐ 2014

Originating Campus: **Cave Hill** ☐ **Mona** ■ **St. Augustine** ☐ **Open** ☐

Mode: **On Campus** ■ **By Distance** ☐

Course Code and Title: **COMP2190 – Net Centric Computing**

Date:	**December 17, 2014**	Time:	**4 pm**
Duration:	**2 Hours**	Paper No:	**1**

Materials required:

Answer booklet:	**Normal**	■	**Special**	☐	**Not required**		☐
Calculator: (where applicable)	**Programmable**	☐	**Non-Programmable**	■	**Not required**		☐
Multiple Choice answer sheets:	**numerical**	☐	**alphabetical**	☐	**1-20**	■ **1-100**	☐

Auxiliary/Other material(s): None

Instructions to Candidates: This paper has 7 page(s) and 5 questions

Candidates are reminded that the examiners shall take into account the proper use of the English Language in determining the mark for each response.

Answer all questions in Section 1 and any two (2) from Section 2.

The maximum number of marks you may earn for the entire paper is **50**. The number in **[]** by each question indicates the number of marks allotted to the question. Justify all your answers; full credit will be given only for properly supported answers, partial credit will be given where applicable. Some useful information is provided on the last page for your reference.

Please write legibly and keep your answers concise. Points will be deducted for correct answers that also include incorrect or irrelevant information. Good skill!

NB: This paper may not be removed from the examination room.

DO NOT WRITE OR TYPE ON THE BACK OF THIS SHEET: USE ONE SIDE ONLY

INSTRUCTIONS: Each page must be signed by the First and Second Examiners, and where applicable the University and External Examiners. Completed forms should be handed to the Assistant Registrar (Examinations). Where applicable, the EXTERNAL EXAMINER is requested to sign the question paper and return it with comments, if any, (on a

Section 1

Question 1 *10 multiple choice sub-questions* **[10]**

Question 2 [20]

a. What information is used by a process running on one host to identify a process running on another host? **[1]**

b. What is the purpose of the DHCP protocol? **[4]**

c. Host A and B are communicating over a TCP connection, and Host B has already received from A all bytes up through byte 126. Suppose Host A then sends two segments to Host B back-to-back. The first and second segments contain 70 and 50 bytes of data, respectively. In the first segment, the sequence number is 127, the source port number is 302, and the destination port number is 80. Host B sends an acknowledgment whenever it receives a segment from Host A. If the second segment arrives before the first segment, in the acknowledgment of the first arriving segment, what is the acknowledgment number, the source port number, and the destination port number? **[3]**

d. Suppose nodes A, B, and C each attach to the same broadcast LAN (through their adapters). If A sends thousands of IP datagrams to B with each encapsulating frame addressed to the MAC address of B, will C's adapter process those frames? If so, will C's adapter pass the IP datagrams in these frames to the network layer in node C? How would your answers change if A sends frames with the MAC broadcast address? **[4]**

e. What are the differences between message confidentiality and message integrity? Can you have confidentiality without integrity? Can you have integrity without confidentiality? Justify your answer. **[4]**

f. (i) Write XHTML for a link element that displays the text "Click here" and has a target URL that uses the HTTP scheme with host name "`www.example.edu.jm`", hierarchical portion "`/level/2/courses`", and a query value: "`discipline`" with value "`info`". **[2]**

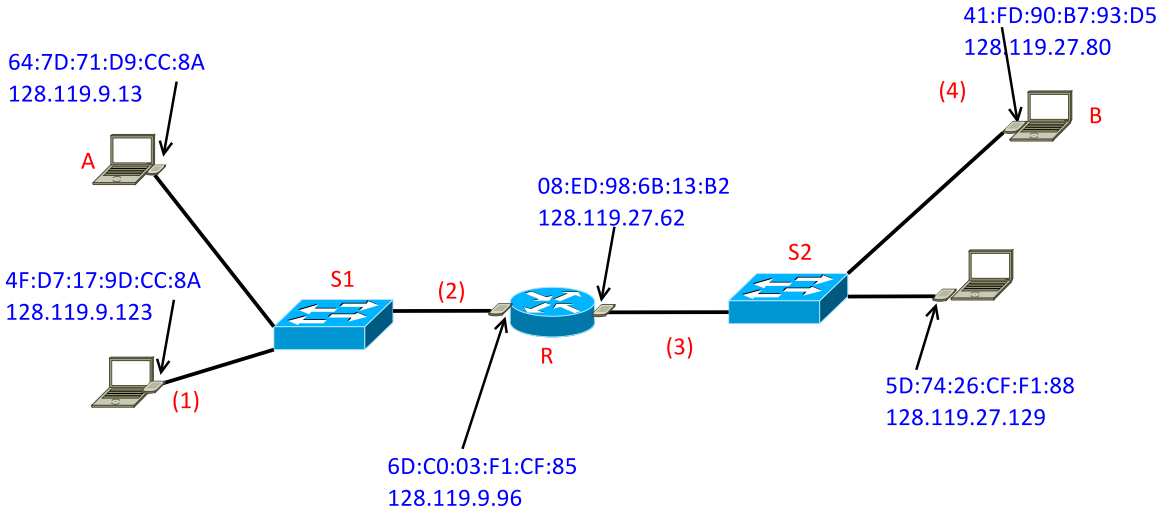
(ii) Indicate whether the following statement is True or False, AND explain your answer. "In HTML entities are used to incorporate external content, such as images, into a Web page." **[2]**

OVER...

Section 2

Question 3 [10]

Consider the scenario in Fig. 3 below in which two LANs are connected by a router. Suppose that `A` is in the process of sending an IP datagram from itself (`A`) to `B`. Answer the following questions:



a. Consider the MAC frame (containing the `A`-to-`B` datagram being sent by `A`) as it arrives to the left interface of router `R`. What are the MAC addresses on this frame? What are the IP addresses on the datagram encapsulated inside this frame? **[4]**

b. How did `A` learn (i.e., what protocol did it use to find out) what destination MAC address to use on this frame? **[2]**

c. After the frame has been received by the router, what is the content of the switch table at S1? (Hint: In answering this question, take into account your answer to part b., above, as well as the fact that a frame containing the `A`-to-`B` IP datagram has also passed through this switch.) **[4]**

Question 4 [10]

a. What is an important difference between a symmetric-key system and a public-key system? **[2]**

b. Consider RSA with $p = 11$ and $q = 7$

(i) What are n and $\phi(n)$ (same as z)? **[1]**

(ii) Give four acceptable choices for d? **[2]**

(iii) For one of your choices for d above, find e such that $de \mod \phi(n) = 1$ and $d < \phi(n)$. Please show all work. **[3]**

(iv) Can you encrypt the message $m = 255$ using the key (n, e). Justify your answer. **[2]**

OVER...

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Question 5 [10]

a) Write PHP code that processes the following form:

```
<form action="q5.php" method="post">
   <fieldset>
     Discipline <input type="text" name="disc" id="crsDisc"> <br />
     Code <input type="text" name="crsCode" id="crsCode"> <br />
     Title <input type="text" name="crsTitle" id="crsTitle"> <br />
     <input type="submit" />
    </fieldset>
  </form>
```

Your code should examine the discipline, course code, and title submitted and verify that they are valid. Valid disciplines and course codes are each four characters long. A valid course title is any non-empty string. Your PHP code's output should be a level-1 heading stating whether the data was valid or invalid, and a paragraph containing the data itself separated by commas. **[6]**

b) Describe two ways in which CSS allows for code reuse. **[2]**

c) Suppose the `crsCode` field contains 0219. What will the following JavaScript function do? **[2]**

```
function testInput() {
   var crsCode = document.getElementByID("crsCode");
   var codeVal = crsCode.value;
   if ( codeVal!='' && ((codeVal-codeVal) == 0)
     && codeVal.length == 4) {
      crsCode.style.backgroundColor = "white";
      return true;
   }
   else {
      crsCode.style.backgroundColor = "red";
      return false;
   }
}
```

OVER...

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Useful Information

Algorithm 1 Extended_Euclidean(m, n)

$(A_1, A_2, A_3) \leftarrow (1, 0, m)$
$(B_1, B_2, B_3) \leftarrow (0, 1, n)$
while true **do**
  if $B_3 == 0$ **then**
    return A_3 {//No inverse}
  end if
  if $B_3 == 1$ **then**
    return B_2 {//$B_2 \equiv n^{-1} \mod m$}
  end if
  $Q \leftarrow \left\lfloor \frac{A_3}{B_3} \right\rfloor$
  $(T_1, T_2, T_3) \leftarrow (A_1 - Q \times B_1, A_2 - Q \times B_2, A_3 - Q \times B_3)$
  $(A_1, A_2, A_3) \leftarrow (B_1, B_2, B_3)$
  $(B_1, B_2, B_3) \leftarrow (T_1, T_2, T_3)$
end while

END

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