Section A: Answer all questions in a separate answer book.

1. Convert the following Perl program to output a HTML web page that displays all the environmental variables in "environmental name=value" format. Hint: Environmental variables are stored in %ENV and you can use foreach to access each key.

   ```perl
   #!/usr/comp/bin/perl -w
   print "CGI Environment Variables are:\n";
   ```

   [6 marks]

2. Some web sites use cookies to store user name and password, or some configuration information on the client’s machine. List in point form, the advantages and disadvantages of this approach.

   [4 marks]

3. The HTTP protocol is inherently stateless, which is not appropriate for many applications. State 3 approaches to solve this problem.

   [6 marks]

4. An HTTP request message may contain one or more header fields. Yet, the message itself provides no information about the exact number of header fields it carries. So how can the web server detect the start of the entity body of the request message?

   [3 marks]

5. Give two differences between the POST method and the GET method as used in invoking CGI programs.

   [6 marks]

6. Give three differences between connection-oriented communication and connectionless communication.

   [6 marks]

7. Why can’t an image file (e.g. a jpeg file) be put directly in the entity body of a HTTP reply message? How does the web server tackle this?

   [4 marks]

The following are multiple-choice questions. You can select up to two choices in your answer. Note the following:

- If one of the choices is incorrect, missing or extra, 0.5 marks will be deducted.
- Similarly, if the answer is completely wrong, 0.5 marks will be deducted.
- No marks will be deducted for unanswered question.
- Each question carries 1.5 marks.

In your answer book, you are required to write down the question number clearly, followed by the correct answer(s) e.g. question 5, with the answer of a and c should be written as 5) a, c.

[15 marks]

8. Which statement(s) is/are not true about cookie state retention that is required for long and multipage Web transactions?

   a. The server initiates cookie storage.
   b. When a client visits the site, the server will request for the cookies.
   c. Cookies can be deleted on the client-side.
   d. If no expiry date is specified, cookies will be removed once the client terminates.

9. Using an HTML <FORM> tag without an action attribute will

   a. Not work
   b. Cause the submit button to use the CGI program that originally generated the page
   c. Cause the submit button to reload the current page
   d. Client returns a 404 error code
10. Using an HTML <FORM> tag without the method attribute will
   a. Not work
   b. Causes the submit button to use the default POST method delivery
   c. Server returns an invalid operation code
   d. Causes the submit button to append the form data to the URL

11. The following URL will work as expected.
    <A HREF="/cgi/foo.pl?name=Jose Loh&Job=engineer"/>
    a. True.
    b. False; you need to replace space with plus symbol.
    c. False; you need to specify the full URL address of the CGI program
    d. False; you can’t pass two parameters to a CGI program
    e. False; the backslash character in the name is not allowed
    f. False; the backslash character need to be encoded in hexadecimal format

12. Which statement(s) is/are not true about Server-side Includes (SSI)?
    a. SSI requires the support of the client browser
    b. SSI can be computationally expensive for the server to process
    c. SSI can be used to invoke server-side CGI program
    d. SSI can be used to include external HTML files.

13. Which statement(s) is/are true about using cookies for long-term storage (in terms of months)
sometimes fail?
    a. Cookies might not be sent if user uses another client browser to access the site.
    b. Cookies are stored in RAM, so it might be lost once the client browser exits.
    c. Cookies are not reliable, since there is no standard encoding technique.
    d. Cookies might not be supported on the client browser.

14. Which statement(s) is/are not true about Common Gateway Interface (CGI)?
    a. CGI defines a communication protocol between web server and backend service program.
    b. CGI is a programming language that talks to backend services such as a database engine.
    c. CGI is the basis to support dynamic content creation and delivery of HTML pages.
    d. CGI allows client to control the administration of a web server.

15. Which statement(s) is/are true about server-side CGI processing using the GET method?
    a. Form data is sent from Web server to CGI program using the STDIN.
    b. The CGI program output the resultant web page to the STDOUT.
    c. The CGI program uses the CONTENT_LENGTH environment variable to retrieve the length of
      form data.
    d. The CGI program is required to translate all '+' symbols to spaces and hexadecimal representation
      to the actual character symbol.

16. Which statement(s) is/are not true about setting path parameters in Cookies?
    a. If path=/, then cookie is sent by client visiting the entire site and related domains.
    b. If path=~cscl clam, then cookie is sent by client visiting the home directory.
    c. If no path parameter is set, the client will not accept any cookies.
    d. To limit sending of cookie to only cgi-bin then set path=~csclam/cgi-bin/

17. Which statement(s) is/are not true about DBI for database programming in Perl?
    a. DBI uses another level of ODBC abstraction to communicate with various database engine.
    b. CSV files are formatted using commas.
    c. DBD forms an application programming interface for CGI program to access the database engine.
    d. CSV driver allows SQL queries on plain text files.
Section B: Answer all questions in a separate answer book.

1. Name 4 major components of an XML document? [4 Marks]

2. Write a DTD for an XML document for final-year project reports. Each report has an abstract, introduction, literature review, methodology, other sections, evaluation, conclusion, reference and optionally an index. Use attributes to contain information about the author name, student ID and supervisor name in the root element. [8 Marks]

3. What are the 5 general issues for designing DTDs? [10 Marks]

4. Write an XSL stylesheet to convert the follow XML document into an HTML document. The output document should highlight the sections in an header element (i.e. <h1>). The marks should be displayed with the questions in a bulleted list.

```xml
<?xml version="1.0"?>
<!DOCTYPE exam "http://here/this.html">
<exam>
  <SectionA>
    <Q mark="25">Question 1</Q>
    <Q mark="25">Question 2</Q>
  </SectionA>
  <SectionB>
    <Q mark="50">Question 3</Q>
  </SectionB>
</exam>
```

[8 Marks]

The following are multiple-choice questions. You can select up to two choices in your answer. Note the following:
- If one of the choices is incorrect, missing or extra, 1 mark will be deducted.
- Similarly, if the answer is completely wrong, 1 mark will be deducted.
- No marks will be deducted for unanswered question.
- Each question carries 2 marks.

In your answer book, you are required to write down the question number clearly, followed by the correct answer(s) e.g. question 5, with the answer of a and c should be written as 5) a, c. [20 marks]

5. What appears as the first element in an XML document?
   a. root element
   b. xml processor instruction
   c. DTD declaration

6. What kind of structure do XML documents have?
   a. string
   b. lattice
   c. tree

7. What property does an ID attribute value have?
   a. uniqueness
   b. string
   c. NMTOKEN
8. What are used to call computer applications to process data?
   a. attributes
   b. parsed entities
   c. notation

9. How are XML Schema specified?
   a. EBNF
   b. DTD
   c. XML

10. What function is XSL not used for?
    a. Layout
    b. Document transformation
    c. Compression

11. How can the root element be specified in the match attribute of an XSL template?
    a. /
    b. ..
    c. /*

12. How can the grandparent node be specified in the select attribute of the matched `<xsl:apply-templates>` element?
    a. //
    b. ../..
    c. ..//*

13. When are XSL transformations carried out?
    a. client-side
    b. server-side
    c. client-server (both sides)

14. What elements enable XSL to make decisions?
    a. xsl:choose
    b. xsl:switch
    c. xsl:if-then