UNIVERSITI TEKNOLOGI MARA
FINAL EXAMINATION

COURSE	:	**PROGRAMMING PARADIGMS**
COURSE CODE	:	**CSC305**
EXAMINATION	:	**MARCH 2014**
TIME	:	**3 HOURS**

INSTRUCTIONS TO CANDIDATES

1. This question paper consists of two (2) parts : PART A (20 Questions)
   PART B (6 Questions)

2. Answer ALL questions from all two (2) parts :

   i) Answer PART A in the Objective Answer Sheet
   ii) Answer PART B in the Answer Booklet. Start each answer on a new page.

3. Do not bring any material into the examination room unless permission is given by the invigilator.

4. Please check to make sure that this examination pack consists of :

   i) the Question Paper
   ii) an Answer Booklet – provided by the Faculty
   iii) an Objective Answer Sheet – provided by the Faculty

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

This examination paper consists of 11 printed pages

PART A (40 MARKS)

1. _____ language is an example of a "Low-Level Language".

   A. Assembly
   B. Pascal
   C. Prolog
   D. Scheme

2. Which of the following translator executes programs directly?

   A. Compiler
   B. Interpreter
   C. Lexical scanner
   D. Machine Language

3. Which of the following are the key features in object-oriented paradigm?

   I. Abstraction
   II. Encapsulation
   III. Polymorphism
   IV. Inheritance

   A. I, II and III only
   B. I, III and IV only
   C. II, III and IV only
   D. I, II, III and IV

4. What is semantic in programming?

   A. Programming language grammar.
   B. Set of rules for the language element.
   C. The form of its expression, statement and program unit.
   D. The meaning of expression, statement and program unit.

5. Based on the given statement in C below, identify its lexemes:

```
A = B + 2;
```

   A. A only
   B. A, =, B, +, 2 and ;
   C. B ,+ and 2 only
   D. No lexeme found

6. A _____ is category of its lexeme.

A. language
B. lexeme
C. sentence
D. token

7. The common elements in subprograms are function prototype, function call and function _____.

A. block
B. definition
C. parameter
D. return value

8. Which of the following statements is **TRUE** about Right-Hand Side of Backus-Naur Form?

I. It consists of Terminal symbols only.
II. It is a mixture of tokens and lexemes.
III. It consists of Non-terminal symbols only.
IV. It defined the abstraction of the grammar represented.

A. I and II only
B. I and IV only
C. II and III only
D. III and IV only

9. Which of the following are composite data types?

I. Array
II. Record
III. Pointer
IV. Boolean

A. I and IV only
B. I, II and III only
C. I, II and IV only
D. III and IV only

10. Which of the following statements is **FALSE** about lexical analyzer?

A. It is responsible to link file to the object loader.
B. It is the front end of the syntax analyzer.
C. Lexical analyzer's main task is to collect characters into logical groups.
D. The final product is a sequence of tokens.

11. Functional programming languages have _____.

I. No variables
II. No assignment statements
III. No iterative construct
IV. No function definition

A. I and II only
B. I, II and III only
C. I, II and IV only
D. I, II, III and IV only

12. What will be the output once the given expressions in Scheme are executed?

```
(+ (* 3 5)(- 7 3))
     (length '((5 2) 9 (9 9)))
```

A. *17 3*
B. *17 5*
C. *19 3*
D. *19 5*

13. Based on the given database in Prolog, which of the following queries will yield **TRUE**?

```
parent(tiffany, lisa).
parent(tiffany, lily).
parent(brian, lisa).
parent(brian, lily).

sibling (X,Y) :- parent(Z,X), parent (Z,Y).
```

A. `?- parent(tiffany, brian).`
B. `?- sibling (lisa,lily).`
C. `?- sibling(tiffany,lisa).`
D. `?- sister(lisa,lily).`

14. Which of the following statements is **NOT** key concept of imperative programming?

A. Data abstraction
B. Inheritance
C. Procedure
D. Variables

15. The _____ statement defines a new data type, with more than one member in C programming language.

A. class
B. extend
C. struct
D. record

16. The following are the characteristics of _____.

- Very high-level string processing
- Very high-level graphical user interface support
- Dynamic typing

A. concurrent programming
B. declarative programming
C. imperative programming
D. scripting languages

17. Which of the following statements is **FALSE** regarding classes in Python?

A. A class is a group of components that may be class variables, class methods and instance methods.
B. A method that will automatically be called when an object of the class is constructed is called an initialization method.
C. Classes in Python support encapsulation.
D. `_salary` is an example of class variable which is declared as public.

18. Choose **ONE (1)** statement that correctly initialized a tuple in Python.

A. `no_series = (11, 22, 33, 44, 55)`
B. `no_series = [11, 22, 33, 44, 55]`
C. `no_series = {11, 22, 33, 44, 55}`
D. `no_series = "11, 22, 33, 44, 55"`

19. Which of the following are states of thread control?

I. Created
II. Running
III. Blocked
IV. Terminated

A. I and II only
B. I, II and III only
C. II, III and IV only
D. I, II, III and IV

20. A _____ is a concurrent program in which several execution contexts.

A. parallel program
B. distributed program
C. shared program
D. synchronized program

PART B (60 MARKS)

QUESTION 1

a) Convert the following mathematical expressions into Scheme expressions:

i) $\frac{x-y}{7+x}$

ii) $\sqrt{10-\frac{5}{8}x}$

(4 marks)

b) Based on the description given, write the function definitions in Scheme.

i) `calSalaryIncrement()` that receives the department and the current salary. The function will then calculates and returns the new monthly salary based on the following table:

Department	Current monthly salary(RM)	Increment rate (%)
A	<= 1500	7
	> 1500	5
B	<= 2000	5
	>2000	3

(3 marks)

ii) `calBonus()` that is able to receive the current salary and returns the amount of bonus received based on the following table:

Salary (RM)	Bonus(RM)
< 2000	500
2000 - 5000	400
> 5000	300

(2 marks)

iii) `calTotalIncome()` that calls the functions in (i) and (ii) and sums the amount.

(1 mark)

QUESTION 2

a) Given the following Prolog facts containing data about computer accessories, its brand and its price:

```
item(speaker,creative,145).
item(speaker,logitech,115).
item(speaker,sony,85).
item(headphone,bose,65).
item(headphone,panasonic,48).
item(headphone, soul,185).
item(mouse,razer,35).
item(mouse,logitech,42).
```

i) Write a query for the following questions:
   a - Is there any headphones which priced less than RM50?
   b - Is there any different items but with the same brand?

(3 marks)

ii) Write a rule to calculate the new price for speaker if all brands of speakers are given 20% discount from its normal price.

(2 marks)

iii) Based on the given query below, what is the value of X?

```
?-item(mouse,X,42).
```

(1 mark)

b) Using the given table below, write rules in Prolog to display the title of suitable books when the user input the age of the reader.

Reader's Age	Books
5-10 years old	The Brave Monkey
11-15 years old	The Guardian The Littlest Knight Meet Mr. Snail
16-20 years old	It Could Happen A Tale of Friendship
Older than 20 years old	Wind Song

(4 marks)

QUESTION 3

a) Given the following program using Scheme language, rewrite the equivalent program in C programming language.

```
>( define ( totalSales m)          ; function definition
      ( cond ((< m 100 )(display "Try again"))
                 ((< m 500) display "Good")
                 (else (display "Very Good"))
       ) )

>( totalSales 150)                 ; function call
```

(4 marks)

b) What is the output for the following program?

```
#include <stdio.h>

void inputData(int n[],int size)
{int i;
 for ( i = 0; i < size; i++ )
 {
    n[ i ] = i + 100;
 }
}

void display(int n[],int size)
{int j;
  for (j = 0; j < size; j++ )
  {
    printf("Element[%d] = %d\n", j, n[j] );
  }
}
int main ()
{
static size=4;
int n[ size ];
inputData(n,size);
display(n,size);
return 0;
}
```

(2 marks)

c) Most of the imperative programming support global and local variable. Briefly explain global variable and give an example in C.

(4 marks)

QUESTION 4

a) Describe the concept of subclass in object-oriented programming.

(2 marks)

b) How do programs written in object-oriented paradigm differ from programs written in imperative paradigm?

(2 marks)

c) The following record is written in C:

```
struct employee {
int id;
float salary;
};
```

STRUCT = RECORD
struct employee = record of employee

Write the equivalent class in Java that contain normal constructor only.

(6 marks)

QUESTION 5

Python has a rich repertoire of composite types: tuples, strings, lists, dictionaries and objects.

a) What is a dictionary?

(2 marks)

b) Write a Python module that supports a "student_record" in UiTM system. Represent the "student_record" by a dictionary. Your dictionary should contains the following data: name of the student, student's ID number, program enrolled and age.

(3 marks)

c) Based on your answer in (b), show how to:

i) display the program enrolled by the student
ii) delete the student's age from the dictionary
iii) add a new information to the record which is the campus where the student is currently studying
iv) print all the student's information

(5 marks)

QUESTION 6

a) What is concurrent program?

(2 marks)

b) Differentiate between races and deadlocks problem in concurrent programming.

(4 marks)

c) Briefly explain **TWO (2)** strategies to avoid deadlocks condition and explain any **ONE (1)** of the strategies.

(4 marks)

END OF QUESTION PAPER