UNIVERSITI TEKNOLOGI MARA
FINAL EXAMINATION

COURSE	:	**PROGRAMMING PARADIGMS**
COURSE CODE	:	**CSC305**
EXAMINATION	:	**MARCH 2016**
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

5. Answer ALL questions in English.

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

This examination paper consists of 12 printed pages

PART A (40 MARKS)

1. A programming paradigm is a pattern of problem solving thought that underlies a particular genre of programs and languages. The main programming paradigms are _____.

   I. Functional programming
   II. Imperative programming
   III. Logic programming
   IV. Object -oriented programming

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

2. Abstractions are categorized into 3 level **EXCEPT**

   A. Basic Abstraction
   B. Module Abstraction
   C. Structured Abstraction
   D. Unit Abstraction

3. Which of the followings are characteristics of a scripting language?

   I. Lack of type-checking
   II. Extendable syntax
   III. Built-in high level data structures
   IV. Highly dynamic behavior

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

4. A compilation process involves 3 different types of analyzer. Select the correct order of analyzers used in translating source code to intermediate code.

   A. Lexical analyzer → Semantic analyzer → Syntax analyzer.
   B. Lexical analyzer → Syntax analyzer → Semantic analyzer.
   C. Syntax analyzer → Semantic analyzer → Lexical analyzer.
   D. Semantic analyzer → Lexical analyzer → Syntax analyzer.

5. The followings are the goals of a Syntax analyzer **EXCEPT** _____.

A. to construct hierarchical structures
B. to detect syntax errors
C. to ignore comment
D. to produce a parse tree

6. The code generator translates the optimized intermediate code version of the program into an equivalent _____.

A. assembly language
B. machine language
C. programming language
D. source language

7. Lexical analyzer gathers the characters of the source program into lexical units or tokens. The lexical units of a program include _____.

I. identifiers
II. special words
III. operators
IV. punctuation symbols

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

8. Which of the following control structures is represented by the program segment below?

```
int sum = 0;
int cnt = 50;
while (cnt > 30)
{
   sum+=cnt;
   cnt = cnt - 7;
}
```

A. function control structure
B. selection control structure
C. sequential control structure
D. repetition control structure

9. There are several iterative statements that can be implemented to control a looping control structure such as _____.

I. counter control loops
II. flag control loops
III. module control loops
IV. sentinel control loops

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

10. Given the following PROLOG statements, identify the control structure used.

```
calcDistance(D1, D2, Distance):-
            (
                  D1 > D2, Distance is D1 - D2,!;
                  D2 > D1, Distance is D2 - D1,!;
                  Distance is 0
            ).
```

A. Multiple-Selection Statements
B. One-Way Selection Statements
C. Three-Way Selection Statements
D. Two-Way Selection Statements

11. Choose the correct output for the following Scheme instruction.

```
(car '(9 0 0 6))
```

A. `0 0 6`
B. `9`
C. `(6 0 0 9)`
D. *`(9 0 0 6)`*

12. Which of the following statements is **INCORRECT**?

A. `(car '((C O) o k))` **returns** `(C O)`
B. `(cons '(R I) '(d e))` **returns** `((R I) d e)`
C. `(LIST? '(CO r rec t))` **returns** `#f`
D. `(max (* 4 2) (+ 50 17))` **returns** *67*

13. Choose a statement that is **FALSE** about Prolog.

A. A Prolog term is an atom, a variable, a numeric value or a structure.
B. A variable is any string of letters, digits and underscores that begins with a lowercase letter.
C. Atoms are the symbolic values of Prolog.
D. Structures represent the composite value of Prolog.

14. Which of the followings is **NOT** a user defined data type in C?

I. `enum day {Sun, Mon, Tue, Wed};`
II. `long int l = 23500;`
III. `#define SALESTAX 0.05`
IV. `struct Book { char name[10]; float price; int pages; };`

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

15. What will be the output of the program given below?

```
#include<stdio.h>

int main()
{
    int X=40;
    {
        int X=20;
        printf("%d ", X);
    }

    printf("%d\n", X);
    system("pause");
    return 0;
}
```

A. 20
B. 20 40
C. 40 40
D. Error

16. Which of the followings is **NOT** programming language that supports scripting paradigm?

A. Java
B. Javascript
C. PHP
D. Python

17. Predict the output from the following Python's program segment.

```
a = 9 / 3 ** 2
print a
```

A. 1
B. 2
C. 6
D. 36

18. Given is the following Python's code segment and its output. What is the missing code at "LINE A"?

Code	Output

`for n in range(2, 6):`
`  for x in range(2, n):`
`  if n % x == 0:`
`  print n, 'equals', x, '*', n/x`
`  LINE A`
`  else:`
`  print n, 'is a prime number'`
	2 is a prime number
	3 is a prime number
	*4 equals 2 * 2*
	5 is a prime number

A. break
B. continue
C. else:
D. end:

19. Distributing processes to separate processors or by interleaving them on a single processor using time slicing enables computers to achieve a significant speed up. This is made possible by the following strategies **EXCEPT** _____.

A. concurrent programming
B. distributed programming
C. parallel programming
D. sequential programming

20. What will happen when the situation below occurs?

"Process A is holding resource X and requesting for resource Y, process B is holding resource Y and is requesting for resource Z, process C is holding resource Z and requesting for resource X"

A. Monitor
B. Races
C. Deadlock
D. Semaphore

PART B (60 MARKS)

QUESTION 1

a) Convert the following Mathematical formulas into functions in Scheme:

i. $C=\frac{2b-4}{2a}+3k$

ii. $m = 6 * 3b - 4j$

(4 marks)

b) Give the output for each of the following Scheme statements:

i. `(length '((l e t s) read a (b c) x y z))`

ii. `(cons '(r s) '((t u) v))`

(2 marks)

c) Write a function in Scheme to calculate total charge for every domestic user for their monthly water usage. The water tariff is based on the following **Table 1**:

Rate (m^3)	Price Per m^3 (RM)	Minimum Payment(RM)
0 – 20 m^3	0.60	5.00/month
21 m^3 - 35 m^3	1.65	
> 35 m^3	2.96	

Table 1

(4 marks)

QUESTION 2

Given a list of menu available at Puteri Pasta in **Table 2**:

Menu	Type	Price (RM)
Chocolate Tiramisu Twist	Beverages	9
Citrus Crush	Beverages	8
Berrylicious	Beverages	8
Cappuccino Freeze	Beverages	9
Creamy Mushroom Chicken Fettuccine	Pasta	14
Creamy Carbonara Fettuccine	Pasta	14
Seafood Lasagna	Pasta	13
Beef Spaghetti	Pasta	14

Table 2

a) Create appropriate Prolog facts based on **Table 2**.

(4 marks)

b) Create a rule for calculating the price of each menu after 15% discount for School Break Promotion.

(3 marks)

c) Intan and Siti purchase food from the menu with their payment amount based on the following facts which are added to the database.

```
purchase(intan,20,seafoodLasagna,pasta).
purchase(siti,50,beefSpaghetti,pasta).
```

Create a rule that returns the balance once the discounted price as calculated in (b) is paid by the customer.

(3 marks)

QUESTION 3

a) There are **TWO (2)** different ways of passing parameters to functions in imperative paradigm. State the methods and explain briefly when to use them.

(4 marks)

b) Predict the output for the following program written in C.

```
#include <stdio.h>

int print_big(int number);

int main()
{
   int array[ ] = { 1, 11, 2, 22, 3, 33 };
   int i;

   for (i = 0; i < 6; i++)
   { print_big(array[i]); }

   return 0;
}

int print_big(int number)
{
   if(number > 10) {
      printf("%d is big\n",number);
   else
      printf("%d is small\n",number); }
}
```

(6 marks)

QUESTION 4

a) Based on the class description given, write the method `calIncometax()` in Java that is able to calculate and return the net income by deducting tax amount from the annual income. Tax rate is based on the **Table 3**.

```
public class incomTaxe
{
    private String name;
    private String IC;
    private double income;
    private int status;

    //constructor
   // accessors
   public double calIncometax()
    //other methods
}
```

Marital Status	Annual Income (RM)	Tax Rate (%)
Single (1)	30,000 and below	5
	30,001 to 50,000	8
	Over 50,000	10
Married (2)	50,000 and below	9
	Over 50,000	12

Table 3

(6 marks)

b) The diagram in **Figure 1** represents three classes for `Shape` class, `Circle` Class and `Square` class.

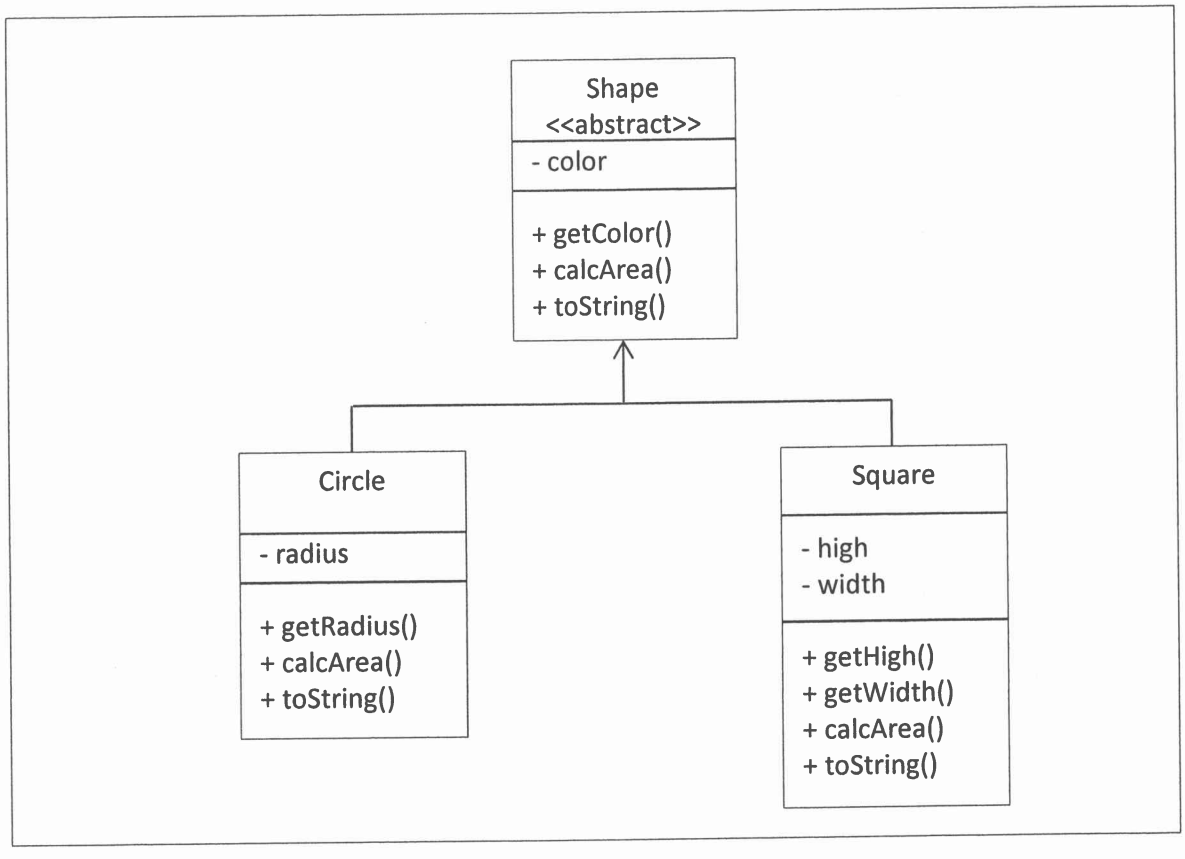

Figure 1

Assume that all the objects have been inserted into an array. Write a program segment to calculate the average radius for all Circle objects. Given an array definition :

```
Shape allShape[ ] = new Shape [100];
```

(4 marks)

QUESTION 5

a) State whether the following statements regarding scripting languages are TRUE (T) or FALSE (F).

i. Scripting languages provide support for variables, procedures and commands.
ii. Almost all scripting languages employ regular expressions in string matching operations.
iii. Python supports continue, break and return sequencers but do not support exceptions.
iv. Functions block in Python begin with the keyword `func` followed by the function name and parentheses ().

(4 marks)

b) Write the output of the following Python program statements.

i.
```
list1 = ['programming', 'paradigm', 'CSC', 305];
 print "output:", list1[2:3];
```

ii.
```
list2 = [001];
 print list2 * 3 + list2;
```

iii.
```
dict2 =
{'vegetable':'spinach','protein':'fish','fruit':'orange'};
print dict2.items();
```

(6 marks)

QUESTION 6

a) Concurrent programs require interthread communication or interaction. Explain briefly **TWO (2)** reasons for interthread communication to occur.

(4 marks)

b) Two communicating threads must synchronize their executions to avoid conflict when acquiring resources, or to make contact when exchanging data. List **TWO (2)** ways for a thread to communicate with other threads.

(2 marks)

c) Explain briefly **FOUR (4)** necessary conditions that must occur for a deadlock to exist.

(4 marks)

END OF QUESTION PAPER