ST0523/ST0502

SINGAPORE POLYTECHNIC

COMMON INFOCOMM TECHNOLOGY PROGRAMME
DIPLOMA IN APPLIED AI & ANALYTICS
DIPLOMA IN INFOCOMM SECURITY MANAGEMENT
DIPLOMA IN INFORMATION TECHNOLOGY

FIRST YEAR FULL TIME

FUNDAMENTALS OF PROGRAMMING

Time Allowed: 1.5 Hours

Instructions to Candidates

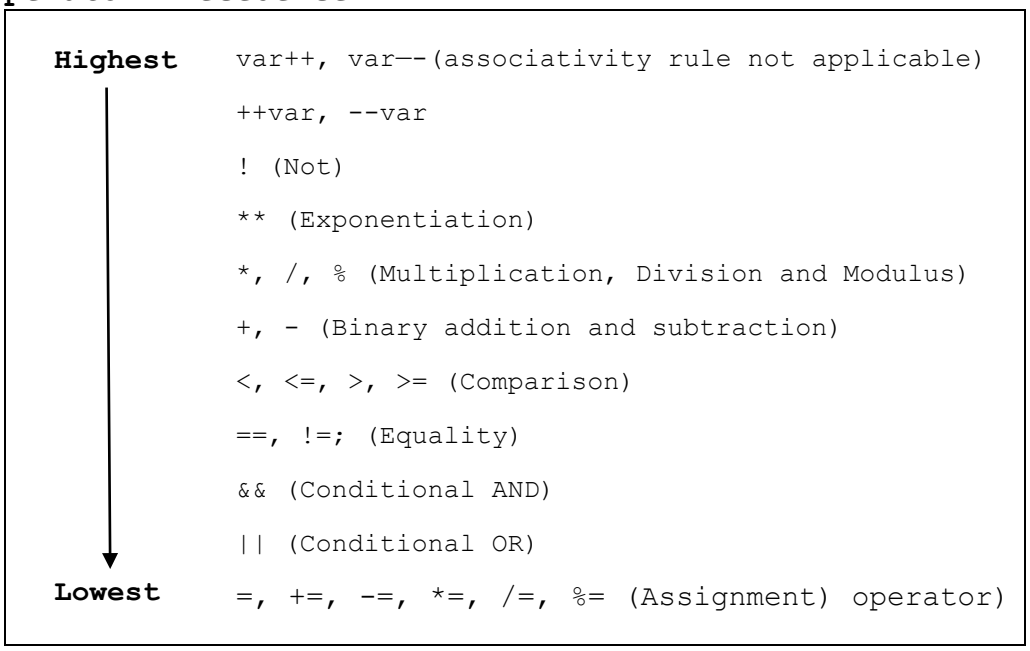
1. This paper comprises **x** questions in Section A and **x** questions in Section B.
2. This paper consists of **x** pages (inclusive of cover page).
3. Answer **ALL** questions.
4. All answers should be written in the Answer booklet provided.
5. You are required to **return ALL papers, Answer Booklet and this question paper** before you leave the room**.**

Mock MST Questions :

This paper contains sample MST questions, NOT a sample past year paper.

JavaScript Syntax List

Operator Precedence



The if statement

```
if ( condition ) {
  // block of code
}
```

The else statement

```
if ( condition ) {
  // block of code
} else {
  // block of code
}
```

The else if statement

```
if ( condition1 ) {
  // block of code
} else if ( condition2 )
{
  // block of code
} else {
  // block of code
  }
```

The for loop

```
for ( statement 1;  statement 2;
  statement 3 ) {
  // block of code
}
```

The while loop

```
while ( condition ) {
  // block of code
}
```

The do while loop

```
do {
  // block of code
}
while ( condition )
```

The switch statement

```
switch ( expression)  {
  case x:
    // block of code
    break;
  case y:
    // block of code
    break;
  default:
    // block of code
}
```

SECTION A:

1. Below are variable names used in a JavaScript program, how many of these is/are valid?

```
$total_Salary
4children
#no_houses
no_houses#
Amt_completed
NOTVALID
_Amt_completed
const
```

a) 4
b) 5
c) 6
d) 7
e) All are valid

2. What value would *x* have after each of the following statements is executed **independently** (if the expression is valid)?

Assume that *h, i, j, k* is reinitialized to *4, 10, 5* and *2* respectively before each statement.

```
var x; //to be a boolean
var h = 4, i = 10, j = 5, k = 2;
```

```
 i)  x = (i < j * 2) && (h + k == i % j) && (h == i);
ii)  x = (true || false && true) && (h == 4)
```

a) i) true ii) true
b) i) false ii) false
c) i) true ii) false
d) i) false ii) true
e) None of the above.

3. What is the output of the following?

```
var z = 3;
var output = '4';
switch (z) {
    case 1:
    output +=9;
    break;
    case 3:
    output +=8;
    break;
    case 5:
    output +=1;
    break;
    case 4:
    output +=2;
    break;
    default: output +=3;
}
console.log (output);
```

a) 8
b) 17
c) 21
d) 48
e) 48123

4. What is the output of the following?

```
var a = 3, b = 7, c = 5, d = 2;

switch (true) {
    case (a == 3):
        a += 2;
    case (c % b == 0) && (b > a):
        a += 3;
    case (false || false && true):
        a += 4;
        break;
    default:
        a++;
}
console.log(a);
```

a) 5
b) 8
c) 12
d) 9
e) None of the above.

5. How many time(s) does the console.log runs?

```
for (var j = 15; j >= 1; j -= 2) {
    if (j % 5 == 1) {
        console.log('jelly');
    }
}
```

a) 8
b) 2
c) 0
d) 15
e) Infinite times

6. What is the output of the following?

```
var t = 0, u = 4;
while (t <= 3) {
    t++;
    for (var v = t; v < u; v += 2) {
        console.log(v - t);
    }
}
```

a) 0
   2
   0
   0

b) 0
   2
   0

c) 2
   2
   2

d) 2
   2
   2
   2

e) None of the above.

7. What is the output of the following?

```
var arr = [1, 2, 3, 6, 7];
var a = arr.push(4);
var b = arr.pop();
console.log(a);
console.log(b);
```

a) 1 2 3 6 7 4
   4

b) 1 2 3 4 6 7
   7

c) 4
   4

d) 6
   4

e) None of the above

8. Identify the condition (using JavaScript) in the missing **do-while** loop.It should prompt for a number from the user until a valid input in the range of 20 to 70 (inclusive) is captured.

```
var input = require('readline-sync');
var num;

do {
    num = parseInt(input.question("Please a number: "));
    if ((_____________________))
        console.log("Please re-enter.");
} while (_____________________);

console.log("Good bye");
```

a) 70< num < 20
b) 20 > num > 70
c) num < 20 || num > 70
d) num<20 && num>70
e) None of the above

9. Which of the following JavaScript code produces an output of **35?**

a)

```
var a = 5;
var output = "";

if (!(a % a % a < a))
    if (++a <= 5)
        output += "1";
if (true)
    output += "2";
else
    output += "3";

if (false || false && true)
    output += "4";
output += "5";

console.log(output);
```

b)

```
var a = 5;
var output = "";

if (!(a % a % a > a))
    if (++a > 5)
        output += "1";
if (true)
    output += "2";
else
    output += "3";

if (false || false && true)
    output += "4";
output += "5";

console.log(output);
```

c)

```
var a = 5;
var output = "";

if (!(a % a % a < a))
    if (++a > 5)
        output += "1";
if (false)
    output += "2";
else
    output += "3";

if (false && false || true)
    output += "4";
output += "5";

console.log(output);
```

d)

```
var a = 5;
var output = "";

if (!(a % a % a < a))
    if (++a > 5)
        output += "1";
if (false)
    output += "2";
else
    output += "3";

if (false || false && true)
    output += "4";
output += "5";

console.log(output);
```

e) None of the above.

10. Given the incomplete program below which is supposed to produce the following output.

Output : (20, 2, 1) (15, 4, 2) (10, 8, 3) (5, 16, 4)

```
var str = " ";
for (var i = 20, j = 2, k = 1; i > 0; (___missing part__) {
    str += "(";
    str += i;
    str += ", ";
    str += j;
    str += ", ";
    str += k;
    str += ") ";
}
console.log(str);
```

Which of the followings can be coded to produce the required output.

i) `i -= 5, j += 2, k++`
ii) `i -= 5, j *= 2, k++`
iii) `++k, i -= 5, j *= 2`
iv) `++k, i -= 5, j += 2`
v) `j *= 2, k++, i -= 5`
vi) `j += 2, k++, i -= 5`

a) i only
b) ii only
c) i, iv and vi are correct
d) ii, iii and v are correct
e) None of the above

SECTION B:

1. What is the output for the following program segment? [AY22/23 Sem 1]

```
var sum = 35;
if (sum % 10 == 0){
    console.log("I am Groot");
} else if (sum % 2 == 1){
    if (sum % 5 == 0 && sum % 2 == 0){
        console.log("I am Not Groot");
    } else if (sum % 5 == 0){
        console.log("I should be Groot")
    } else {
       console.log("I may not be Groot")
    }
} else {
    console.log("I am definitely not Groot")
}
```

2.

a) Determine the value of the variable ***a1*** in each of the following <u>independent</u> statements ie use the initial values above for each part (i), (ii)….etc

Assumes that a program contains the following declarations and initializations of variables. You may round up to 2 decimal places where necessary.

```
var a1 = 1, a2 = 3, a3 = 5, a4 = "7";
var b1 = 7.7;
```

```
i)   a4 = a3 ** a2 ;
     a1 -= a4--;

ii)  a1 = ++b1 + a2++ * 4;
     a1 *= a1;

iii) a1 = b1-- + a2++ * 4;
     a1 += a4;
```

b) What is the output of the following

```
var z = 3;

switch (z) {
    case 1: z += 2;

    case 2: z = 5;

    case 3: z -= 2;

    case 4: z *= 2;

    default: z += 3;
}
console.log ('Value of z is ' + z);
```

3. (Reference Practical 3)

a) Complete the missing codes indicated below to display message according to user's input.

User's input	Message to display
Less than 25	`Sorry wrong entry...program stops.`
More than 60	`Sorry wrong entry...program stops.`
Between range 25 to 60 (inclusive)	`Thank you...program stops.`

Sample outputs :

```
Please enter the amount: 0
Sorry wrong entry...program stops.
```

```
Please enter the amount: 90
Sorry wrong entry...program stops.
```

```
Please enter the amount: 45
Thank you...program stops.
```

```
var input = require('readline-sync');
var amt;
amt = parseInt(input.question("Please enter the amount: "));

/*
   Missing Code(s)

*/
```

b) What is the output for the following program segment?

```
var d = 9, e = 1, f = 2;
if (d < 9) {
    if (f > e) {
        console.log("Zebra");
    } else {
        console.log("Kangaroo");
    }
} else {
    if (++e <= f) {
        console.log("Tiger");
        if (d%4 == 0)
          console.log("Puma");
        else
          console.log("Lion");
    } else {
        console.log("Giraffe");
    }
    console.log("King Kong");
}
```

4. a) Given the incomplete program segment below, complete Part (a) to output **0 1 2 3 4 0 1 2 3 4**

```
var x = 1;
var y = 0;
var str = "";

while (____Part (a)_______) {
    str += y + "  ";
    y = ++y % 5;
    x++;
}
console.log(str);
```

b) What is the output for the following program segment?

```
var s = "";
var i = 1, j = 0;

while (i <= 3) {
    s += (i * 6) + " ";
    i++
    j = 0;
    while (j <= 2) {
        s += (j) + " ";
        j++
    }
}
console.log(s);
```

5. a) What is the output for the following program segment?

```
var order = [8, 'E', 4, 'D', 2, 'C', 4, 'B', 11, 'A']

order.pop();
order[2] = order[2] + order[3];
order[4] += 4;
order[5] = order[3] + order[6];
order.push("Hello");



console.log(order[2]);
console.log(order[4]);
console.log(order[5]);
console.log(order[order[4]]);
console.log(order.length);
```

b) An array called priceList is used to store the prices of a company's products.

i) Create the array priceList and store the following elements **10, 40, 5, 60, 55, 80, 50.**

ii) Use a for loop to check the price of every element. If the price is below 50, double the price. The final priceList will be **20, 80, 10, 60, 55, 80, 100.**

6. a) What is the output for the following program segment? [AY22/23 Semester 1]

```
var arr = new Array(1, "1", 2, "2", 3, "3", 4, "4");
var display;

display = 0;
for (var x = 0; x < arr.length; x += 2) {
    display += arr[x];
}

console.log("Display of the value of the variable display.");
console.log(display);

display = "";
for (var x = 1; x < arr.length; x += 2) {
    display += arr[x];
}

console.log("Display of the value of the variable display.");
console.log(display);
```

(5 marks)

b) Complete the missing codes indicated below. For each corresponding **even index (including 0)** in arrays numArr1 and numArr2, sum its elements and store it in **sumArr.** Use the ***for*** statement. Use of *while* and *do.. while* statements will not be acceptable.

```
var numArr1 = [];
var numArr2 = [];
var sumArr  = [];

for (var i = 0; i < 10; i++) {
    numArr1.push(Math.floor(Math.random() * 100) + 1);
    numArr2.push(Math.floor(Math.random() * 100) + 1);
}
console.log("Display array numArr1");
console.log("numArr1 : " + numArr1);
console.log()
console.log("Display array numArr2");
console.log("numArr2 : " + numArr2);

// Sum of all even index of numArr1 and numArr2
/*
   Missing Code(s)
*/
console.log()
console.log("Display array sumArr");
console.log("sumArr : " + sumArr);
```

Sample output :

```
Display array numArr1
numArr1 : 59,7,53,19,34,57,89,41,51,92

Display array numArr2
numArr2 : 5,75,57,93,19,39,12,40,93,53

Display array sumArr
sumArr : 64,110,53,101,144
```

(5 marks)

7. [AY22/23 Semester 1]

Jenny is a first year student in School of Computing and would like to put her coding skills to good use by creating a timetable for her revision. She has 6 modules to revise for the next 4 weeks. **Listing 2.1** below shows the program outline. Help Jenny complete the code snippet below to achieve the output shown in **Output 2.1** below.

The program should fulfill the following requirements:

a) Code a ***for*** loop to prompt Jenny to input 6 modules and store them into modules.
(2 marks)

b) Code a nested ***for*** loop to print the schedule.

(i) The schedule should be randomly allocated using Math.random().
(ii) The schedule should **not** have the same module for revision in the same week. Eg Week 1 cannot have 2 same modules for different days.
(18 marks)

```
var input = require('readline-sync') ;
var modules = new Array() ;

/*

     (a) Missing codes

*/

console.log('Study schedule for')

/*

     (b) Missing codes

*/
```

Listing 2.1

```
Enter module 1: FOP
Enter module 2: FED
Enter module 3: FOC
Enter module 4: CPE
Enter module 5: CAT
Enter module 6: MATH
Study schedule for
Week 1
        Day 1: FED
        Day 2: CPE
        Day 3: MATH
        Day 4: FOC
        Day 5: FOP
        Day 6: CAT
Week 2
        Day 1: CPE
        Day 2: FED
        Day 3: FOP
        Day 4: MATH
        Day 5: FOC
        Day 6: CAT
Week 3
        Day 1: FOP
        Day 2: MATH
        Day 3: CAT
        Day 4: FED
        Day 5: CPE
        Day 6: FOC
Week 4
        Day 1: FOC
        Day 2: FOP
        Day 3: MATH
        Day 4: CAT
        Day 5: CPE
        Day 6: FED
```

Output 2.1

~The End~