Indian Institute of Science Education and Research Pune
Mid-semester Exam, Aug-Dec 2018.

Course name: Introduction to computation **Course code:** IDC101
Date: 28.9.2018 *Duration:* 2 hours (10 am to 12 noon)
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Total marks: 85

- All the questions are compulsory. Answers for each question should be written only in the box provided below. Answers written outside the given space will not be considered. This exam carries 30% weightage in final grading.
- If you need, you can ask for additional page for rough work.

1. Write the output of this piece of python code. (2)

```
x=2.456
print(format(x,'.2e'))
```

2.46e+00

2. Write only two lines of python code that will check if u is divisible by 6 and by 7. If exactly divisible by both 6 and 7, then your code should print the output 'The given number is divisible'. (4)

```
if u%6 ==0 and u%7 ==0:
    print('The given number is divisible')
```

3. A user has written the following to evaluate the value of y using python. The user relies on operator precedence defined in python.

```
y = x**2/3*1-3*x/5
```

Write y in standard mathematical equation form. (3)

$$y = \frac{x^2}{(3\times 1)} - \frac{3x}{5} = \frac{x^2}{3} - \frac{3x}{5}$$

4. Let x be in the range [-10,10), If x is positive then $y = \sqrt{x}$ and if x is negative then the `sqrt` operation is not valid. Write an `if` statement to represent this. (3)

```
if x>0:
    y=sqrt(x)
```

5. If $f(x) = x^2$ and

$$y = f(f(f \ldots\ldots f(x)) \qquad \text{(function applied 10 times.)}$$

An incorrect code to compute y is the following;

```
x=0.972
N=1
while N < 10
  y = x**(2)
  x = y**(2)
  N = N + 2
```

Correct all the errors in this python code and rewrite it in the space given below so that it will correctly compute the value of y when f is applied 10 times. You have to correct the given code and NOT write a new piece of code. (6)

```
x = 0.972
N = 1
while N <= 10:
    y = x**2
    x = y
    N = N+1
```

6. What is printed by the following python code ? (3)

```
n=3
for x in [2, 5, 8]:
   n=n+x
   print(n)
```

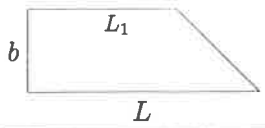
```
5
10
18
```

7. What is printed by the python code? (3)

```
print(2*('No'+'!'))
print(1,2,list(range(2)))
```

```
No!No!
1 2 [0, 1]
```

8. Write a one-line python code to calculate the area A of the figure given below. (2)




```
A = L1 * b + (L-L1) * b/2
```

9. What is the output of the print statement. (3)

```
a=[1,2,list(range(2))]
b=a
b[2][1]=3
print(a)
```

[1, 2, [0,3]]

10. Given an infinite series of the form,

$$F(x) = \sum_{n=0}^{\infty} \frac{x^n}{n^2} + \frac{x^{n+1}}{n},$$

this needs to be summed such that the result is correct to 5 decimal places. If you are using python program to compute the sum, what is the mathematical criteria you will apply to obtain F correct to 5 decimal places. You NEED NOT write python code. Just give a suitable mathematical criteria to terminate the infinite sum. (5)

Let $F_N(x) = \sum_{n=1}^{N} \frac{x^n}{n^2} + \frac{x^{n+1}}{n}$

$$|F_{N+1} - F_N| < 10^{-5}$$

11. What is the output of the following code ? (4)

```
def f(x):
   return x**2
sum=0
for n in range(5):
    sum=sum+f(n)
    print (sum)
```

0, 1, 5, 14, 30.

12. What are the outputs for the following commands ? (4)

```
2/2*4,
2*4/2,
2**2**3, and
3%2
```

4.0, 4.0, 256, 1

13. Write the output of the following program? (4)

```
adj = ["red", "big", "tasty"]
fruits = ["apple", "banana", "cherry"]
for x in adj:
  for y in fruits:
     if y == 'banana':
        break
     print(x, y)
```

red apple

big apple

tasty apple

14. For the following piece of code, what is the output and how many lines of output will be there ? (3)

```
i=1;
while i<10:
   i=i+1
   print(i)
   i=i-1
   print(i)
```

Output: 2 and 1.
This leads to infinite loop.
There will be infinite lines of output.

15. Write python code to print a sequence of numbers ranging from -30 to 20 in steps of 3. Output should be -30, -27, ... (4)

```
n = -30
while n < 20:
    print(n)
    n = n+3
```

16. What is the output of the following piece of code ? (3)

```
myvar=['godavari','krishna','narmada','cauvery','jhelum']
if myvar[1] > myvar[3]:
   print(myvar[1]+myvar[3])
else:
   print(myvar[3]+myvar[1])
```

krishnacauvery

17. Following commands are given. What is the final output. (3)

```
var1 = 'cricket'
var2 = var1*2
type(var2)
```

String or <class 'str'>

18. Consider the following input statement:

```
hrs = float( input('Input the number of hours : ') )
```

If the input given is 45.23, what is the output of `print(int(hrs)+hrs)`. Briefly explain what would be the output if `float` is removed in the `input` statement. (3)

90.23
If float is removed, 45.23 will be treated as string. So, print statement will generate error.

19. Here is the first line of a program that generates numbers from 10 to 39.

```
for i in range(10,40):
```

This program should print only multiples of three as output. You are allowed to write two more lines of python code. In the space given below, write the next two lines of code. (4)

```
if i%3 ==0:
   print(i)
```

20. Briefly explain what is wrong with the following function definition: (3)

```
def multiply(x, y, z)
    return x*y*z
    print('the answer is', x * y * z)
```

There is syntax error in first statement.
":" is missing.
Print statement will never be executed
because it comes after 'return' statement.

21. Three lines of code are given in interactive mode:

```
>> a='hello'
>> b=8
>> a==b
```

What is the output ? (3)

False

22. If the variable `x` contains an initial value of 1, what is the largest value that will be assigned to `x` after the assignment statement `x = (x+1)%20` is executed an arbitrary large number of times. (4)

19

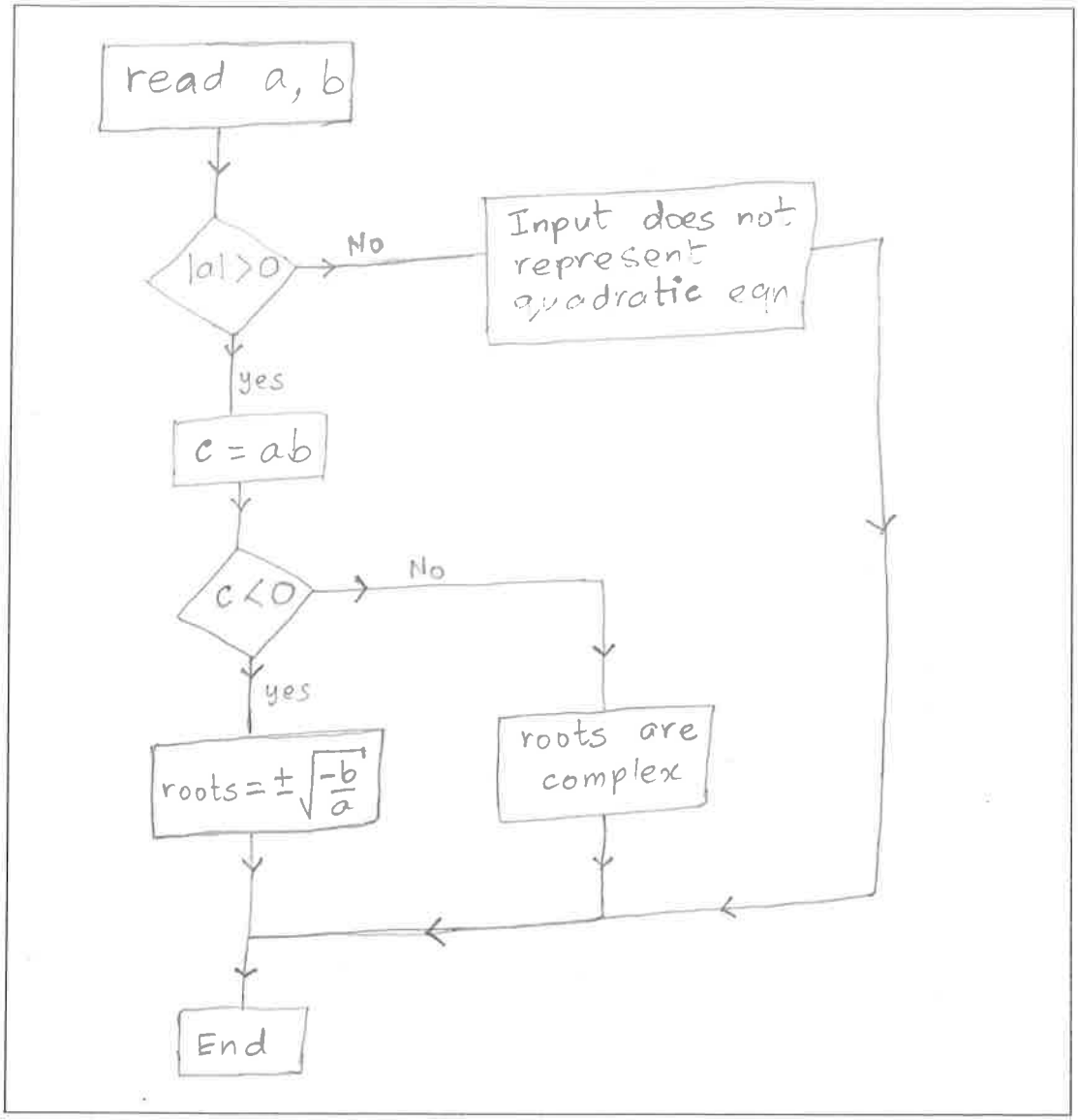
23. In python interactive mode, following statements are given one after the other.

```
u=10
u=u+5
u==20
```

What is the output if the next statement is `print(u)` (3)

15

24. Draw a flowchart (NOT a program) to find the roots of the quadratic equation $ax^2 + b = 0$. Take care of all possible real values of a and b. (6)


read a, b
|a| > 0
No
Input does not represent quadratic eqn
yes
c = ab
c < 0
No
yes
roots = ± √(-b/a)
roots are complex
End