

- (x) What will be the output when the following code snippet is executed in R?
`df<- data.frame(c('HITK', 'JU'), c(5691, 4932))`
`df[-1,1]`
 (a) "HITK" (b) "JU" (c) 5691 (d) 4932

Fill in the blanks with the correct word

- (xi) Deriving a child class from more than one parent classes is called _____.
 (xii) R is a dynamic programming language, which means R automatically _____ the code as it is run.
 (xiii) The function `pow(x,y,z)` represents the expression _____.
 (xiv) The expression `2**2**3` is evaluated as: `(2**2)**3`. (True / False) _____.
 (xv) What will be displayed, when the statement `round(3.4999,1)/ceiling(3.4999)` is executed in R? _____.

Group - B

2. (a) What will be the output when the following code is run, and why?

```
def my_function(n):
    return_value = None
    if n == 0 or n == 1:
        return_value = False
    i=2
    while i < n**0.5:
        if n%i==0:
            return_value = False
            break
        i+=1
    return_value = True
    return return_value
print(my_function(37))
```

- (b) In Python, what are anonymous functions and how are they defined?
 (c) How does the special function `__str__` operate? Explain with examples.
 (d) How is the special function `__add__` invoked? Explain with examples.

[[CO1](Evaluate/HOCQ)]
 [[CO1](Remember/LOCQ)]
 [[CO1](Understand/LOCQ)]
 [[CO1](Understand/LOCQ)]
3 + 3 + 3 + 3 = 12

3. (a) Say you have created three modules as follows:

```
Mod1.py
ins = 'Heritage' ; print(ins)
```

```
Mod2.py
import Mod1
des='India' ; print(des)
```

```
Main.py
import Mod2
import Mod1
print('main')
```

If you run Main.py what will be the output. Justify your answer.

- (b) Say you have written following Python script greet.py :

```
def hello(name):
    print("Hello ", name)
if __name__ == "__main__":
    name = input("Your Name please: ")
    print("Noted!")
    hello(name)
```

What output will you expect when you:

- i) When you run greet.py from command line
 ii) When you import greet.py as module and issue `greet.hello("Kunal")`.
 (c) What is a "namespace" in Python? How can you create "namespaces"? What are the different types of namespace created in Python? What are the differences between namespaces and scope in Python with respect to definition, purpose, levels, relationship and access?

[[CO1](Understand/IOCQ)]
 [[CO1](Remember/LOCQ)]
 [[CO2](Apply/IOCQ)]
3 + 2 + (4 + 3) = 12

Group - C

4. (a) Mention the advantages and disadvantages of using files versus standard input/output.
 (b) What will be the output of the following code, and why?

```
def my_func(x):
    ab={}
    keys = x.keys()
    for j in keys:
        if j!=0:
            ab[j-1]=(j)*x[j]
    return ab
print(my_func({1:-3, 3:2, 5:-1, 6:2}))
```

[[CO2](Understand/LOCQ)]

- print(my_func({0:-4, 2:12, 3:-2, 4:3, 8:2})) [[CO1](Analyse/IOCQ)]
- (c) With reference to the following code, what are the values of z for n = 3, 5, 9? In no more than three sentence, write a specification for what you think the following code is computing. [[CO2](Understand/LOCQ)]
- ```
z = sum(map (int , [c for c in str(functools.reduce(lambda x, y: x * y, range(1, n))])))
```
- 4 + 4 + 4 = 12**
5. (a) Specify main characteristics of four collection data types in the Python. What is the content and type of Tuple1 and Tuple2 in the following statements?  
 Tuple1 = ('mongodb',)\*3  
 Tuple2 = ('mongodb',)\*3  
 Say profile = ("Kumar Gaurav", 35) is a profile of a student, modify it by adding his skills ("Python", "Django", "Flask") in the same tuple and show the content after adding skills. Briefly discuss the object creation steps in this process [[CO2](Understand/LOCQ)]
- (b) What is packing and unpacking of tuple? Give an example. What will happen if the number of variables does not match the number of values in the tuple? [[CO2](Understand/LOCQ)]
- (c) Examine following code snippet (line no at left) and answer the questions given below:  
 1 from copy import copy, deepcopy  
 2 stdinfo = ("Linda", 18, ["Math", "Physics", "History"])  
 3 stdprofile = copy(stdinfo)  
 4 stdprofile[2][1] = "Chemistry"  
 5 stdprofile = deepcopy(stdinfo)  
 6 stdprofile[2][2] = "Computer Science"  
 What is the content of stdinfo and stdprofile after line 3? Why are you able to change the tuple at line 4 when tuple is immutable? After this change what will be the content of stdinfo? After change at line 6 what are the content of stdinfo and stdprofile. Why the change in stdprofile is not affecting stdinfo ? [[CO2](Understand/LOCQ)]
- (2 + 1 + 2) + 3 + 4 = 12**

### Group - D

6. (a) Using Pandas data structure, write the code to create a data frame as given below:
- | Name     | Physics | Chemistry | Mathematics |
|----------|---------|-----------|-------------|
| Abhishek | 88      | 82        | 95          |
| Usha     | 81      | 91        | 97          |
| Shreya   | 90      | 85        | 89          |
| Vijay    | 87      | 89        | 91          |
- Add another column showing the marks in Biology as 82, 79, 90, 80 respectively. Find the aggregate marks of each student and show it in a new column 'Aggregate'. Display in tabular form, the descriptive statistics of all the four subjects and the aggregate. [[CO4](Understand/LOCQ)]
- (b) Mention two important data structures of Pandas and compare and contrast them. [[CO4](Understand/LOCQ)]
- (c) What will be the output of the following code, and why?  
 import pandas as pd  
 frame1 = pd.DataFrame(marks)  
 print(frame1)  
 print("Maths." in frame1.columns)  
 print("XI" in frame1.index) [[CO4](Analyse/IOCQ)]
- 6 + 3 + 3 = 12**
7. (a) Using NumPy, write a program to do the following:  
 (i) Create a 4 X 3 array (name: arr1) containing integer numbers of your choice.  
 (ii) Create another array (name: arr2) from a list of 4 integer numbers of your choice [[CO4](Apply/IOCQ)]  
 Now answer the following questions:  
 (i) What is the shape of arr1?  
 (ii) What is the shape of arr2?  
 (iii) Apply Broadcasting Rules step-by-step to find out whether arr3 = arr1 – arr2 can be found out [[CO4](Understand/LOCQ)]
- (b) What is the function of np.where in the following program? What will be displayed when the following code is executed?  
 import numpy as np  
 xarr = np.array([-1.0, 1.5, -2.0, 2.5, -3.0])  
 yarr = np.array([1.0, -1.5, 2.0, -2.5, 3.0])  
 cond = np.array([True, False, True, False, False])  
 outarr = np.where(cond, xarr, yarr)  
 print(outarr) [[CO4](Apply/IOCQ)]
- (c) What will be displayed when the following code is executed? Explain.  
 import numpy as np  
 names = np.array(['HITK', 'JU', 'IEST', 'HITK'])  
 arr = np.matrix([[ 0, -1, 2], [-3, -4, -6], [8, -9, -1], [7, 5, 0]])  
 print(arr[names == 'HITK']) [[CO4](Analyse/IOCQ)]
- (1 + 1 + 1 + 1 + 3) + 3 + 2 = 12**

## Group - E

8. (a) What is a data frame in R? How is it used? [[C05](Understand/LOCQ)]  
 (b) What will the following piece of code display?  
`vec<- c(6, -1, 3, 8, 2, -7)`  
`vec[2:4]` [[C05](Analyse/IOCQ)]  
 (c) How does R use the environment system? [[C05](Understand/LOCQ)]  
 (d) How does a repeat loop work in R? [[C05](Understand/IOCQ)]  
**3 + 1 + 4 + 4 = 12**
9. (a) What is a factor in R? Explain with examples. What are the steps in creating a factor? [[C05](Remember/LOCQ)]  
 (b) What is a data frame in R? What are a data frame's components? What kind of information about the data frame can be obtained by applying the summary() function? [[C05](Analyse/IOCQ)]  
 (c) What will be printed when the following code is executed?  
`for (i in c(3, 6, 23, 19, 0, 21))`  
`{`  
`if (i == 0)`  
`{`  
`next`  
`}`  
`print(i)`  
`}` [[C05](Analyse/IOCQ)]  
 (d) In R, how can you have a function return multiple objects as output? Explain with an example. [[C05](Understand/LOCQ)]  
**(2 + 1 + 1) + (2 + 1 + 1) + 2 + 2 = 12**

| Cognition Level         | LOCQ  | IOCQ  | HOCQ |
|-------------------------|-------|-------|------|
| Percentage distribution | 58.33 | 38.54 | 3.13 |