*All questions are compulsory. Question paper is divided into 4 sections, A, B, C and D.*
*Section A : Unit 1, Section B : Unit 2, Section C : Unit 3, Section D : Unit 4*

## SECTION A

1. (a) What is the value of the following expression ?  1

    ```
    3 + 3.00, 3**3.0
    ```

    (a) (6.0, 27.0)    (b) (6.0, 9.00)    (c) (6, 27)    (d) [6.0, 27.0]    (e) [6, 27]

    (b) Which code segment will output the number 20 to the console window ?  1

    (a)
    ```
    myValue01 = "10"
    myValue02 = "10"
    myValue01 = myValue01 + myValue02
    print(myValue02)
    ```

    (b)
    ```
    myValue01 = 10
    myValue02 = 10
    myValue01 = myValue01 + myValue02
    print(myValue01)
    ```

    (c)
    ```
    MyValue01 = 10
    myValue02 = 10
    print(myValue01 + myValue02)
    ```

    (d)
    ```
    MyValue01 = "10"
    myValue02 = "10"
    print(myValue01 + myValue02)
    ```

    (c) Which Python libraries/modules need to be imported to use following functions ?  1

    (i) str( )        (ii) linspace( )

    (d) Find the errors in following code and write the correct code.  2

    (i) Underline the corrections

    (ii) Write the reason/error next to it in comment form.

    ```
    s = [11, 13, 15]
    for n in len(s) :
        tot = tot + s[n]
    print(tot)
    ```

    (e) How many times will the following for loop execute and what's the output ?  2

    (i)
    ```
    for i in range(-1,7, -2):
        for j in range (3):
            print(1, j)
    ```

    (ii)
    ```
    for i in range(1,3,1):
        for j in range(i + 1):
            print('*')
    ```

    (f) Determine the output of the following :  3

    ```
    def compute(s):
        x = []
        for i in range( len(s)):
            a = s[i]
            b = a.upper()
            if a not in x and b not in x :
                if a > 'p' :
                    x.append(a.upper())
    ```

    (P.48)

```
            else:
                x.append(a)
        return x
    print(compute('abracadabra'))
```

(g) What are the possible outcome(s) executed from the following code ? Also specify the maximum and minimum values that can be assigned to variable PICKER. 2

```
import random
PICK = random.randint(0, 3)
CITY = ["DELHI", "MUMBAI", "CHENNAI", "KOLKATA"] ;
for I in CITY :
    for J in range(1, PICK) :
        print(I, end = " ")
    print( )
```

  (i) DELHIDELHI                   (ii) DELHI
      MUMBAIMUMBAI                 DELHIMUMBAI
      CHENNAICHENNAI             DELHIMUMBAICHENNAI
      KOLKATAKOLKATA

  (iii) DELHI                     (iv) DELHI
      MUMBAI                   MUMBAIMUMBAI
      CHENNAI                 KOLKATAKOLKATAKOLKATA
      KOLKATA

2. (a) What are enqueue and dequeue operations ? 1

(b) Why are recursive functions considered slower than their iterative counterparts ? 1

*Or*

Out of **Best -** , **Average-**, **Worst-case complexities**, which one gives expected running time of an algorithm?

(c) If a user tries to remove an element from empty queue it is called _____ . 1

  (a) Underflow                   (b) Empty collection
  (c) Overflow                    (d) Garbage Collection

(d) Reorder the following efficiencies from the smallest to the largest : 1

  (a) $n \log_2 (n)$     (b) $n + n^2 + n^3$     (c) $2^4$         (d) $n^{0.5}$

(e) *Write the equivalent infix expression for given postfix expression : a, b, AND, a, c, AND, OR.*
1

(f) Compare iteration and recursion. 2

(g) Your school sports teams have played number of matches in past year as given : 2

```
'Footbal' = 10 matches, 'Foosball' = 8 matches, 'Cricket' = 13 matches,
'Badminton' = 7 matches, 'T.T.' = 9 matches, 'Squash' = 3 matches
```

  ➤ Write code to plot a horizontal bar chart using the above information.
  ➤ You can use Numpy arrays to create other series if required.

*Or*

Figure out the error in the following recursive code of factorial :

```
def factorial(n) :
    if n == 0:
        return 1
    else:
        n * factorial(n-1)
#__main__
print(factorial(4) )
```

(h) Write a program to display all the records in a file along with line/record number.   2

*Or*

Write a function that receives a file name and then displays number of characters and number of lines in the file.

(i) Write a recursive program to compute sum of the series

$$1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \ldots\ldots + \frac{1}{n}$$

Input value of n from user.   3

*Or*

Write a recursive Python program to calculate amount after compound interest compounded yearly.

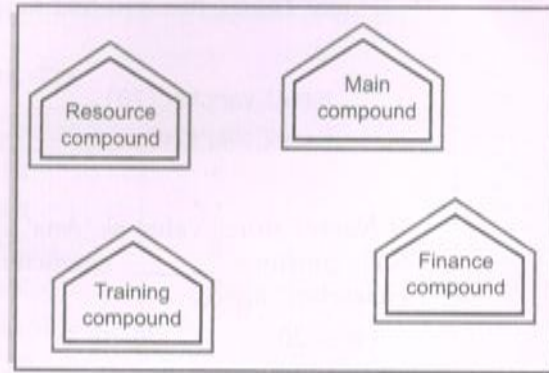(j) Write a program to insert or delete an element from a queue depending upon user's choice.   4

*Or*

Write a program that depending upon user's choice, either pushes or pops an element in a stack.

## SECTION B

3. (a) The device that can operate in place of a hub is a :   1

   (a) Switch      (b) Bridge      (c) Router      (d) Gateway

   (b) The physical address assigned by NIC manufacturer is called _____ address.   1

   (c) The cloud is a generic term used for Internet. (True/False)   1

   (d) In computer, process of superimposing a low frequency signal over a high frequency signal is called   1

   (a) modulation                    (b) demodulation

   (c) frequency modulation          (d) amplitude modulation

   (e) Give the full form for the following :   2

   (a) FM      (b) AM      (c) NFS      (d) FTP.

   (f) When would you opt for a router in a network ?   2

   (g) Identify the term/protocol/device from the given description.   3

   (i) 128 bit IP address      (ii) 48 bit unique physical address of a device.

   (iii) A network device that regenerates a signal than amplifying it.

(h) "Learn Together" is an educational NGO. It is setting up its new campus at Jabalpur for its web based activities. The campus has 4 compounds as shown in the adjacent diagram.    4

Center to center distances between various Compounds as per architectural drawings (in Metre) is as follows :

| Main Compound to Resource Compound | 110 m |
| Main Compound to Training Compound | 115 m |
| Main Compound to Finance Compound | 35 m |
| Resource Compound to Training Compound | 25 m |
| Resource Compound to Finance Compound | 135 m |
| Training Compound to Finance Compound | 100 m |

Expected Number of Computers in each Compound is as follows :

| Main Compound | 5 |
| Resource Compound | 15 |
| Training Compound | 150 |
| Accounts Compound | 20 |

(i) Suggest the most suitable place (i.e., compound) to house the server for this NGO. Also provide a suitable reason for your suggestion.

(ii) Suggest the placement of the following devices with justification :
   (a) Repeater      (b) Hub/Switch

(iii) The NGO is planning to connect its International office situated in Mumbai, which out of the following wired communication link, you will suggest for a very high speed connectivity ?
   (a) Telephone Analog Line     (b) Optical Fiber     (c) Ethernet Cable

## SECTION C

4. (a) What is the full form of DDL ?    1
   (a) Dynamic Data Language          (b) Detailed Data Language
   (c) Data Definition Language       (d) Data Derivation Language

(b) The term _____ is used to refer to a field in a table.    1
   (a) Attribute    (b) Tuple          (c) Row          (d) Instance

(c) A table *Table1* has two text fields defined as below :                                1

    ⋮

    Name1 varchar(20),
    Name2 char(20),

    ⋮

If *Name1* stores value as 'Ana' and *Name2* stores value as 'Anuj', then *Name1* will consume _____ characters' space and *Name2* will consume _____ characters' space.

    (a) 3, 20        (b) 20, 4        (c) 20, 20        (d) 3, 4

(d) Consider the following query

    SELECT * FROM employee ORDER BY salary _____ , name _____ ;

To display the *salary* from greater to smaller and *name* in alphabetical order which of the following options should be used ?                                1

    (a) Ascending, Descending        (b) Asc, Desc

    (c) Desc, Asc        (d) Descending, Ascending

(e) What is an Alternate Key ?                                2

<center>Or</center>

What do you understand by the terms Primary Key and Degree of a relation in relational database ?

(f) (i) What are Django Templates ?    (ii) What are Django views ?                                2

(g) Consider the following tables WORKER and PAYLEVEL and answer the following parts of this question :                                3

<center>Table : WORKER</center>

| ECODE | NAME | DESIG | PLEVEL | DOJ | DOB |
|-------|------|-------|--------|-----|-----|
| 11 | Radhe Shyam | Supervisor | P001 | 13-Sep-2004 | 23-Aug-1981 |
| 12 | Chander Nath | Operator | P003 | 22-Feb-2010 | 12-Jul-1987 |
| 13 | Fizza | Operator | P003 | 14-Jun-2009 | 14-Oct-1983 |
| 15 | Ameen Ahmed | Mechanic | P002 | 21-Aug-2006 | 13-Mar-1984 |
| 18 | Sanya | Clerk | P002 | 19-Dec-2005 | 09-Jun-1983 |

<center>Table : PAYLEVEL</center>

| PLEVEL | PAY | ALLOWANCE |
|--------|-----|-----------|
| P001 | 26000 | 12000 |
| P002 | 22000 | 10000 |
| P003 | 12000 | 6000 |

Give the output of the following SQL queries :

    (i) SELECT COUNT (PLEVEL), PLEVEL FROM WORKER GROUP BY PLEVEL ;

    (ii) SELECT MAX(DOB), MIN(DOJ) FROM WORKER ;

    (iii) SELECT Name, Pay FROM WORKER W, PAYLEVEL P
         WHERE W.PLEVEL = P.PLEVEL AND W.ECODE < 13 ;

(h) Consider the following tables FLIGHTS and FARES. Write SQL commands for the following statements.  **4**

Table : **FLIGHTS**

| FL_NO | STARTING | ENDING | NO_FLIGHTS | NO_STOPS |
|---|---|---|---|---|
| IC301 | MUMBAI | DELHI | 8 | 0 |
| IC799 | BANGALORE | DELHI | 2 | 1 |
| MC101 | INDORE | MUMBAI | 3 | 0 |
| IC302 | DELHI | MUMBAI | 8 | 0 |
| AM812 | KANPUR | BANGALORE | 3 | 1 |
| IC899 | MUMBAI | KOCHI | 1 | 4 |
| AM501 | DELHI | TRIVANDRUM | 1 | 5 |
| MU499 | MUMBAI | MADRAS | 3 | 3 |
| IC701 | DELHI | AHMEDABAD | 4 | 0 |

Table : **FARES**

| FL_NO | AIRLINES | FARE | TAX% |
|---|---|---|---|
| IC701 | Indian Airlines | 6500 | 10 |
| MU499 | Sahara | 9400 | 5 |
| AM501 | Jet Airways | 13450 | 8 |
| IC899 | Indian Airlines | 8300 | 4 |
| IC302 | Indian Airlines | 4300 | 10 |
| IC799 | Indian Airlines | 10500 | 10 |
| MC101 | Deccan Airlines | 3500 | 4 |

(i) Display FL_NO and NO_FLIGHTS from "KANPUR" to "BANGALORE" from the table FLIGHTS.

(ii) Arrange the contents of the table FLIGHTS in the ascending order of FL_NO.

(iii) Display the FL_NO and fare to be paid for the flights from DELHI to MUMBAI using the tables FLIGHTS and FARES, where the fare to be paid = FARE + FARE*TAX%/100.

(iv) Display the minimum fare "Indian Airlines" is offering from the table FARES.

## SECTION D

5. (a) The information/art/work that exists in digital form is called _____ .  1
   (a) e-work
   (b) e-asset
   (c) digital property
   (d) e-property

   (b) Which of the following is/are examples of online fraud ?  1
   (a) Sita placed an order online and made full payment but no goods were delivered to her.
   (b) Tim ordered a phone online with full advance payment but he received same brand phone of old model.
   (c) Your peer picked your credit card and made payment with it.
   (d) All of the above.

(c) What do you understand by plagiarism ? Why is it a punishable offence ?  2

(d) List a table of differences between Free software and Open source software.  2

(e) Carefully read the following and determine what kind of cybercrime has caused them ? Changes in an account's beneficiaries  2

   (a) Credit reports that contain inquiries or information about accounts that the client did not open

   (b) Bills arrive from unknown or unfamiliar sources

   (c) Inappropriate or unusual charges to a debit or credit card

   (d) Calls from creditors or collection agencies about services or purchases that your client did not initiate.

(f) Why should intellectual property rights be protected ?  2