

SY-IT

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Sem - III

09/11/22

Max Marks: 75

# Python Prog.

Reg.

Max Time: 2½ hrs

## Instructions:

- 1) All questions are **compulsory**.
- 2) Mixing of sub questions are not allowed.
- 3) Write in clear, legible, writings.

## Q I Attempt any **three**

(15)

- A) Explain the different brackets and their usages in Python.
- B) Explain the various operators in Python with the help of examples.
- C) Explain the ways of terminating the loops and skipping specific sections in Python.
- D) Write a program that reads a number and displays the square, cube, and fourth power. Use the \*\* operator only for the fourth power.
- E) Write a program that asks the user for the lengths of the sides of a rectangle. Then print (i) The area and perimeter of the rectangle (ii) The length of the diagonal.
- F) Write a program that reads a five-digit positive integer and breaks it into a sequence of individual digits. For example, the input 16384 is displayed as 1 6 3 8 4.

## Q II Attempt any **three**

(15)

- A) Explain what are boolean functions, void functions, fruitful functions.
- B) Explain recursive functions with help of an example.
- C) Explain what are parameters and arguments in functions.
- D) Write a recursive function which returns the factorial of a number.
- E) Write a function repeat(st, n, delim) that returns the string st repeated n times, separated by the string delim. For example, repeat("ab", 3, ", ") returns "ab, ab, ab".
- F) Write a function middle(string) that returns a string containing the middle character in string if the length of string is odd, or the two middle characters if the length is even. For example, middle("middle") returns "dd".

# Python Prog.

## Q III Attempt any **three**

(15)

- A) Explain what is exception. Explain at least 7 built in exceptions.
- B) Explain various file modes in Python.
- C) Explain list in Python and the various functions and operations associated with it with examples for each.
- D) Write a function `sumWithoutSmallest` that computes the sum of a list of values, except for the smallest one, in a single loop.
- E) Define a dictionary that maps month name abbreviations to month names. Then it asks the user to enter the abbreviation and the program displays the month name.
- F) Given a dictionary `gradeCounts = {"A": 8, "D": 3, "B": 15, "F": 2, "C": 6}`, write the Python statement(s) to print: (i) all the keys. (ii) all the values. (iii) all the key and value pairs. (iv) the average value.

## Q IV Attempt any **three**

(15)

- A) Explain the one way to create threads in Python.
- B) Explain at least two functions from each of these modules: `math`, `random`.
- C) Explain how to define a class and create objects.
- D) Explain how to create and use module in python.
- E) Create a 'Point' class that represents a point in the Cartesian coordinate system. Define function to find the distance between the calling point object and another point object passed as an argument to the function.
- F) Create a class to encapsulate a vector (having i, j, k components). Define the appropriate 'constructor'. Define functions to return the sum and dot product of the calling vector object and another vector object passed as an argument.

## Q V Attempt any **three**

(15)

- A) Write a python code to display error, yes-no message box.
- B) Explain the 'Entry' widget.
- C) Explain how to create menu in python.
- D) Write a short note on Place Geometry.
- E) Write a python code to create a GUI application to covert 'meter' to 'kilometer'.
- F) Explain 'Radiobutton' widget.

## Comp. Networks

Max Time: 2 ½ hrs.

Max Marks: 75

Instructions:

- 1) All questions are compulsory.
- 2) Mixing of sub-questions is not allowed.
- 3) Write in clear, legible, writing.

Q I Attempt any three (15)

- A) . List and explain signals & types of signals.
- B) . Explain the types of Computer Networks.
- C) . Compare Connectionless and Connection-Oriented.
- D) . Explain the TCP/IP model
- E) . Explain types of Transmission Impairment.
- F) . Compare amplitude modulation, frequency modulation, and phase modulation.

Q II Attempt any three (15)

- A) . What is a switching technique? What are types?
- B) . Write a short note on Framing and explain any framing methods with examples.
- C) . Difference Between circuit switching and packet switching
- D) . Explain the transmission media and the difference between the guided media.
- E) . What is HDLC? What are the different types of frames in HDLC? Explain the different fields in HDLC frames.
- F) . Compare the amplitude shift key and frequency shift key.

Q III Attempt any three (15)

- A) . What is Virtual LAN? How are stations grouped into different VLANs? Explain.
- B) . Explain services provided by Network Layer.
- C) . Explain different classes of IP addresses.
- D) . What are different connecting devices state them and describe in short.
- E) . Explain the spanning tree algorithm.
- F) . Write notes on the satellite network. Explain the types of satellite

Q IV Attempt any three (15)

- A) . Explain encoding decoding techniques of CRC.
- B) . Explain flow control
- C) . Discuss the addressing mechanisms of the IEEE 802.11 project.
- D) . What are the different transition strategies from IPv4 to IPv6? Explain.
- E) . What is routing information protocol? Explain the RIP algorithm.
- F) . Explain services provided by Physical Layer.

Q V Attempt any three (15)

- A) . FTP
- B) . HTTP
- C) . INTERNET PROTOCOL
- D) . What is a dynamic host configuration protocol? Explain the DHCP message format.
- E) . Explain WWW & chat applications.
- F) . Explain DNS.

SY-BSc. IT  
Sem-III

(2½ hours)

Data Structures

Regular

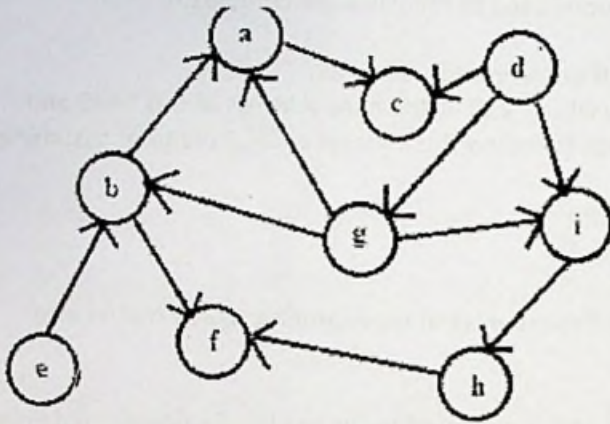
Total Marks: 75

11/11/2022

- N. B.:(1) All questions are compulsory.  
(2) Make suitable assumptions wherever necessary and state the assumptions made.  
(3) Answers to the same question must be written together.  
(4) Numbers to the right indicate marks.  
(5) Draw neat labeled diagrams wherever necessary.  
(6) Use of Non-programmable calculators is allowed.

1. Attempt any three of the following: 15
- What is data structure? Explain different categories in which data structure can be divided. Give example for each one
  - List and explain different operations that can be performed on a data structure.
  - Define different asymptotic notations used to measure the complexity of an algorithm.
  - Discuss memory representation of one dimensional array.
  - Consider a two dimensional array  $D[3:7, -2:6]$ . If the base address of D is 5639 and each element takes 2 memory cells then find the address of  $D[4,0]$  element assuming that
    - Array D is sorted in column major order.
    - Array D is sorted in row major order.
  - What is sparse matrix? Explain different ways of representing sparse matrix into memory.
2. Attempt any three of the following: 15
- Explain how memory is allocated and deallocated for linked list. Explanation of Free Storage List, insertion and removal of node to and from Free Storage List
  - Write and explain an algorithm to insert a new element into sorted linked list.
  - Write and explain an algorithm to split a linked list into two linked lists.
  - Write and explain an algorithm to delete a node containing item from a doubly linked list
  - What is header linked list? Explain different categories of header linked list.
  - Write algorithm to subtract two polynomials.
3. Attempt any three of the following: 15
- Write and explain syntax verification algorithm.
  - Convert following infix expression into prefix and postfix expressions.
    - $a \times b \times (c - d) - (e \wedge 3 \times f) + g / h$
    - $(a \times b \times c \wedge 2) + d - (c / d + e)$
  - What is recursion? What are disadvantages of recursion?
  - Write an algorithm to evaluate an arithmetic postfix expression and calculate the result of the expression. Give suitable example.
  - What is queue? How queue is represented in memory? Write and explain an algorithm to insert element into circular queue.
  - Explain with example priority queue.
4. Attempt any three of the following: 15
- Sort the following elements using merge sort.  
23 56 13 34 78 62 98 53 49 82
  - Explain with example the following terms:
    - Degree of a node
    - Path

- iii. Internal node
  - iv. Similar binary trees
  - v. Complete binary tree
  - c. Draw the binary tree whose inorder and preorder traversals are:  
In-order : g d b h e i a f c  
Pre-order : a b d g e h i c f
  - d. Make a binary search tree by inserting the following numbers in sequence  
52 36 98 29 123 39 15 56 31 365 278 45 72
  - e. Draw max and min heap with the following elements  
80 9 25 30 100 45 62 89 51 23 11 27 323
  - f. What is AVL tree? How balancing is done in AVL tree? Explain with example
5. Attempt any three of the following: 15
- a. Find the adjacency matrix and list representation of the following graph



- b. List graph traversal technique. Write and explain algorithm for any one. Give suitable example.
  - 1. DFS
  - 2. BFS
- c. Explain with example Dijkstra shortest path algorithm.
- d. Explain with example Prim's algorithm to find the MST
- e. List different hashing methods. Explain with example any two of them.
- f. List different techniques of open addressing. Explain any one

12/11/2022

Instructions:

- 1) All questions are **compulsory**.
- 2) Mixing of sub questions are not allowed.
- 3) Write in clear, legible, writings.

Subject :- AM

Q I Attempt any **three**

(15)

- A) . Find inverse of the matrix by adjoint method

$$C = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$$

- B) . Solve the following system of equations using elementary transformations.

$$3x+2y+6z=8$$

$$x+y+2z = 6$$

$$2x+2y+5z=6$$

- C) . Find the inverse of the matrix by using elementary transformation

$$B = \begin{bmatrix} 1 & 3 & 2 \\ 3 & 1 & 2 \\ 1 & 2 & 3 \end{bmatrix}$$

- D) . If
- $x + iy = \frac{1}{a+ib}$
- then prove that
- $(x^2 + y^2)(a^2 + b^2) = 1$
- .

$$E) . \text{ Prove that } \frac{1}{1 - \frac{1}{1 - \frac{1}{1 + \sin^2 hx}}} = -\sin^2 hx$$

- F) . If
- $\tanh x = \frac{2}{3}$
- , find the value of
- $x$
- and then find
- $\cosh x$

Q II Attempt any **three**

(15)

- A) . substitute
- $y = vx$
- and solve the Differential equation
- $(x^2 + y^2)dx - 2xy dy = 0$
- .

- B) . Solve the first order Linear differential equation and find the general solution of

$$\frac{dy}{dx} + x^2y = x^5$$

- C) . Check whether the given Differential equation is exact or not exact if it is not exact then find Integrating factor and write the general solution of the equation.

$$(xy + 1)y dx + (1 + xy + x^2y^2)x dy = 0$$

- D) . solve
- $\frac{d^4y}{dx^4} + 5\frac{d^2y}{dx^2} + 6y = 0$

- E) . By method of separation of variable solve
- $x \cos x \cos y + \sin y \frac{dy}{dx} = 0$
- .

- F) . By method of separation of variable solve
- $\frac{dy}{dx} = e^{x-3y}$

Q III Attempt any **three**

(15)

- A) . Find Laplace transformation
- $L[t^3 + 5t - 2]$

- B) . Show that
- $L[\sin h(3t)] = \frac{3}{s^2-9}$
- for
- $s > |3|$

- C) . Find the inverse of Laplace transformation of
- $F(s) = \frac{2}{s} + \frac{1}{s^2}$
- .

- D) . Find inverse of Laplace transformation by using partial fraction method
- $F(s) = \frac{s+1}{s^2-4}$

- E) . Find the Laplace transform of
- $f(t) = 6t^3 - 3 \cos(2t) + 7e^{-2t}$

AM

F) . If  $f$  is defined as  $f(t) = 7t$ ,  $t \geq 0$  then find its Laplace transformation.

Q IV Attempt any three (15)

A) . Evaluate  $\int_0^1 \int_0^{x^2} (x + 2y^2) dy dx$ .

B) . Evaluate  $\int_0^1 \int_0^2 \int_0^3 dz dy dx$

C) . Find  $\int \int_R 1 dA$  where the region R is bounded by the curves  $y^2 = 2x$  and  $y = x$

D) . Show that  $\int_0^{\frac{\pi}{2}} \int_0^1 y \sin x dy dx = \frac{\pi}{2}$

E) . Find  $\int \int_R (1 + (x-1)^2y + 4y^2) dA$  where R be given as  $R = [0,3] \times [0,2]$

F) . Find  $\int_0^1 \int_0^x \int_0^{x+y} (2x + y - 1) dz dy dx$

Q V Attempt any three (15)

A) . Evaluate  $\beta(4.5, 3.5)$ .

B) .  $\int_0^{\infty} x^n e^{-ax} dx$

C) . prove that

i)  $\operatorname{erf}(0) = 0$                       ii)  $\operatorname{erf}(\infty) = 1$

D) . Symmetric property of  $\beta$  function.

$$\beta(m, n) = \beta(n, m)$$

E) . Solve by using D.U.I.S method  $\int_1^0 \left( \frac{1-x^\alpha}{\log x} \right) dx$ ,  $\alpha \geq 0$

F) . Prove that  $\sqrt[n]{n+1} = n\sqrt[n]{n}$

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(2)

Class:-S.Y.B.Sc.I.T.

Subject:- Database Management Systems

(Time:- 2 hours 30 minutes)

Total Marks :- 75

N.B.

- 1) All questions are compulsory
- 2) Make suitable assumptions wherever necessary and state the assumptions made
- 3) Answers to the same question must be written together
- 4) Numbers to the right indicate marks
- 5) Draw neat labeled diagrams wherever necessary
- 6) Use of non-programmable calculators is allowed

**Q. 1.] Attempt any three of the following:-**

15

1. What are the different types of Database users?
2. Write a short note on Generalization and Specialization
3. Explain Data Abstraction Views in DBMS
4. What do you mean by Logical Data Independence and Physical Data Independence in DBMS?
5. Explain ER diagram and its components.
6. Draw an ER diagram of a store management system

**Q. 2.] Attempt any three of the following:-**

15

1. Define the following terms:
  - a. Table.
  - b. Field.
  - c. Record or row.
  - d. Column or domain.
  - e. Degree of relational schema
2. Explain through an example the process of Normalisation
3. Differentiate between relational algebra and relational Calculus
4. Write short note on Cartesian product with its syntax and example.
5. Write a short note on Domain relational Calculus
6. What is Relational Algebra? Explain the following operators used in relational algebra:
  - a. Select
  - b. Project.
  - c. Rename
  - d. Joins

**Q. 3.] Attempt any three of the following:-**

15

1. What are Views? How do you create and drop a view? Give example of each
2. Create a table Movie(MovId, Title, Type, Price). Alter the table to add a new column Actors which can store names of actors (upto 100 characters). Also add the restriction that Title of the movie cannot be NULL



## DBMS

3. Consider the following tables:-

BOOKS(BookId, Title, Price)

SUPPLIER(SupId, SupName, SupAddress)

BOOKSUPPLY(BookId, SupId, Quantity)

Write SQL queries to do the following:- (any five)

- i. Display the details of books whose prices are greater than the average price of books
  - ii. Display names of all suppliers who are supplying book with BookId 'B005'
  - iii. Display the highest quantity of books supplied by each supplier
  - iv. Display the names of books starting with 'B' and ending with 'G'
  - v. Display the title of the costliest book
  - vi. Display the book titles and names of their suppliers
4. Define Join and List its type and explain any two in details.
5. What are constraints? What are its types? Explain each
6. Explain the commands for granting and revoking rights through examples

**Q. 4.] Attempt any three of the following:-**

15

1. What is a transaction? What are the different states of a transaction? Explain with a diagram
2. What is a DBMS lock? What are the two modes in which a data item can be locked?
3. Explain concurrent schedule with examples
4. If deadlock is avoided by deadlock-avoidance schemes, is starvation still possible? Explain your answer.
5. What is a deadlock? What are the different deadlock detection and recovery schemes?
6. What is database recovery? What are the types of database recovery?

**Q. 5.] Attempt any three of the following:-**

15

1. What is a transaction? Explain Commit, Rollback and Savepoint statements.
2. What are User-defined exceptions? Explain with an example
3. What are Implicit cursors? Illustrate the attributes of Implicit cursor with an example
4. Write a PL/SQL block that accepts the empid and new salary to be updated in the table. But before updated it checks If the salary is less than or equal to zero or greater than 3 lacs then it should not allow the updation to take place by raising an error/exception
5. Write a PL/SQL block to finds the greater number amongst three numbers entered by the user
6. Create a sequence that stores odd numbers from 1 to 100. Change the sequence to now count only upto 500 and increment the values by 5. It should also repeat the numbers from 1 when it reaches 500.