

Sy. BS. IT
Sem- III
Oct- 2019

QUESTION PAPER

S.Y. BSCIT

SEM-III

OCT. - 2019

- 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

- Define "Formal Language" and "Natural Language". What is the difference between the two?
- What is type conversion? Explain Implicit Type Conversion with a suitable example.
- Write a program to accept a single character from the user and check whether it an uppercase letter, lowercase letter, digit or special symbol.
- Write a program to accept a number from the user and print sum of its digits.
- Explain the break statement with a suitable example.
- Explain the syntax of Python.

2. Attempt **any three** of the following: 15

- Explain the following with respect to functions:
 - Flow of Execution
 - Scope and Lifetime of Variables
- Write a program to accept the age of the user and check whether the user is adult or minor using Boolean function.
- Write a function to check whether the number entered by the user is a Palindrome.
- What is a void function? Explain with the help of an example.
- What is immutability? Are strings mutable or immutable? Justify your answer.
- Explain the following string functions with example:
 - endswith()
 - lstrip()

3. Attempt **any three** of the following: 15

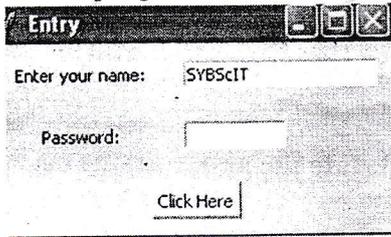
- What are the different methods for removing elements to a list? Give example for each method.
- Explain the built-in tuple functions.
- Explain the file object attributes with an example.
- Write a python program to combine the content of two files and store it in a single list and display that list.
- What is the use of finally block in exception handling?
- Write a program to concatenate the following dictionaries to create a new one.
 $d1 = \{1:10, 2:20\}$, $d2 = \{3:30, 4:40\}$, $d3 = \{5:50, 6:60\}$
 - Write a program to sum all the items in a dictionary.

4. Attempt **any three** of the following: 15

- What is data hiding? Write a program that demonstrates data hiding.
- Design a class complex for adding two complex numbers and also show the use of constructor.
- Write a program to implement multi-threaded priority queue.
- List and explain the different function decorators that can be used in a class.
- What is a module? What are the different ways of importing modules in Python?
- Explain the repetition patterns that are used in Regular Expressions.

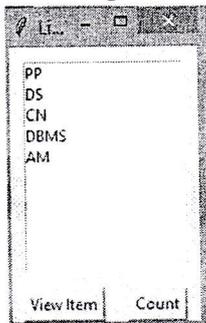
5. Attempt any three of the following:

- a. Write a program to create the following GUI:



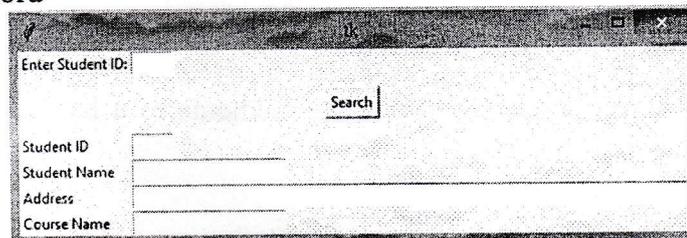
The default value in the Entry should be “SYBScIT”. When the user clicks the button “Click Here”, a welcome message should be displayed with the user’s name.

- b. Write a program to create the following GUI:



- i) The button “View Item” should display the selected list item in a messagebox.
- ii) The button “Count” should display total no. of items in the list.

- c. What is the use of LabelFrame Widget? Explain any five properties of LabelFrame Widget.
- d. Explain the following standard attributes of Widgets
 - i) Dimension
 - ii) Color
 - iii) Relief
- e. Explain the configuration of MySQL connection in Python.
- f. Write a program using the following layout that searches for student details based on Student ID from Student Table (stud_id, stud_name, address, course_name) and displays the record



2/10/19

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- f. Explain the syntax of Python.

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 - ii) Write a program to sum all the items in a dictionary.

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- e. What is a module? What are the different ways of importing modules in Python?
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S.Y.B.Sc.(IT.) – Semester III
DATA STRUCTURES
OCTOBER 2019

(Time: 2½ hours)

Total Marks: 75

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1. **Attempt any three of the following:** 15
- a. What is Algorithm? What are the characteristics of algorithm?
 - b. Write an algorithm on-
Sorting an array 'S' of size 'n' in increasing order using the bubble sort technique.
 - c. Differentiate between Linear Search and Binary Search.
 - d. What is data structure? What are the importance of data structure?
 - e. What is bubble sort? Sort the following data items using bubble sort method.
14,33,27,35,10.
 - f. What are various operations associated with array?
2. **Attempt any three of the following:** 15
- a. What is linked list? How it is different from linear array?
 - b. Write an algorithm to insert a new node at the beginning of two-way linked list with help of the diagram.
 - c. Write an algorithm to insert a new node after a particular node in two-way linked list.
 - d. Explain the structure, advantages, disadvantages and types of linked list.
 - e. Write the algorithm for insertion of a node at the given position and deletion at the end in single linked list.
 - f. Explain the different categories of header linked list.
3. **Attempt any three of the following:** 15
- a. Write the algorithm for push and pop operation of the stack with linked list representation.
 - b. How priority queue are represented in memory. Explain them.
 - c. Write an algorithm to implement a stack using array.
 - d. What are special kinds of Queue? Explain in brief.
 - e. Explain in detail Memory Representation of Queue.
 - f. Solve the In-fix expression to Pre-fix expression-
 - a. $((a+b)/d^{((e-f)+g)})$
 - b. $(x+y)+(z+((a+b-c)xd))-ix(j/k)$
 - c. $axb+(c+d)-(e+f)+gxh/k^2$
 - d. $b+cx-d-e+(e^2xf)$
 - e. $(axbxc^2+d)+(c/d+c)$

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DATA STRUCTURES
OCTOBER 2019

4. Attempt *any three* of the following:

15

- a. Explain the terms-
 - 1. Length of a path
 - 2. Height of a node
 - 3. Degree of node
 - 4. Weight of the tree
 - 5. Levels of the tree
- b. What are operations performed on binary tree? Explain with help of examples.
- c. Create a heap for the given elements 15 7 10 2 20 15 18.
- d. Sort the following elements using selection sort.
22 35 17 8 13 44 5 28
- e. Write an algorithm to traverse a binary tree in the post-order manner.
- f. Write an algorithm to find number of internal and external nodes in binary tree.

5. Attempt *any three* of the following:

15

- a. Explain the Graph Terminology-
 - a) Outdegree and Indegree
 - b) Source and Sink
 - c) Hamilton Path
 - d) Sub-graph
 - e) Directed Graph
- b. Explain memory representation of graph with suitable example.
- c. Explain Shortest Path Problems in Graph.
- d. What are hash table and hash functions? Explain folding method and mid square method for constructing hash functions.
- e. What are applications of Graph? Explain in detail.
- f. What is spanning tree? Explain with help of example.

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S.Y.B.Sc.(I.T.) – Semester III
COMPUTER NETWORKS
OCTOBER 2019

(Time: 2½ hours)

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1. Attempt **any three** of the following: 15
- a. Discuss following concepts
 - 1. Synchronize transmission
 - 2. Asynchronize transmission
 - b. Write a short note on internet.
 - c. Discuss following concepts.
 - 1. Attenuation
 - 2. Distortion
 - 3. Noise
 - d. Explain role of standard creation committees.
 - e. Write a short note on VPN.
 - f. Discuss role of following OSI layers
 - 1. Physical layer
 - 2. Session layer
2. Attempt **any three** of the following: 15
- a. Write a short note on datagram packet switching.
 - b. What are the 3 phases of data transmission? Explain.
 - c. Write a short note on radio wave frequency.
 - d. Explain ARQ system.
 - e. Write a short note on types of error.
 - f. Write a short note on any one guided media.
3. Attempt **any three** of the following: 15
- a. Write a short note on Bluetooth.
 - b. Discuss following method of multiple access
 - 1. CSMA/CD
 - c. Explain following concept
 - 1. Starting and ending character with character stuffing
 - 2. Starting and ending flags, with bit stuffing
 - d. Discuss PPP frame format.
 - e. Explain sliding window concept with suitable diagram.
 - f. Write a short note on router.
4. Attempt **any three** of the following: 15
- a. Explain IP V6 address.
 - b. Discuss flow base routing.
 - c. Write a short note on subnet mask.
 - d. Explain IP V4 header format.
 - e. Discuss advantages of IP V6.
 - f. Discuss implementation of connectionless services with suitable diagram.

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COMPUTER NETWORKS
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5. Attempt any three of the following:
- a. Discuss following concept
 1. Email
 - b. Discuss duties of transport layer.
 - c. Write a short note on TCP frame format.
 - d. Discuss DNS with example.
 - e. Discuss SMTP with example.
 - f. Discuss WWW concept with suitable example.

S.Y.B.Sc.(I,T.) – Semester III
DATABASE MANAGEMENT SYSTEMS
OCTOBER 2019

(Time: 2½ hours)

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1. Attempt **any three** of the following: 15
a. Explain Database system architecture with a neat diagram.
b. What are the advantages of DBMS over file systems?
c. What is an ER diagram? Explain its notations along with an example.
d. Explain in detail the different levels of abstraction.
e. Explain Codd's rules.
f. Explain the degree of relationship set.
2. Attempt **any three** of the following: 15
a. Explain the significance of candidate key, primary key and super key.
b. Explain the various integrity rules for databases.
c. Differentiate between relational algebra and relational calculus.
d. Explain the insert, update and delete anomalies with example.
e. Differentiate between 3NF and BCNF.
f. What are set operators? Explain the set operators in relational algebra.
3. Attempt **any three** of the following: 15
a. What is a constraint? Explain its types.
b. List and explain the various SQL data types.
c. Write appropriate query for the table Account_Master(acno,cname,phno,balance)
 i. Change the value of the filed balance to 3500 for Ajay Sharma's record.
 ii. Add a column amt_credit to the above table.
 iii. Delete the record of smita patel from Account_Master table.
 iv. Retrieve the records of those customers whose cname starts with 'S'.
 v. Delete the above table permanently from the database.
d. What is a view? Create a vertical view for the base table employee. Also write the syntax for updating and dropping the view.
e. List the types of joins. Explain about any two types of joins with syntax and example.
f. Explain aggregate functions with syntax and example.
4. Attempt **any three** of the following: 15
a. Explain the concept of transaction.
b. Describe ACID property for transaction.
c. Write a short note on 2PL.
d. Explain shadow paging recovery scheme.
e. What is the use of locking mechanism? Explain its types.
f. Differentiate between serial schedule and serializable schedule.

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DATABASE MANAGEMENT SYSTEMS
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5. Attempt *any three* of the following:
- Explain the PL/SQL block structure with syntax and example.
 - Write a note on %TYPE attribute.
 - Explain IF-THEN-ELSE statement with syntax and example.
 - Write a PL/SQL program to check whether an alphabet is vowel or consonant using simple CASE statement
 - Explain PL/SQL functions in detail. How does it differ from procedure?
 - Explain about exception handling with syntax and example.

S.Y.B.Sc.(I.T) – SEMESTER III
APPLIED MATHEMATICS
OCTOBER 2019

Time: 2½ hours)

Total Marks: 75

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1. Attempt **any three** of the following: 15

- a. Examine consistency of the following equation,
 $x - y + z = 4$; $2x + 3y - z = 1$; $3x - 2y + 4z = 6$ and solve them if consistent

b. Verify Cayley Hamilton theorem for

$$A = \begin{bmatrix} 2 & 1 & 1 \\ 2 & 3 & 2 \\ 3 & 3 & 4 \end{bmatrix}$$

- c. Find Inverse using adjoint method for following Matrices: $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$

d. Express in polar form $1 - \sqrt{3}i$

e. Solve the following equation : $x^7 + 1 = 0$

f. Prove that $(1 + i\sqrt{3})^8 + (1 - i\sqrt{3})^8 = -2^8$

2. Attempt **any three** of the following: 15

a. Solve : $(2x^2 + 6xy - y^2)dx + (3x^2 - 2xy + y^2)dy = 0$

b. Solve : $x \frac{dy}{dx} + \frac{y^2}{x} = y$

c. Solve : $\frac{dy}{dx} + 2xy = 2e^{-x^2}$

d. Solve : $xp^2 - 2yp + ax = 0$

e. Find general solution of $(D^2 - 4)y = \cos 2x + x^4$

f. Find general solution of $x^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} - 3y = 0$

3. Attempt **any three** of the following: 15

a. Find Laplace transform of $f(t) = t \cdot \cosh^2 4t$

b. Find Laplace Transform using convolution theorem $f(s) = \frac{s^2}{(s^2+4)(s^2+1)}$

c. Evaluate : $\int_0^\infty e^{-t} \frac{\sin^2 t}{t} dt$

d. Find inverse Laplace transform of $\frac{s^2+1}{s^3+3s^2+2s}$

- e. Solve differential Equation using Laplace transform $\frac{d^2y}{dt^2} + 2\frac{dy}{dt} + 5y = e^{-t} \sin t$
- f. Find Laplace transform of $\sin^3 t$
4. Attempt any three of the following: 15
- a. Evaluate : $\int_0^{2a} \int_0^x \int_y^x xyz \, dx dy dz$
- b. Evaluate : $\int \int xy(x+y) \, dx dy$ over the area between curve $y^2 = x$ and the line $y = x$
- c. Evaluate : $\int_0^3 \int_x^{2x} dx dy$
- d. Evaluate : $\int_0^1 \int_0^{1-x} \int_0^{x+y} e^z \, dx dy dz$
- e. Change the order of the integration to polar form : $\int_0^2 \int_0^{\sqrt{2x-x^2}} \frac{x \, dx dy}{\sqrt{x^2+y^2}}$
- f. Evaluate : $\int_0^2 \int_x^{4-x} \int_{\frac{3x}{2}-y}^3 dx dy dz$
5. Attempt any three of the following: 15
- a. Evaluate : $\int_0^\infty \sqrt[4]{x} e^{-\sqrt{x}} \, dx$
- b. Evaluate : $\int_0^{\pi/2} \sin^5 x \cos^3 x \, dx$
- c. Show that : $\int_0^\infty \frac{\sin x}{x} = \frac{\pi}{2}$
- d. Evaluate : (i) $\operatorname{erfc}(-x) + \operatorname{erfc}(x)$ (ii) $\operatorname{erfc}(x) + \operatorname{erf}(x)$
- e. Evaluate : $\int_0^a (a^6 - x^6)^{1/6} \, dx$
- f. Evaluate : $\int_0^1 x^3 (1 - \sqrt{x})^5 \, dx$