Class:-S.Y.B.Sc.I.T. Sem-III 19|10|19

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. Explain the Architecture of DBMS with a neat diagram
2. Differentiate between File Processing system and DBMS
3. Explain the degree of an entity in a relationship OR what are the different types of relationship in an ER diagram?
4. Give comparison between hierarchical, network & relational model.
5. Write a short note on Generalization and Specialization in an ER diagram
6. Draw an ER diagram of a library 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 the different types of views you can create in a database? What are its advantages and disadvantages?
2. List the rules that restrict the updating of a view
3. What are constraints? What are the different types of constraints? Explain.
4. Write SQL statements for creating the following tables:-
   PATIENT(PatientId, PatientName, Address) – PatientId is Primary Key column

DOCTOR(DocId, DocName, Specialization) – DocId is Primary Key column
ADMIT(BedId, PatientId, DocId, Disease, DateOfAdmit, DateOfDischarge)- BedId is Primary Key column and PatientId and DocId are Forieng Key Columns

5. Consider the relations : Worker (WORKER_ID,FIRST_NAME,LAST_NAME,SALARY,JOINING_DATE,DEPARTMENT) Write the SQL queries for the following:

    a. Print The FIRST_NAME And LAST_NAME From Worker Table Into A Single Column COMPLETE_NAME. A Space Char Should Separate Them.
    b. Fetch the Unique Values Of DEPARTMENT From Worker Table And Print Its Length.
    c. Print First Three Characters Of FIRST_NAME From Worker Table.
    d. Fetch Worker Names With Salaries >= 50000 And <= 100000
    e. Fetch The No. Of Workers for Each Department in the Descending Order.

6. What is a subquery? What are its search conditions? Give one example of each

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. Explain the following iteration control structures used in PL/SQL:- While loop, For loop
2. What are Explicit cursors? Explain the steps involved in explicit cursor. Explain with an example
3. What is PL/SQL? Explain the structure of a PL/SQL block. Give an example
4. Consider a table PRODUCT (ProductId, ProductName, CompanyName, UnitPrice, Quantity). Create a package ProductInfo that has a Function that accepts ProductId and returns the quantity of that product and a procedure that accepts ProductId and new UnitPrice and changes the UnitPrice for that product in the table
5. Create a sequence that stores numbers from 1000 to 10000. Use this sequence to insert data in a table Order(OrderId, OrderName) for OrderId column values. Change the sequence to now count only upto 5000
6. Write a PL/SQL block to finds the greater number amongst three numbers entered by the user

Max Time: 2½ hrs

Max Marks: 75

SY- IT sem-III

Python Prog.

16/10/19

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".

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 table in mysql database.

F) Explain 'Radiobutton' widget.

Max Time: 2½ hrs

SY-IT Sem-III
Data Structures
17/10/19

Max Marks: 75

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) What is Data Structure? Explain different categories of data structure.
B) List and Explain different operations that can be performed on a data structure.
C) What is bubble sort ? Explain with the help of an example how to sort 14,27,33,35,10.
D) Write an algorithm for merging two arrays.
E) Explain different asymptotic notations.
F) What are advantages and limitations of an array.

Q II Attempt any three (15)

A) What is a linked list? Explain the memory representation of a linked list.
B) What is a circular linked list? Write a short note on it.
C) Write an algorithm to delete elements from a singly linked list
D) Write a note on subtraction of polynomials using linked list
E) Explain doubly linked list with a diagram and memory representation.
F) What is a header linked list? Explain

Q III Attempt any three (15)

A) Write an algorithm for PUSH and POP operation of stack.
B) How insertion and deletion take place in a queue?
C) Why do you create a circular queue? Explain
D) What are the uses of a stack?
E) Explain how function calls are made using stack.
F) What are Priority Queues? Explain

Q IV Attempt any three (15)

A) What is a binary tree? Construct a binary tree from the following data:
50 30 29 79 20 16 29 49 15 9
B) What are the different ordering techniques of a tree ? Explain
C) What is a max-heap and min-heap? Explain with an algorithm deletion from a heap.
D) Explain Selection sort using an example.
E) What is an AVL Tree? Explain its construction.

F) What is a 2-3 Tree? Explain

Q V Attempt any three (15)

A) What is adjacency matrix and list representation of a graph:

B) Explain with example Dijkstra's shortest path algorithm.

C) What is Prim's algorithm to find the minimum spanning tree. Explain

D) Explain Depth-first search. What are its uses?

E) What is hashing? Explain

F) .List different techniques of open addressing . Explain any one.

SY-IT Sem-III (Comp. Networks) 18/10/19

Max Time: 2½ hrs Max Marks: 75

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 data communication & where we using it.
B) . Compare TCP\IP and OSI model
C) . Explain types of transmission Impairment.
D) . Discuss the history of Internet.
E) . Short notes
   a. UDP
   b. INTERNET PROTOCOL
F) . Explain Analog to Analog conversion.

Q. II Attempt any **three** (15)

A) . What are the functions of data link layer?
B) . What is error? Explain types of error?
C) . What is the working of Parity check bit methods? Explain with suitable example.
D) . Explain encoding decoding techniques of CRC.
E) . Difference Between circuit switching and packet switching
F) . Describe checksum computation at sender and receiver side.

Q. III Attempt any **three** (15)

A) . What is Virtual LAN? How are stations grouped into different VLANs? Explain.
B) . Draw and explain flow of ALOHA protocol and compare Pure ALOHA with Slotted ALOHA.
C) . What are different connecting devices state them and describe in short.
D) . Compare OSPF and RIP
E) . Explain flow control
F) . Discuss the addressing mechanisms of IEEE 802.11 project.

Q IV Attempt any **three** (15)

A) . What are the different transition strategies from IPv4 to IPv6? Explain.
B) . Explain the services provided by Transport Layer.
C) . Describe the TCP segment header format in details.
D) . What do you mean by the resolution in DNS? What are its types?
E) . Explain Email Architecture.
F) . What is dynamic host configuration protocol? Explain the DHCP message format.

Q V Attempt any **three** (15)

A) . FTP
B) . HTTP
C) . INTERNET PROTOCOL
D) . Compare Bridge and Gateway
E) . What do you understand by 3 way handshaking in TCP Connection Establishment? Explain.
F) .Explain the following: selective repeat, piggy backing.

23/10/19

S.Y.B.Sc. (I.T.)

APPLIED MATHEMATICS (SEM III) Marks: 75

Q.1) Attempt any three of the following. Marks: 15

a) Determine the linear dependence or independence of vector.

$X_1 = [1\ 2\ 4]$, $X_2 = [2\ -1\ 3]$, $X_3 = [0\ 1\ 2]$, $X_4 = [-3\ 7\ 2]$

b) Find the inverse of the matrix given using adjoint method $\begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$

c) Solve the following system of equations.

$2x - 2y - 5z = 0$

$4x - y + z = 0$,

$3x - 2y + 3z = 0$

$X - 3y + 7z = 0$

d) Express the following in the form of x + iy

i) $\frac{(2-8i)(7+8i)}{1+i}$ ii) $(1 + i)^4$

e) Use De-Moivre's theorem to prove that,

$cos4\theta = cos^4\theta - 6\ cos^2\theta\ .sin^2\ \theta + sin^4\theta$

$sin4\theta = 4\ cos^3\theta\ .sin\ \theta - 4\ cos\ \theta\ sin^3\theta$

f) If sin hx – cos hx = 5, then find tan hx

Q.2) Attempt any three of the following. Marks: 15

a) Solve, $\frac{dy}{dx} = \frac{x+2y+1}{2x+4y+3}$

b) Solve, $\frac{y}{x}\frac{dy}{dx} = \sqrt{1 + x^2 + y^2 + x^2y^2}$

c) Solve, $(p - 2x)(p - y) = 0$

d) Solve, $y = xp + \frac{1}{p}$

e) Solve, $\frac{d^3y}{dx^3} + \frac{d^2y}{dx^2}\frac{dy}{dx} - y = \cos 2x$

f) Solve, $(D^2 + 1)y = x \cos x$

Q.3) Attempt any three of the following. Marks:15

a) Define Laplace transform of a function. Find the Laplace transform of cos hat.

b) Prove that $L[t^n] = \frac{n!}{s^{n+1}}$

c) Evaluate, $L\left[\frac{e^{-3t} - e^{4t}}{t}\right]$

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

e) Evaluate, $L^{-1}\left[\frac{3s+4}{s^2-3s-4}\right]$

f) Solve the following Differential equation using Laplace transform.

$2Y'(t) + 3Y = e^{3t}$ $Y(0) = 1$

Q.4) Attempt any three of the following. Marks:15

a) Evaluate, $\int_0^1 \int_0^y xye^{-x^2}\,dx\,dy$

b) By changing into polar form solve, $\int_0^1 \int_0^{\sqrt{x-x^2}} \frac{4xy}{x^2+y^2}\,dx\,dy$

c) $\iiint \frac{dx\,dy\,dz}{\sqrt{1-x^2-y^2-z^2}}$

d) Evaluate $\iint e^{ax+by}\,dxdy$ over the area of a triangle bounded by x =0, y = 0 and ax +by = 1

e) Find the volume bounded by the cylinder $x^2 + y^2 = 4$ and the planes $y + z = 3$ and $z = 0$

f) Find the area of the circle $x^2 + y^2 = 25$.

Q.5) Attempt any three of the following. Marks: 15

a) Prove that $\int_0^{\frac{\pi}{2}} sin^p\theta cos^q\theta\ d\theta = \frac{1}{2}\beta\ \left(\frac{p+1}{2}, \frac{q+1}{2}\right)$

b) Evaluate, $\int_0^\infty \frac{x^4(1+x^5)}{(1+x)^{15}}dx$

c) Using DUIS prove that, $\int_0^\infty \frac{\log(1+ax^2)}{x^2}dx = \pi\sqrt{a}$

d) Show that, $\int_0^1 \frac{x^a - x^b}{\log x}\,dx = \log\left(\frac{(a+1)}{(b+1)}\right) = \log\left(\frac{a+1}{b+1}\right)$

e) Show that, $erf_c(-x) + erf_c(x) = 2$.

f) Prove that, $\frac{d}{dx}[\text{erf}(ax^n)] = \frac{2an}{\sqrt{p}}x^{n-1}.e^{-a^2x^{2n}}$