D.B.J. College, Chiplun

F. Y. B.Sc. (I.T.) First Semester Exam (ATKT) Oct – 2024

Subject: Fundamentals of Database Management Systems (USIT103) **Paper: III**

Date: 14/11/24 Time: 10:00 am to 12:30 pm **Time: 2½ Hrs.**

Total Marks :75

Note: **1) Figures to right indicate full marks.**
2) Assume necessary data required.
3) All questions are compulsory.

Que. 1 **Solve the following (any three)**

A) What is a DBMS? Explain its any four advantages. **05**
B) Explain the role of Database Administrator in a DBMS. **05**
C) What is data abstraction? Explain the different levels of data abstraction. **05**
D) Explain the need of the data model. **05**
E) List and explain the advantages of the Relational model. **05**
F) Explain any four fundamental operations for relational algebra with an example. **05**

Que. 2 **Attempt the following (any three)**

A) Explain the following terms with an example: **05**
I) Foreign Key II) Primary Key III) Metadata
B) Draw the E-R diagram for the College Library system. **05**
C) What are constraints? Explain its different types. **05**
D) Explain the term weak entity set and strong entity with an example. **05**
E) Explain the extended features of the ER model. **05**
F) What is an attribute? Explain different types of attributes. **05**

Que. 3 **Solve the following (any three)**

A) What is Normalization? Explain its advantages. **05**
B) Explain First Normal form (1NF) with an example. **05**
C) What is denormalization? Explain it. **05**
D) Define the features of the good database design. **05**
E) Explain Third Normal form (3NF) with an example. **05**
F) Explain the terms Entity integrity and Referential integrity with an example. **05**

Que. 4 **Solve the following (any three)**

A) Explain the following SQL instructions with proper syntax : **05**
1)Create Table 2) Insert 3) Delete
B) What are relational set operators? Explain with examples. **05**
C) Explain group by and order by clause with an example. **05**

Cont..

D) Explain the terms natural join and outer join. 05

E) What is a View? How it is created? 05

F) The **BOOKMASTER** table have following structure. 05

BOOKMASTER

Attribute	Data type	Constraints
BookNo	Integer	Primary Key
BookName	Char	Not Null
Price	Integer	
Language	Char	
PublicationId	char	Not Null
Writer	Char	

Write the query in a SQL for the followings:

1. For creating **BOOKMASTER** table.
2. To create a view which contains BookNo, Writer, Price.
3. To display a Language wise total books.
4. To display Bookno and price having price more than 500/-
5. To sort the table on Price.

Que.5 **Attempt the following (any three)**

A) What is transaction? List and explain its properties. 05

B) What is a deadlock? Explain it with an example. 05

C) Explain basic techniques to control deadlocks. 05

D) Explain the importance of locking technique while executing transactions. 05

E) Write a short note on 'Database Recovery Management'. 05

F) With a state diagram explain various stages of transaction. 05

DBT College, Chiplun
Semester I ATKT Examination November 2024
class: FYIT Subject: Computational logic and Discrete Structure
Date: 15/11/24 Time: 10:00 am to 12:30 pm

Time: 2.30 Hrs. **Full Marks: 75**

Instructions:
(1) All questions are compulsory.
(2) Numbers to the right indicate full marks.
(3) Use of scientific calculator is allowed.

Q.1) **Attempt any three of the following** **(15)**

a) Let A={1,2,3,4}, B={3,4,5,6} and C={5,6,7,8}.Find each of the following sets:
i)A∆B ii)B∆C iii)A∆C iv)(A∆B)∆C

b) Let, A= {c, d, e, f, g}, B= {f, g} and C= {d, g}.Answer each of the following questions and give reasons for your answers.
i) Is B subset of A?
ii) Is C subset of A?
iii) Is C subset of C?
iv) Is C a proper subset of A?

c) Simplify truth table
$(p \wedge \sim q) \wedge (\sim p \vee q)$

d) If A ={2,4,6} and B={1,3,5}, find A×B, A×A, B×B, B×A

e) Verify the following by using truth table.
$P \wedge (q \wedge r) = \sim (P \wedge r) \rightarrow (p \vee r)$

f) If A={1,2} , B={3,4} , C={5,6}, prove that
i) A×(BUC) = (A×B)U(A×C)
ii) A×(B∩C)= (A×B) ∩ (A×C)

Q.2) **Attempt any three of the following** **(15)**

a) Prove that for all integers m and n, m+ n and m - n are either both odd or both even.

b) Prove that $\sqrt{5}$ is irrational.

c) Show that if r and s are any two rational numbers then $r+s^2$ is rational.

d) State quotient remainder theorem. If m mod 11=6, what is 4m mod 11?

e) Indicate whether the following arguments are valid or invalid. Support your answer with diagrams.
All polynomial functions are differentiable.
All differentiable functions are continuous.
∴ All polynomial functions are continuous.

f) Find gcd of (188,385).

Q.3) **Attempt any three of the following** **(15)**

a) A function f: Z→Z is defined by $f(x) = x^2$ where Z: set of integers. Check whether f is bijective?

b) Use mathematical induction to prove that $1 + 2 + 3 + \ldots + n = \frac{n(n+1)}{2}$, for all positive integers n.

c) Prove that 7^{n-1} is divisible by 6, for each integer $n \geq 0$.

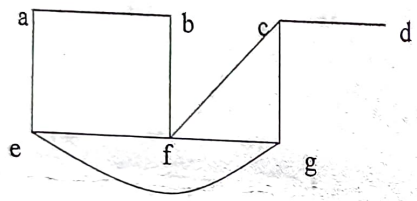
d) If $f(x) = 9 - 4x$ and $g(x) = 2x - 7$, find the composite functions (fog)x, (gof)x. Verify (fog)x = (gof)x.

e) Prove that n! +2 is divisible by 2, for all integers $n \geq 2$.

f) Solve the recurrence relation $Tn = 10Tn_{-1} - 25Tn_{-2}$ where $To = 3$, $T_1 = 17$.

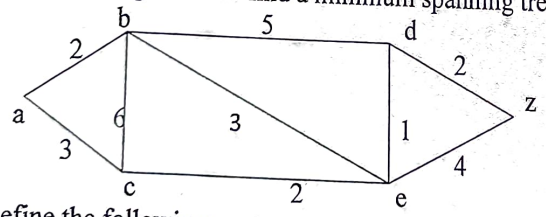
Q.4) **Attempt any three of the following** **(15)**

a) Find the spanning trees of the following graph



b) Explain rooted trees and binary trees. Draw binary trees to represent the following expressions:
i) ((a-b).c) + (d/e))
ii) a.b - (c/(d+e))

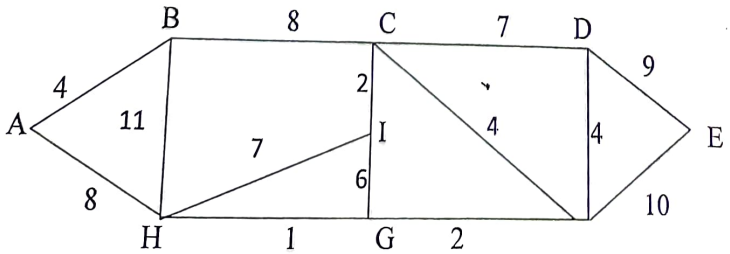
c) Use Prim's algorithm to find a minimum spanning tree in the following weighted graph.



d) Define the following:
i) Trail **ii)** Connected graph **iii)** Spanning tree **iv)** k-regular graph **v)**Simple graph.

e) Let A={a,b,c,d,e,f}and partial order relation R on A is define as R={(a,a), (b,b), (c,c), (d,d), (e,e), (a,c), (c,d), (c,e), (a,d), (a,e), (b,c), (b,d), (b,e)}. Find matrix of relation R (M_R) and draw diagraph of a relation R.

f) Find minimum spanning tree of the following weighted graph by using Kruskal's Algorithm.



5) **Attempt any three of the following**

a) A 5 digit number is to be form using the digits from 0 to 9. How many such numbers can be formed if (15)
   i) The digits are distinct.
   ii) The repetition of digit is allowed.

b) Find the number of words that can be formed when the letters of each of the words
   i) COMMITTE
   ii) INDIFFERENCE

c) From 5 professors and 7 students, the committee of 4 is to be formed in how many ways this can be done if the committee contains
   i) Exactly three professor.
   ii) At least three professors.
   iii) At most two professors.

d) One card is drawn from a well shuffled pack of 52 cards. Find the probability that it is
   i) Diamond or an ace.
   ii) Red card or a queen.

e) If $P(A) = \frac{2}{3}$, $P(B) = \frac{1}{2}$, $P(A/B) = \frac{1}{6}$, find $P(A \cap B)$ and $P(B/A)$.

f) If A and B are two events such that $P(A) = 0.8$, $P(B) = 0.7$, $P(AUB) = 0.6$.
   Find $P(A \cap B)$, $P(A/B)$, $P(B/A)$.

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