VIT
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)
CHENNAI

Reg. Number:	24MCA1034

Continuous Assessment Test (CAT) – II - October 2024

Programme	:	Master of Computer Applications	Semester	:	Fall Semester 2024-2025
Course Code & Course Title	:	PMCA503L & Database Systems	Class Number	:	CH2024250103011
Faculty	:	Dr.M.Sandhya	Slot	:	D1+TD1
Duration	:	1.5 hrs	Max. Mark		50

General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information.
- Only non-programmable calculator without storage is permitted

Answer all questions

Q. No	Sub Sec.	Description	Marks
1.		i) Consider a relation R (A, B, C, D, E, F), where each attribute is atomic, and following functional dependencies are: F = {AB → C, AC → B, AD → E, BC → A, E → F} Find all possible candidate keys and non-key attributes of the above relation schema R (4marks) ii)Consider the relation schema: Depositer_Account (id, acc_num, access_date, balance, and branch_name). Functional Dependencies are: id, acc_num → {access_date} acc_num → {balance, branch_name} Find out the closure of {id, acc_num} and acc_num (3marks) iii)Find the minimal cover for the following functional dependencies. {A->C, AC->D, E->H, E->AD} (3marks)	10
2.		Suppose that extendable hashing is being used on a database file that contains records with the following search key values: 2,3,5,7,11,17,19,23,29,31. Construct the extendable hash structure for this file if the hash function is h(x) = x mod 5 and each bucket can hold three records.(consider LSB for hash function)	10

Decimal	Binary
0	000
1	001
2	010
3	011
4	100

5	101
6	110

3. Construct a B+ tree to insert the following key elements: (24,22,77,54,48,56,65,98,42,59,82,90). Order of the tree is 3. **10**

4. Consider the following GRADEBOOK relational schema describing the data for a grade book of a particular instructor.
CATALOG (Cno, Ctitle)
STUDENTS (Sid, Fname, Lname, Mname, Mobileno,mailid)
COURSES (Term, Sec_no, Cno)
ENROLLS (Sid, Term, Sec_no)
Write the following queries using the relational algebra. (5x2=10 marks)
a. Retrieve the names of students enrolled in the Automata class during the fall 2009 term.
b. Retrieve the Sid values of students who have enrolled in CSC226 and CSC227.
c. Retrieve the Sid values of students who have enrolled in CSC226 or CSC227.
d. Retrieve the names of students who have not enrolled in any class.
e. Retrieve the names of students who have enrolled in all courses in the CATALOG table. **10**

5. Normalize the following relation up to 3NF:
Bank (acc_no, cust_id,cust_name, acc_type, acc_balance, int_rate, cust_city, phonenum, branch_id, branch_name, branch_city)
The following are the functional dependencies for the above relation:
acc_no,cust_id→acc_type, acc_balance, int_rate,cust_name **10**
acc_type→int_rate
cust_id→cust_name, cust_city, phonenum
branch_id-→branch_name, branch_city

**********All the best **********