

1. Translate the E-R schema on the personnel of a company (Shown in Fig.1) into a schema of the relational model. (25%)

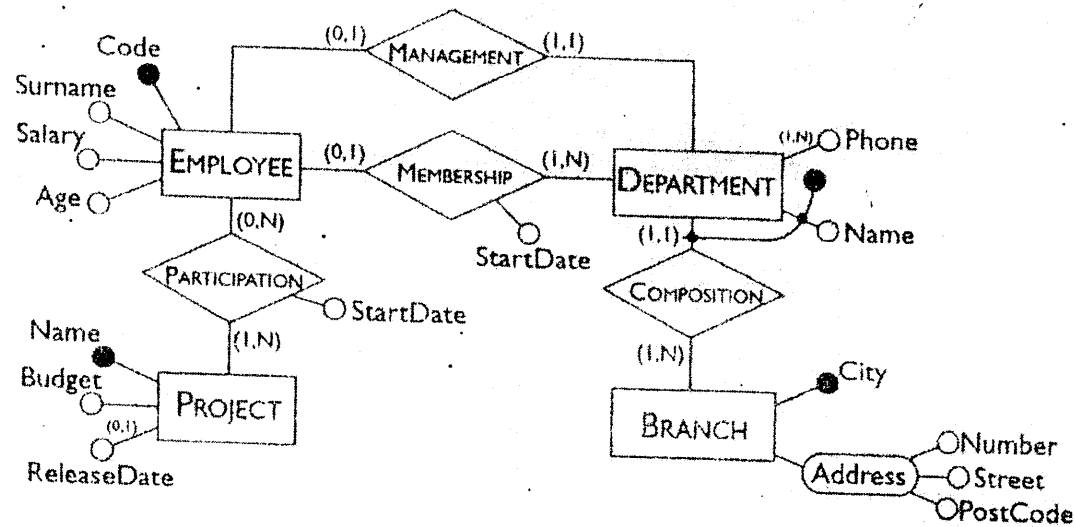


Fig.1 : An E-R schema on the personnel of a company

2. Explain how to implement two stacks in on array  $A[1..n]$  in such a way that neither stack overflows unless the total number of elements in both stacks together is  $n$ . The PUSH and POP operations should run in  $O(1)$  time.(20%)

3. Consider the following algorithm: (20%)

```

Algorithm Fun1 (x)
    if x=1 or x=0
        return 1
    else
        return Fun1(x-1)+Fun1(x-2)
end Fun1
    
```

What would be returned if Fun1 is called as:

- (a) Fun1 (8)
- (b) Fun1 (20)

4. What makes a good hash function?(15%)

5. Consider the relation (Shown in the Table 1) and identify the functional dependence of the corresponding application. Identify possible redundancies and anomalies in the relation. (20%)

Table 1 A Relation for Problem 5.

Tutor	Department	Faculty	HeadOfDept	Course
Thomson	Maths	Engineering	Jackson	Statistics
Thomson	Maths	Engineering	Jackson	Number theory
Robinson	Physics	Engineering	Jackson	Statistics
Robinson	Physics	Science	Johnson	Statistics
MackKay	Physics	Science	Johnson	Relativity