Q1: Consider Relational database: Part (<u>pid</u>,pname,price), Vendor (<u>vid</u>,vname,location), Supply(<u>pid,vid</u>,Qty). Write relational algebra (RA) and TRC: *[5 Marks]*

[A.] Get pid, pname for those not supplied by any vendor.   [B.] Get supplier who supply every red part.
[C.] Get PID, and Pname for those supplied by every vedor.   [D.] Get vendor and product name supplied by vendor
[E.] Get pair of VID which belong to same location and supply same part with parice greater than 1st vendor.

Q2: A data file consisting of 1,50,000 student-records is stored on a hard disk with block size of 2048 bytes. The data file is not-sorted on the primary key RollNo. The size of a record pointer for this disk is 10 bytes and block pointer is 8 bytes. Each student-record size is 128B and has a candidate key attribute called RollNo of size 12 bytes. Assume that the records of data file and index file are not split across disk blocks. Find the number of block acesss to search any record in 1-level indexing and multi-level indexing. *[3 Marks]*

Q3: Given a schema $R(A,B,C,D,E,F,G,H,I,J)$, and the following set of FDs $(AB \rightarrow C, A \rightarrow CDE, B \rightarrow F, F \rightarrow GH, D \rightarrow IJ)$. Find the highest normal form. *[1 Mark]*

Q4: Consider a disk with block size B = 1024B, with Table R1 (A,B,C) has 30,000 records and R2(C,D,E) has 20,000 records. size of A: 100B, B: 50B, C: 100B, D: 50B, and E: 100B. The function dependencies present in relation: $A \rightarrow B$, $C \rightarrow D$, and $D \rightarrow E$. Compute the minimum and maximum number of block required to store result of below expression: [6 Marks]

[i.] $R1 \cup R2$ [ii.] $R1 \bowtie R2$ [iii.] $R1 \star R2$ [iV.] $R1 \cup (R1 \cap R2)$