**Functional Dependencies**

**Show all the working. Do not simply write answers. If essential steps, such as edge diagrams, transitive inferences are missing, points will be deducted.**

**A-1 Transitive Dependency and Keys (5 points)**

You have a relation R(L,M,N,O,P,Q) and a set of functional dependencies F = {LNO→M, MN→LOP, N→O, OP→LN}.

* [2pt] Can we infer NP → LM from F ?
* [3pt] Can we infer NQ → LO from F ?

**A-2 Keys (10 points)**

(i)[5pt]Find **all** the candidate keys of the Relation R(ABCDE) with FD's:

D → C, CE → A, D → A, and AE → D

(ii) [5pt] Determine **all** the candidate and superkeys of the relation R(ABCDEF) with FD's:

AEF → C, BF → C, EF → D, and ACDE → F

**A-3** **Minimal Cover (10 points)**

[10 pt] Find all minimal covers for the following set F of functional dependencies.

X → Z, XY → Z, Z → UT, ZU → T, ZW → XY, WT → Z

Show your working clearly. Points will be deducted if you do not show the extraneous attributes, and their elimination.

**A-4** **Equivalence (15 points)**

[15pt] Consider the following set of F.Ds. Determine if FD1 is equivalent to FD2 or to FD3:

FD1:

{BC->D, ACD->B, CG->B, CG->D, AB->C, C->A,D->E,BE->C,D->G,CE->A,CE->G}

FD2:

{AB->C,C->A,BC->D,CD->B,D->E,D->G,BE->C,CG->D}

FD3:

{AB->C,C->A,D->G,BE->C,CG->D,CE->G,BC->D,CD->B,D->E}

You must show closure of each LHS attributes on the left hand side of each FD\_i where i = {1,2,3} via going through the other FD set.

Then establish the equivalence.