

## Q2) Bayesian Networks

i)b)  $A \perp\!\!\!\perp C | B, D$ .

This is True because, when conditioned on B and D all paths b/w A and C are blocked. Arrows meet head to tail at node B and D.

$A \perp\!\!\!\perp C | B, D$  holds True



$B \perp\!\!\!\perp D | A, C$

This is False, when conditioned on ~~B and D~~ A and C there is still an active path b/w B and D.

Mathematically

$$\frac{P(A, B, C, D)}{P(A, C)} = \frac{P(A) P(B|A) P(D|A) P(C|B, D)}{P(A) \cancel{P(C|B, D)}}$$

$$= P(B|A) P(D|A)$$

$\neq B \perp\!\!\!\perp D | A, C$

$\therefore$  This is False

