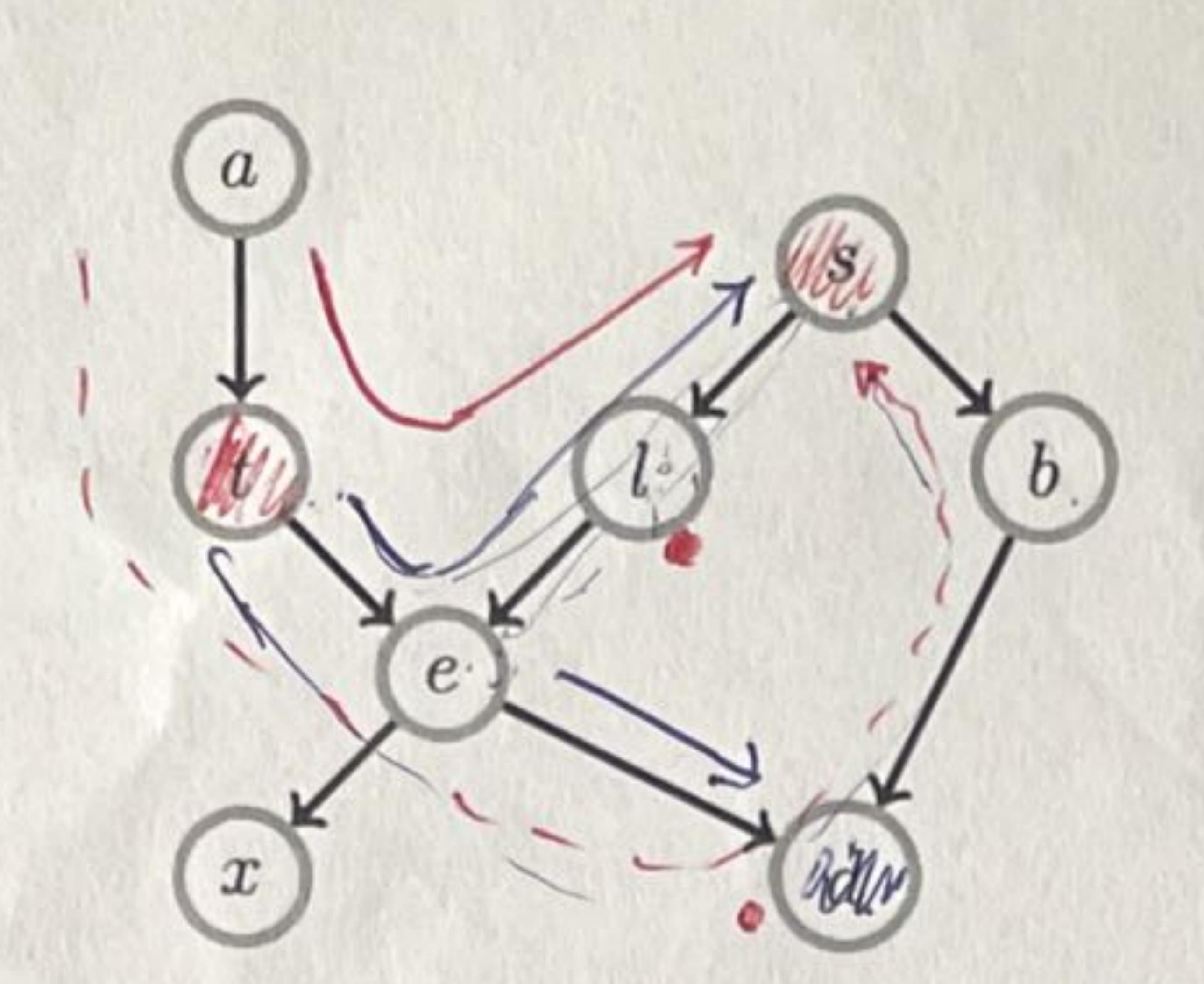
Name:

Roll No.

Degree (B.Tech./M.Tech./Ph.D.):

1. The Chest Clinic network (Fig below) concerns the diagnosis of lung disease (tuberculosis, lung cancer, or both, or neither). In this model a visit to Asia is assumed to increase the probability of tuberculosis. State if the following conditional independence relationships are true or false.



x = Positive X-ray

d = Dyspnea (Shortness of breath)

e = Either Tuberculosis or Lung Cancer

t = Tuberculosis

l = Lung Cancer

b = Bronchitis

a = Visited Asia

s = Smoker

A Bayesian network for the chest clinic example.

Solve on ly (i) (ii) (iv)

(i) tuberculosis \(\) smoking \| shortness of breath \(\).

TRUB 1 SiBinstantiated.

(iii) visit to Asia 1 smoking | lung cancer

lung cancer \(\text{L bronchitis} \) smoking

(iv) visit to Asia 1 smoking | lung cance, shortness of breath FALSE

parn a -s via dis d-connerted.

Answer (with justification):

(ii)

or econditionally independent given Z.

d-separation: Zis in suial connution/diverging

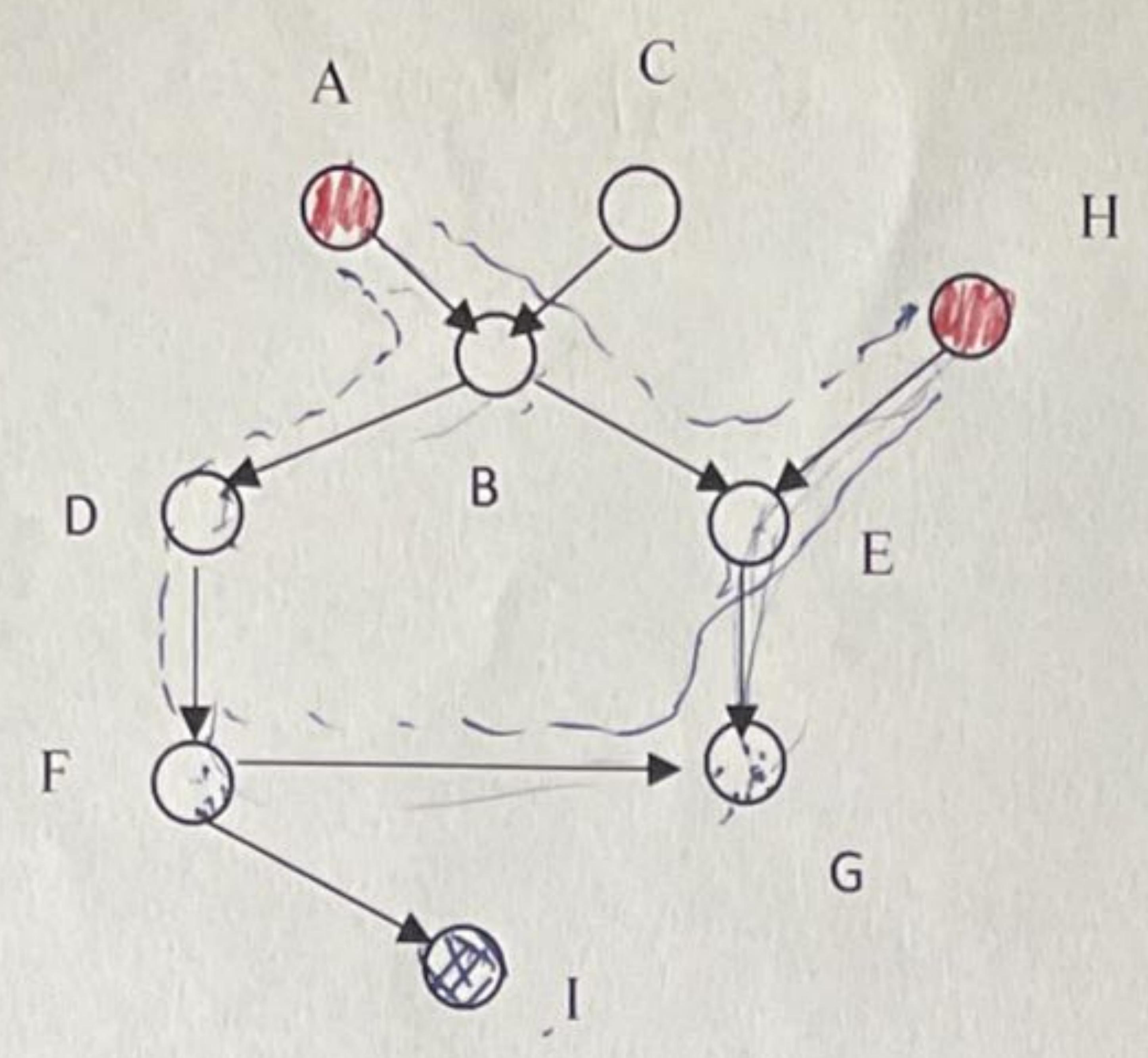
2 is instantialed

Zisinconverging connection, neither z not any of zis ducendute are known

(i) 6 1 3 1 d : 6 = 2 - 2 : not de separated

e-l-s: serial connection

2. Given I is known, is A d-separated from H.



Answer (with justification):

(A and H are d-separated if all the

palhs are d-sepanated).

Aisnot-desparated. from H

A-B-D-R-9 ! Serial Lemelton de constitut

A - G - E: b16 ched

(TRue)

(IV) a L 3 | 2, d