Applied Probability   Quiz # 01

2018-EE-386   Asad Khan

Question # 01

Solution: Let

$A = \{$ Amazon receives order $\}$

$B = \{$ Bookscouter receives order $\}$

$\Rightarrow$ $T = \{$ Arrive in time $\}$

$P(A) = 0.6$, $P(B) = 0.4$

$P(T \mid A) = 0.75$, $P(T \mid B) = 0.9$

$P(B \mid T) = ?$ $= \dfrac{P(B \cap T)}{P(T)}$

$P(B \mid T)$ $= \dfrac{P(T \mid B)\, P(B)}{P(T \mid B)\, P(B) + P(T \mid A)\, P(A)}$

$= \dfrac{(0.9)(0.4)}{(0.9)(0.4) + (0.75)(0.6)}$

Answer   is

$$P(B|T) = 0.44$$

Question # 02

Solution:

Part (a)

Let

$$V = \{virus \ in \ the \ computer\}$$

$$D = \{virus \ Detected\}$$

Now

$$P(D|V^c) = 0.10 \qquad \Rightarrow P(D|V) = 1 - P(D|V^c)$$
$$= 0.9$$

and

$$P(V) = 0.15$$

$$P(V|D) = \frac{P(V \cap D)}{P(D)} = \frac{P(D|V)(P(V))}{P(D|V)P(V) + P(D|V^c)P(V^c)}$$
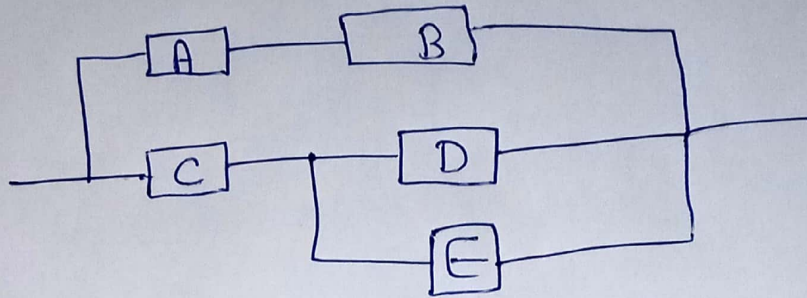
By putting values, we have

$$P(V|D) = 0.614$$

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Question # 02

Part B

According to given statement

$$p = 0.92$$

System is

Solving D || E
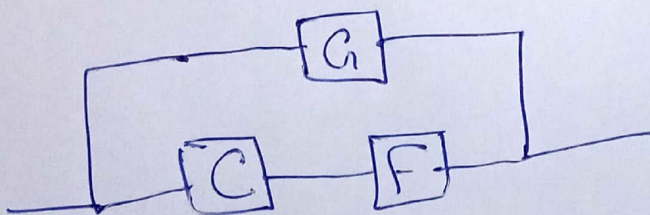
$$P(U) = 1 - (1 - P_D)(1 - P_E)$$

$$P(U) = 1 - (0.08)^2$$

$$\boxed{P(U) = 0.9936}$$

Now, solving A and B which are in series

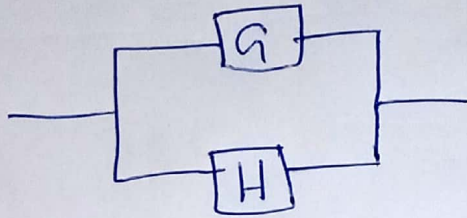$$P_G(U) = 0.92 \times 0.92 = 0.8464$$

Now System reduced to

Now, solving   C + F

$$P_H(U) = (0.92)(0.9936)$$

$$\boxed{P_H(U) = 0.9141}$$

final system is

$$P_S(U) = 1 - (1 - P_H)(1 - P_G)$$

$$= 1 - (1 - 0.8464)(1 - 0.9141)$$

$$\boxed{P_S(U) = 0.9868}$$

So, our given system is approximately

98% reliable.