Answer to question 1

1a) Node E will be explored first.

~~b) The queue will look like~~

Y	x	z

~~c) Node Y will be explored 1st.~~

b) The queue will look like

Y	A	x	B	z	C	D

c) Node Y will be explored First.

2.a) A heuristic $h(n)$ is admissible if it always underestimates the actual cost to ~~the~~ goal.

Here, optimal path cost for H to goal is 7. So, the heuristic must be $h(n) \leq 7$. It can't be more than 7 as it will be overestimation.

For consistency,

Here, $n^* = A$, $h(n^*) = 2$, $h^*(n, n^*) = 5$

We know, $h(n) \leq h^*(n, n^*) + h(n^*)$

$\Rightarrow h(n) - h(n^*) \leq \cancel{h(n, n^*)}\ 5$; it must

6 be satisfied,

For, $n^* = I$

$h(n) - h(n^*) \leq 1$.

That's how consistency is maintained.

b) The formula for consistency ~~s~~ states that ~~each node is admissible~~. search is efficient and fast. A consistent heuristic is always admissible. And, a admissible heuristic is necessary for optimality. That's how the condition ensures optimality.

$$h(n) \leq h^*(n, n^*) + h(n^*)$$

Question : 2

1. I will use Binary encoding

0 → Absent in the population

1 → present in the population

	A	B	C	D	E	F	G
C1	1	1	0	0	0	0	1
C2	0	0	0	0	1	1	1
C3	1	0	1	0	1	1	0
C4	0	0	0	1	1	0	0

Theser are the chromosomes.

2. The fitness function are, consider the profit,

$c1 = A+B+G = 10+5+10 = 25$

$c2 = E+F+G = 6+18+10 = 34$

$c3 = A+C+E+F = 10+15+6+18 = 49$

$c4 = D+E = 7+6 = 13$

∴ c2 and c3 are selected as they are fittest.

Their weight, $c2 = 1+4+8 = 13$

$c3 = \cancel{10}\ 2+5+1+4 = 12$

∴ They are also less than 15.

So, they are selected.

3. Crossover, point = 3

c2 = | 0 | 0 | 0 | 0 | 1 | 1 | 1 | = | 0 | 0 | 0 | 0 | 1 | 1 | 0 |

c3 = | 1 | 0 | 1 | 0 | 1 | 1 | 0 | = | 1 | 0 | 1 | 0 | 1 | 1 | 1 |

4. Mutation,

OS1 = | 0 | 0 | 0 | 0 | 1 | 1 | 0 | => | 0 | 1 | 0 | 0 | 1 | 1 | 0 |

∴ Fitness = B + E + F = 5 + 6 + 18 = 29

OS2 = | 1 | 0 | 1 | 0 | 1 | 1 | 1 | = | 1 | 0 | 1 | 0 | 1 | 0 | 1 |

∴ Fitness = A + C + E + H

= 10 + 15 + 6 + 10 = 41

(Ans)

3.1) BFS:

$\{S^0\}$

$S^0 \{A^6 \; B^2 \; C^1\}$

$A^6 \{B^2 \; C^1 \; D^9 \; G^{26}\}$

$B^2 \{C^1 \; D^9 \; G^{26} \; D^4 \; E^8\}$

$C^1 \{D^9 \; G^{26} \; D^4 \; E^8 \; E^7 \; F^5\}$

$D^9 \{G^{26} \; E^8 \; E^7 \; F^5 \; F^9\}$

$G^{26} \{ \cancel{E \; F^5 \; F^9}$
$E^8 \; E^7 \; F^5 \; F^9\}$

$\therefore$ path $S \to A \to G$, cost $= 26$

ii) DFS

$\{S^0\}$

$S^0 \{A^6 \; B^2 \; C^1\}$

$A^6 \{D^9 \; G^{26} \; B^2 \; C^1\}$

$D^9 \{F^9 \; G^{26} \; B^2 \; C^1\}$

$F^9 \{G^{10} \; G^{26} \; B^2 \; C^1\}$

$G^{10} \{G^{26} \; B^2 \; C^1\}$

~~∴ path → F → G~~

∴ path $S \to A \to D \to F \to G$, cost = 10

iii) UCS :

$$S^0 \{ \}$$

$$S^0 \{ C^1 \ B^2 \ A^6 \}$$

$$C^1 \{ B^2 \ F^5 \ A^6 \ E^7 \}$$

$$B^2 \{ D^4 \ F^5 \ A^6 \ E^7 \}$$

$$D^4 \{ F^5 \ A^6 \ E^7 \}$$

$$F^5 \{ A^6 \ E^7 \ G^{10} \}$$

$$A^6 \{ E^7 \ G^{10} \}$$

$$E^7 \{ G^9 \}$$

$$\cancel{D^7 \{ E^9 \}}$$

$$G^9 \{ \}$$

Path : ~~S → A → D → G~~ S → C → E → G

cost = 9

Question 4)

Performance measure: Reliability, cost, efficiency, quality.

Environment: Bidder, item, auctioneer, room.

Actuator: Speaker, mircophone, display, projector.

Sensor: Camera, price monitoring system, sound detector system.

5. ~~Sa~~ Simulated Anealing uses the analogy of how metal cools and freezes in a minimum energy situation. To build something from metal when the temperature is high it's changed again and again to bring into a good shape. with cooling down the changes also decrease. Simulated anealing follows the same principle. ~~g~~ when the control parameter T is high it makes more and more bad moves. with T bad moves also decreases. with T tends

to zero, it becomes like hill climbing.

We know, $e^{\frac{\Delta E}{T}} > rand(0,1)$. ~~The higher the~~

In high temperature bad moves will happen more often. Because, in $e^{\frac{\Delta E}{T}}$, a larger T will give a ~~smaller~~ larger value cause it's in the ~~deno~~ denominator and ΔE = negative. So, it's ~~less~~ more likely that it will give a ~~value~~ value greater than rand (0, 1). So ~~less~~ more bad moves.

Again, in low temperature $e^{\frac{\Delta E}{T}}$ will give large values, ~~so it~~ and ΔE is negative. So, the computed value will be smaller. The smaller it is, the lesser bad moves. So, in low temperature it will be less bad moves.