Chapter 5

1| (a) Using maximax, the best payoffs are as follows.

Do nothing – $60 thousand

Expand – $80 thousand

subcontract – $70 thousand

The best payoff is the $80 thousand in the second row. Hence, the maximax criterion leads to Expand.

(b) Using maximin, the worst payoffs for the alternatives are as follows:

Do nothing – $50 thousand

Expand – $20 thousand

subcontract – $40 thousand

Since the best is $50 thousand, Do nothing is maximin strategy.

(c) Using Laplace, the row average for the alternatives are as follows:

Alternative	Row total	Row Average
Do nothing	$110	$55
Expand	$100	$50
subcontract	$110	$55

As the above table shows highest average of Do nothing and subcontract are same, it is indifferent between do nothing and subcontract under the laplace criterion.

(d) Minimax regret follows the regret table for the alternatives:

Alternatives	low	High	worst
Do nothing	50-50=0	80-60=20	$20
Expand	50-20=30	80-80=0	$30
subcontract	50-40=10	80-70=0	$10

from the regret table, we can see that the lowest regret is $10 thousand which for subcontract. Thus, sub-contract would be chosen under the minimax regret criterion.

2] (a) Given,

$$P(\text{low}) = 0.3$$

$$P(\text{high}) = 0.7$$

$\therefore EMV_{\text{Do nothing}} = 0.3(50) + 0.7(60) = 57$

$\therefore EMV_{\text{Expand}} = 0.3(20) + 0.7(80) = 62$

$\therefore EMV_{\text{subcontract}} = 0.3(40) + 0.7(70) = 61.$

As Expand shows best profit, it is the best alternative.

(3)

(c) with perfect information we need to choose the alternative that gives the highest payoff in each state:

If, low occurs: best payoff = max(50, 20, 40)

∴ Do nothing - 50

If, high occurs: best payoff = max(60, 80, 70)

∴ Expand - 80

∴ Expected payoff under certainty,

$= 0.3(50) + 0.7(80)$

$= 71.$

∴ EVPI = Expected payoff under certainty $-$ EMV best

$= 71 - 62$

$= 9$

If the contractor ~~called~~ could learn the demand state for less than 9k that information would be worth buying because it would allow

choosing 'Do nothing' under low and Expand under high and increase expected profit by $9 thousand.

4 (a)

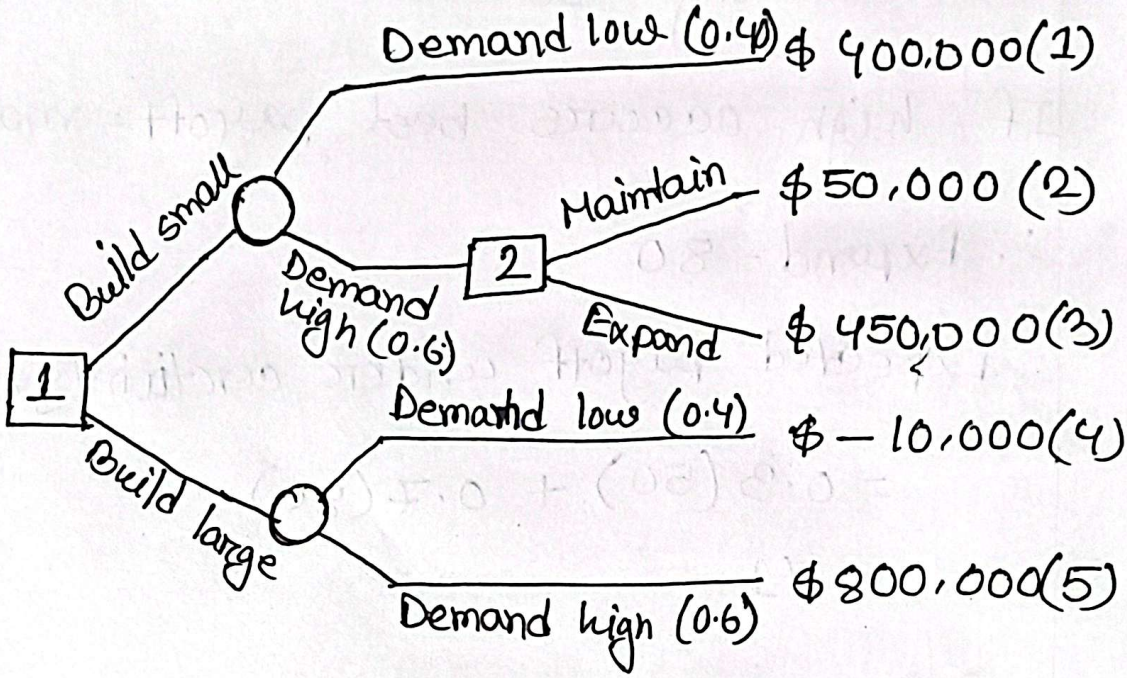

fig: Decision tree

$EV_{small} = 0.4(400) + 0.6(450) = 430$

$EV_{large} = 0.4(-10) + 0.6(800) = 476$

As, $EV_{large} > EV_{small}$. Build large facility.

(4)

(b) from the tree,

If low occurs, best payoff = $400k

If high occurs, best payoff = $800k

∴ Expected payoff under certainty,

$= 0.40(400) + 0.60(800)$

$= 640$

$= 640,000$

∴ EVPI = Expected payoff under certainty
− expected payoff under risk

$= 640,000 - EMV_{best}$

$= 640,000 - 476,000$

$= 164,000$

∴ EVPI = $164000

Perfect information is worth up to $164,000 to the firm, if it could learn demand before committing it could increase expected net present value by $164K by building small under low demand and building large under high demand.

61 (a) Using maximax, the best payoffs are as follows,

Renew – $500,000

Relocate – $5,000,000

The best payoff is $5,000,000 in the second row. Hence, the maximax criterion leads to Relocate.

(b) Using maximin. the worst payoffs for the options are as follows:

Renew – $400,000

Relocate – $10,000

since the best payoff is $400,000, Renew is chosen under maximin criterion

(c) Using laplace, the row average for the options are as follows.

options	Row total	Row Average
Renew	$900,000	$450,000
Relocate	5,010,000	2505,000

(b)

From the table, the highest average is of Relocate. Thus, Relocate is chosen under laplace criterion.

(d) Minimax regret follows the regret table for the options:

options	Motel Approved	Motel Rejected	worst
Renew	5000000 − 400000 = 4600K	400K − 400K = 0	4600,000
Relocate	5000K − 5000K = 0	400K − 10K = 390K	390,000

from the regret table, we can see that the lowest regret is $390,000 which is for the Relocate option. Thus, Relocate is chosen under minimax regret criterion.

13) (a) Using maximin, the worst payoffs for the alternatives are as follows:

Reassign staff - $50

New staff - $60

Redesign collection - $40

Since the best payoff is New staff under $60k, the maximin criterion leads to New staff.

(b) Using maximax, the best payoffs are as follows:

Reassign staff - $85

New staff - $60

Redesign collection - $90

The best payoff is $90k which is under Redesign collection. Thus, Redesign is chosen under maximax criterion.