Exercise – 2.3

Compiled by Dr. AK Chaudhary

B. Practical Problems

1. Mr. Shrestha is on a point to decide whether to stock paddy or rice. If he stocks paddy and if it is a success, he hopes that he can make profit Rs.10000 and if it is a flop, he will lose Rs.2000. If he stocks rice and if it is a success, he thinks that he can make Rs.20000 but if it is a flop, he would lose Rs.5000. From the following probability distribution, construct a decision tree indicating all events.

Probability Distribution

Act / Event	Paddy	Rice
Success	0.6	0.7
Flop	0.4	0.3
Total	1.00	1.00

   (i) Find the total expected monetary value of the two decisions.

   (ii) Advice Mr. Shrestha as to which item he should stock and what would be his maximum possible outcome?

2. The Khanal Publication Pvt. Ltd. has to take a decision regarding publication of any of the three projects offered by an author: Statistical Methods (SM), Quantitative Techniques (QT) and Business Mathematics (BM).

   The probability distribution of these three projects have been estimated as under:

	State of sales			
Project	Very good	Good	Fair	Poor
SM	0.40	0.30	0.20	0.10
QT	0.50	0.25	0.15	0.10
BM	0.25	0.40	0.20	0.15

   The profits expected from the projects under the given states of sale are as follows:

	State of sales			
Project	Very good	Good	Fair	Poor
SM	40000	30000	10000	-5000
QT	25000	15000	5000	-3000
BM	50000	20000	10000	-5000

   Construct a decision tree for the above data and advice the Khanal as to which project it should take up for the publication.

3. A Company has leased as oil mine. It may sell it for Rs.25000 or drill it for oil. The various possible drilling results are given as under along with the probability distribution and rupee consequences.

Possible Results	Probability	Rupee consequences
Dry well	0.10	-100000
Gas well only	0.40	45000
Oil and gas	0.30	98000
Oil well only	0.20	199000

   Draw a decision tree for the above problem and calculate the EMV for the act drill. Should the company drill the mine or sell it?

4. A contractor is in a fix whether to take up the contract A or the contract B. The relative payoffs and the probabilities of both the contracts are as under:

Contract A		Contract B	
Profit Rs.	Probability	Profit Rs.	Probability
100000	0.20	40000	0.30
50000	0.40	10000	0.40
0	0.30		
-30000	0.10	-10000	0.30

   Using decision tree analysis which contract should be selected and what is the expected profit associated with the optimal decision?

5. A company is to select a machine out of two available, an old and a new. The new machine performs better if the raw material is of superior quality, while the old machine performs better with ordinary quality raw materials. Use of superior quality raw material with old machine results in profit of Rs.2000 and of ordinary quality in profit of Rs.1600. Use of superior quality raw material with new machine results in profit of Rs.2400 and ordinary quality material in profit of Rs.800. Probability of availability of superior and ordinary quality raw materials is 0.8 and 0.2 respectively.

   (i) Construct decision tree indicating all events

(ii) What is the total expected monetary value of the two decisions?

(iii) Which of the two is a better choice?

6. An industry must decide to build a large or a small plant to produce a new cassette deck which is expected to have a market life of 10 years. A large plant will cost Rs.2800000 to build and put into operation, while a small plant will cost only Rs.1400000 to build and put into operation. The company's best estimate of a discrete distribution of sales over the 10 year period is as follows:

Demand:	High	Moderate	Low
Probability:	0.5	0.3	0.2

The annual profits of high and moderate demands associated with large plant are Rs.1000000 and Rs.600000 respectively. However, a large plant with low demand would lose Rs.200000 annually because of production inefficiencies. The corresponding annual profits associated with small plant are Rs.250000, Rs.450000 and Rs.550000 respectively.

(i) Construct decision tree indicating all events

(ii) Find the EMV of each decision.

(iii) What should be the better alternative for building plant?

Answers

B.

1. (i) EMV for paddy = Rs.5200, EMV for rice = Rs.12500, (ii) Stock rice

2. EMV for SM = Rs.26500; EMV for QT = Rs.16700; EMV for BM = Rs.21750; it should take up the project for statistical methods for publication.

3. EMV for selling the mine = Rs.25000, EMV for drilling the mine = Rs.77200. It is advised to drill the mine rather than sell it.

4. He should select the contract A, Rs.37000.

5. (ii)EMV for old machine selection = Rs.1920; EMV for new machine selection = Rs.2080;

(iii) New machine.

6. (ii) EMV from large plant = Rs.3600000, EMV from small plant = Rs.2300000

(iii) Build large plant.