[Summary]

Decision Theory

Subject:	Business Economics
Course:	B.A., 4th Semester, Undergraduate
Paper No. & Title:	Paper – 403 Quantitative Techniques for Management
Unit No. & Title:	Unit - 4 Theory of Game, Decision Theory and Decision Analysis
Lecture No. & Title:	Lecture – 2 Decision Theory

Summary

- **Course of action (Acts)**

A decision is made among a set of defined alternative course of action. These are also called actions, acts or strategies and are under control and known to the decision-maker.

- **States of nature (Event)**

Outcomes of any course of action are dependent upon certain factors beyond the control of the decision-maker. These factors are called states of nature.

- **Pay off**

For each combination of an act and states of nature, there will exist an outcome. This outcome may be quantified in terms of monetary value. This outcome of act-event combination is called pay off.

- **Types of decision-making**

Decisions are based upon the information data available about the occurrence of events as well as the decision situation. The types of decision making environment: certainty, uncertainty and risk.

(a)Decision making under certainty

(b)Decision making under risk

(i) Expected Monetary Value (EMV)

EMV $(A_j) = \sum a_{ij} * p_i$

where a_{ij} = payoff associated with state of nature E_i and course of action A_j

p_i = probability of occurrence of states of nature E_i

The course of action for which the EMV is maximum, is recommended.

(ii) Expected Opportunity Loss (EOL)

EOL $(A_j) = \sum l_{ij} * p_i$

where l_{ij} = opportunity loss associated with state of nature E_i and course of action A_j

p_i = probability of occurrence of states of nature E_i

The course of action for which the EOL is minimum, is recommended.

(iii) Expected Value of Perfect Information (EVPI)

EVPI = Expected value with perfect information under certainty – Expected profit without perfect information

EVPI = $\sum a_{ij} * p_i$ - Maximum EMV

Where $a_{ij}{}^*$ = best payoff associated with state of nature E_i

p_i = probability of occurrence of states of nature E_i

(c) Decision making under uncertainty

In this case the decision-maker is unable to specify the probabilities with which the various states of nature will occur.

(i) Maximax or Minimax Criterion

(ii) Laplace Criterion

(iii) Hurwicz Criterion

(iv) Criterion of Regret (Savage Criterion)