



Sankardham Kelavani Mandal's Jashbhai Maganbhai Patel College of Commerce

### Program: F.Y. B. Com.

Semester- I

Course: Mathematical and Statistical Techniques-I

Topic: Decision Theory (Decision Tree)

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A decision tree is graphical representation of a decision process involving multiple stages.

It indicates all course of action, state of nature with associated probabilities and conditional pay-off of a decision problem.

**Decision tree consist of nodes and branches** 

A decision node is represented by a square

Usually it is numbered using capital letters A,B, C,...from left to right

□ State of nature is represented by circle.

□ Usually it is numbered using 1,2,3,... sequentially from left to right.





□ A different course of action originate as branches from decision nodes.

□ At the end of these branches there is state of nature nodes.

□ The state of nature emerges as sub-branches from these nodes.

The probabilities associated to these state of nature and the pay-off are shown on these branches.

This way representation of a decision problem is called Decision Tree.

Decision Tree



# Example: Burger Prince



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### To Draw a decision tree



Identify all decisions (and their alternatives) to be made and the order in which they are to be made

Identify chance events (state of nature) that can occur after each decision

Develop a tree diagram showing the sequence of decision and chance events

The tree is constructed starting from left, moving towards the right.

The square box D denoted a decision node at which available strategies are considered

A circle O represent the chance node or state of nature (events) the various state of nature or outcomes emanate from this chance events

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Obtain probability estimate of the chance of each outcome's occurrence

Obtain estimate consequences of all possible outcomes and actions

Calculate the expected value of all possible outcomes and actions.

Select the action offering the most attracted expected value.







Draw a decision tree for the decision problem below and suggest the best optimal choice

Production option	Market demand		
	Poor	Average	Good
Ρ	100	350	100
Q	150	250	150
probability	0.3	0.55	0.15

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#### Draw a decision tree and give the best

Acts	Events		
	E1	E2	E3
А	20	30	50
В	40	45	30
С	30	25	35
Prob.	0.3	0.5	0.2

## EMV





**Best Course of Action is B** 

Acts	Events		
	E1	E2	E3
А	20	30	50
В	40	45	30
С	30	25	35
Prob.	0.3	0.5	0.2

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