12th May 2017　　　　　　　**1.00 pm to 3.00 pm**　　　　　　　**40 marks**

Notes: 1. First three questions are 8 marks each, fourth question carries 16 marks.
　　　　2. This is a closed book exam.

1.　Given below is a payoff table for different investment alternatives:

	State of Economy (figures in % return)		
Decision Alternative	**Strong**	**Medium**	**Weak**
i) Shares	24	12	-20
ii) Mutual Fund	18	12	5
iii) Fixed Income Sec	8	8	8

Probabilities for the states of Economy are not known. Please suggest optimal decisions under following criteria:
a)　Optimistic (maximize the maximum return)
b)　Pessimistic (maximize the minimum return)
c)　Opportunity Loss (minimize maximum opportunity loss)
d)　Equal likelihood (assume all states with equal probability)
e)　Realistic (your expectations)

2.　At a pizza parlor, pizza sells for Rs.150 apiece if sold on the day it is cooked. After that it sells for Rs.50 apiece. The cost of pizza is Rs.90 apiece to the parlor. The number of pizzas the parlor is able to sell varies from 11 dozens to 20 dozens with uniform probability. The parlor is seeking your help to decide i) how many pizzas it should cook to maximize its profit. ii) The probability of understocking, and iii) The probability of overstocking.

3.　National Motors (NaMo) is planning their production strategy for their next model. Three alternatives production levels are being considered for their model XXX: 30,000, 20,000, and 12,000. NaMo decides to categorize the demand for XXX for the next year as either High (H) or Low (L). The payoffs measured in crores of rupees and probabilities of states of nature are presented in the table below:

| | States of nature (demand) | |
Decision Alternatives	High (H)	Low (L)
Produce 30K	30	-12
Produce 20K	20	8
Produce 12K	8	12
Probabilities	0.60	0.40

For this problem, if we want to draw a decision tree,
1) How many decision nodes are required? How many branches come out of each decision node?
2) How many chance nodes are required? How many branches come out of each chance node?
3) Draw the decision tree. Label each branch completely including probabilities and payoffs.
4) Solve the decision tree and find the best production strategy.

4. An Oil company must decide whether to drill a well or not. If it drills, it might strike high flow of oil (large well) with a probability of 0.2, might strike low flow of oil (small well) with a probability of 0.5, or might not strike oil. The resultant profit is shown in following payoff table (payoff in lacs of Rs.):

| | State of Nature | | |
Decision Alternative	Strike High Flow(s1)	Strike Low Flow(s2)	No Oil(s3)
Drill (d1)	75	45	-15
Donot Drill (d2)	0	0	0

Cost of drilling is Rs.500,000/-.

a. Use a decision tree analysis to recommend optimal decision.
b. Compute EVPI.
c. A geological test of the oil field is expected to report either a favorable (F) or unfavorable (U) condition. The relevant conditional probabilities are as follows:

$$P(F/s1) = 0.90, \quad P(U/s1) = 0.10$$
$$P(F/s2) = 0.60, \quad P(U/s2) = 0.40$$
$$P(F/s3) = 0.40, \quad P(U/s3) = 0.60$$

What is the probability that test report will be favorable? Unfavorable?
d. What is company's optimal strategy?
e. What is expected value of test information (EVSI)?
f. What is the efficiency of test information?