COURSE TITLE: OPERATIONS RESEARCH
COURSE CODE: ECO314
UNITS: 3
TIME ALLOWED: 3 HOURS
INSTRUCTION: ANSWER FOUR (4) QUESTIONS. QUESTION ONE (1) IS COMPULSORY.

Question 1

1a Define Operations Research

1b. State five Significances of Operation Research

1c. List areas of application of operation research (Total mark 25)

Question 2
A company manufactures two products, X and Y by using three machines A, B, and C. Machine A has 4 hours of capacity available during the coming week. Similarly, the available capacity of machines B and C during the coming week is 24 hours and 35 hours respectively. One unit of product X requires one hour of Machine A, 3 hours of machine B and 10 hours of machine C. Similarly one unit of product Y requires 1 hour, 8 hour and 7 hours of machine A, B and C respectively. When one unit of X is sold in the market, it yields a profit of N 50/- per product and that of Y is N 70/- per unit.
Solve the problem by using graphical method to find the optimal product mix. (Total mark 15)

Question 3
A retail store stocks two types of shirts A and B. These are packed in attractive cardboard boxes. During a week the store can sell a maximum of 400 shirts of type A and a maximum of 300 shirts of type B. The storage capacity, however, is limited to a maximum of 600 of both types combined. Type A shirt fetches a profit of N 20/- per unit and type B a profit of N 50/- per unit. How many of each type the store should stock per week to maximize the total profit?
Formulate a mathematical model of the problem. (Total mark 15)

Question 4
A company produces three products A, B and C by using two raw materials X and Y. 4000 units of X and 6000 units of Z are available for production. The requirement of raw materials by each product is given below:

Machines	Requirement per unit of product		
	A	B	C
X	2	3	5
Y	4	2	7

(Total mark 15)

Question 5

A particular raw material input has a demand of 9000 unit/year. The cost of a single procurement is N100 and the holding cost per unit is N 2.40k per year. The replacement is instantaneous and no shortages are allowed.

Determine:

   i.   The economic lot size
  ii.   The number of orders per year
 iii.   The time between orders
 iv.   The total cost per if the cost of one unit is N1. (Total mark 15)