NATIONAL OPEN UNIVERSITY OF NIGERIA
14/16 AHMADU BELLO WAY, VICTORIA ISLAND, LAGOS
SCHOOL OF SCIENCE AND TECHNOLOGY
JUNE/JULY EXAMINATION

COURSE CODE: CIT425
COURSE TITLE: OPERATIONS RESEARCH
TIME ALLOWED:2 HOURS
INSTRUCTION: Answer any four questions

1. (a) List fourbasic facts of Operations Research as a concept

   (b) Explain why Operations Research is regarded as an adaptation of scientific approach**.**

   (c) Enumerate the Seven Stages of Operations Research

2. (a) Explain the terms;Modeling and Models.

   (b) The sales manager of Turnover Limited maintains he could increase the sales turnover (inunits) of any of the company's product by 50 percent if he was authorised to give a 10% price discount and place appropriate additional advertising matter. The Board wishes to know the maximum additional advertising expense they can incur in respect of any given product without the manager's proposal resulting in a smaller profit.

3. A calculator company produces a scientific calculator and a graphing calculator. Long-term projections indicate an expected demand of at least 100 scientific and 80 graphing calculators each day. Because of limitations on production capacity, no more than 200 scientific and 170 graphing calculators can be made daily. To satisfy a shipping contract, a total of at least 200 calculators much be shipped each day.

   If each scientific calculator sold results in a N2 loss, but each graphing calculator produces a N5 profit, how many of each type should be made daily to maximize net profits?

4. A convalescent hospital wishes to provide at a minimum cost, a diet that has a minimum of $200g$ of carbohydrates, $100g$ of protein and $120g$ of fats per day. These requirements can be met with two foods:

Food	Carbohydrates	Protein	Fats
A	$10g$	$2g$	$3g$
B	$5g$	$5g$	$4g$

   If food A cost $29k$ per ounce and food B cost $15k$ per ounce, how many ounces of each food should be purchased for each patient per day in order to meet the minimum requirements at the lowest cost?

You are required to formulate the LP model.

5. Big Bros. Inc. is an investment company doing an analysis of the pension fund for a certain company. A maximum of ¿10 million is available to invest in two places. No more than ¿8 million can be invested in stocks yielding 12% and at least ¿2 million can be invested in long-term bonds yielding 8% . The stock-to-bond investment ratio cannot be more than 1 to 3 . How should Big Bros. advise their client so that the pension fund will receive the maximum yearly return on investment? You are required to formulate the required LP model

6. A farmer has 100 acres on which to plant two crops: corn or wheat. To produce these crops, there are certain expenses as shown in the table.

Item	Cost per Acre (¿)¿
Corn	
Seed	12
Fertilizer	58
Planting/care/harvesting	50
Total	120
Wheat	
Seed	40
Fertilizer	80
Planting/care/harvesting	90
Total	210

After the harvest, the farmer must store the crops awaiting proper market conditions. Each acre yields an average of 110 bushels of corn or 30 bushels of wheat. The limitations of resources are as follows:

Available capital: ¿15,000 .

Available storage facilities: 4,000 bushels.

If net profit (the profit after all expenses have been subtracted) per bushel of corn is ¿1.30 and for wheat is ¿2.00 , how should the farmer plant the 100 acres to

maximize the profits?