



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

COURSE CODE: CIT756

COURSE TITLE: OPERATIONS RESEARCH

TIME ALLOWED: 2 HOURS

INSTRUCTION: Answer any four questions

1. (a) Define the term Operations Research.
(b) List and explain the stages in Operations Research.
(c) Briefly explain the role of Operations Research in business sector.
2. (a) Differentiate between the following mathematical models:
Quantitative and Qualitative
Probabilistic and Deterministic
Linear and Non Linear
(b) Outline the steps involved in transforming a real-life problem into a mathematical
- 3 ONIJOGBO manufactures two types of settee; half-upholstered and full-upholstered. The contribution per unit to profit is ₦80 for half-upholstered and ₦90 for full-upholstered. The amount of materials needed per product and maximum available materials are given below:

Product	Unit of Material		
	Wood	Foam	Cover
Half-upholstered	2	2	5
Full-upholstered	1	4	5
Maximum available	12	24	35

Required: formulate the linear programming model for the above problem.

4. Solve the linear programming using Simplex method.

Max $x_1 + x_2$

Subject to: $2x_1 + x_2 \leq 4$

$x_1 + 2x_2 \leq 3$

With: $x_1 \geq 0, x_2 \geq 0$

5 The sales manager of Turnover Limited maintains he could increase the sales turnover (in units) of any of the company's product by 50 percent if he was authorized to give a 10% price discount and place appropriate additional advertising matter.

Required:

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.

6. 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 clients so that the pension fund will receive the maximum yearly return on investment? You are required to formulate the required LP model