

**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 N80 for half-upholstered and N90 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 |  |  |  |
| Full-upholstered |  |  |  |
| Maximum available |  |  |  |

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

4. Solve the linear programming using Simplex method.

Max x1  + x2

Subject to: 2X1 +X2 ≤ 4

 X1 +2X2 ≤ 3

With: X1 ≥ 0, X≥ ≥ 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  percent if he was authorized to give a  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 million is available to invest in two places. No more than million can be invested in stocks yielding  and at least million can be invested in long-term bonds yielding. The stock-to-bond investment ratio cannot be more than  toHow 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