



NATIONAL OPEN

UNIVERSITY OF

NIGERIA

University Village, Plot 91, Cadastral Zone, Nnamdi Azikiwe Express Way, Jabi, Abuja

FACULTY OF SCIENCES

JULY 2017 EXAMINATION

Course Title: CIT425: Operations Research

Credit Unit: 3

Instruction: Answer question one and three others

Time: 3hrs

Question One

1a). Explain the term Operations Research and also describe the role, and limitations.

10marks

1b). Enumerate the types of models used in Operations Research.

2marks

1c). Write short note on the following programs :

- i. linear programs **-1mark**
- ii. quadratic program **-1mark**
- iii. integer program **-1mark**

1d) The sales manager of Turnover Limited maintains he could increase the sales turnover (in units) of any of the company's product by 50 per cent if he was authorized to give a 10% price discount and place appropriate additional advertising matter. The Board wish 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. **-10marks.**

Question Two

2a). In a Simplex method what do change of Basis means?

-3marks

2b). Mention and explain any five applications of Linear Programming to Business.

5marks.

2c). Maximise $Z = 2x_1 + 4x_2 - 3x_3$

Subject to the constraints.

$$x_1 + x_2 + x_3 > 8$$

$$x_1 - x_2 > 1$$

$$3x_1 + 4x_2 + x_3 > 40$$

-7marks

Question Three

3a). What are the constraints in the formulation of Linear Programming Models? **-3marks**

3b). Hallbottle 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

Formulate the linear programming model for the above problem

-12marks

Question Four

4a). Under Cutting-Plane Algorithm Fractional algorithm and mixed algorithm are applied to the two problems respectively, what are the five steps involved in finding the solutions?

-5marks

4b). Write short note on the following assumptions of Linear Programming

- | | |
|---------------------|----------------|
| I. Certainty | -2marks |
| II. Proportionality | -2marks |
| III. Additivity | -2marks |
| IV. Divisibility | -2marks |
| V. Non-negativity | -2marks |

Question Five

5a). Explain the important terms in Dynamic programming that you have learnt. **-5marks**

5b). State and explain the steps that are involved in the formulation and solution of Dynamic programming. **- 5marks**

5c). State any five characteristics general transportation tableau .

-5marks

Question Six

6a). Explain the concept of Transportation problem in Operation Research

-3marks

6b). What are the general form of a transportation problem for ' m ' sources and ' n ' destination

-6marks

6c). Mention three methods used to find the initial feasible solution

-6marks