NATIONAL OPEN UNIVERSITY OF NIGERIA
14-16 AHMADU BELLO WAY, VICTORIA ISLAND LAGOS
MARCH/APRIL 2016 EXAMINATION

SCHOOL OF SCIENCE AND TECHNOLOGY

COURSE CODE: **FMT309**
COURSE TITLE: **MATHEMATICAL PROGRAMMING I**
TIME ALLOWED **(3 HRS)**
INSTRUCTION: **Answer any 3 questions.**

1. A company manufactures two products A and B. These products are processed in the same machine. It takes 10 minutes to process one unit of product A and 2 minutes for each unit of product B and the machine operates for a maximum of 35 hours in a week. Product A requires 1kg and B 0.5kg of raw material per unit, the supply of which is 600kg per week. Market constraints on product B is known to be minimum of 800 units every week. Product A costs N 5 per unit and sold at N 10. Product B costs N 6 per unit and can be sold in the market at a unit price of N 8. Determine the number of units of A and B per week to maximize the profit. 23marks

2. State the steps or Procedures involved for solving LPP by graphical method. 23marks

3. Solve the following LPP by graphical method.

Minimize $z=20x_1+10x_2$

Subject to. $x_1+2x_2\leq 40$

$3x_1+x_2\geq 30$

$4x_1+3x_2\geq 60$

with $x_1,x_2\geq 0$

23marks

4. Use the simplex method to solve the linear programming problem.

Minimize $z=2x_1-x_2+2x_3$

Subject to. $2x_1+x_2\leq 10$

$x_1+2x_2-2x_3\leq 20$

$x_2+2x_2\leq 5$

with $x_1,x_2,x_3\geq 0$ 23marks

5. A small petroleum company owns two refineries. Refinery 1 costs N 20,000 per day to operate, and it can produce 400 barrels of high-grade oil, 300 barrels of medium-grade oil,

and 200 barrels of low-grade oil each day. Refinery 2 is newer and more modern. It costs N 25,000 per day to operate, and it can produce 300 barrels of high-grade oil, 400 barrels of medium-grade oil, and 500 barrels of low-grade oil each day. The company has orders totaling 25,000 barrels of high-grade oil, 27,000 barrels of medium grade oil, and 30,000 barrels of low-grade oil. How many days should it run each refinery to minimize its costs and still refine enough oil to meet its orders? 23marks.