NATIONAL OPEN UNIVERSITY OF NIGERIA
14-16 AHMADU BELLO WAY, VICTORIA ISLAND LAGOS
SEPTEMBER/OCTOBER 2015 EXAMINATION

SCHOOL OF SCIENCE AND TECHNOLOGY

COURSE CODE: CIT756
COURSE TITLE: OPERATIONS RESEARCH

INSTRUCTION: ***Answer any FOUR questions.*** **Time: 3 HOURS**

1.
   a. Briefly describe what Operations Research is. *(5 marks)*
   b. List five limitations of Operations Research. *(10 marks)*
   c. Briefly describe the role of a digital computer in operations research. *(5 marks)*

2.
   a. Write brief notes on the following:
      i. Simulation model
      ii. Iconic model *(8 marks)*
   b. Distinguish between probabilistic and deterministic models. *(6 marks)*
   c. Briefly describe the main features of a dynamic model. *(4 marks)*

3.
   a. A linear programming problem is paused as follows: Find the values of and that will minimize the sum subject to the following constraints:

      Using a graphical method or otherwise solve the problem. *(15 marks)*

   b. Briefly describe 5 classes of mathematical models. (5 marks)

4.
   a. Briefly explain what Linear Programming is mentioning five major assumptions made in applying it. (10 marks)
   b. Explain Vogel's Approximation Method and describe its algorithm. (6 marks)
   c. State and explain the concept of Optimality. (4 marks)

5.
   a. Write a brief note on three approaches in the analysis and interpretation of a business problem. (6 marks)
   b. A cement manufacturer has three plants (one each in Ashaka, Katsina and Obiajana) and distributes the product to four warehouses (one each in Enugu, Kaduna, Kano and Lagos). The capacity of the plants and the demands of the warehouse are stable and have values as shown in the following table. The unit shipping costs are also indicated in the intersection squares of the table. Determine an optimal distribution plan for the company.

	WAREHOUSES				**MONTHLY CAPACITY**
PLANTS	ENUGU	KADUNA	KANO	LAGOS	
ASHAKA	10	6	6	12	**50**
KATSINA	12	5	4	12	**40**
OBIAJANA	7	6	7	7	**80**
MONTHLY DEMANDS	**35**	**30**	**45**	**50**	170 160

(14 marks)

6.

a. Write down three basic characteristics of a queuing system. (*6 marks*)

b. The marketing department has collected data regarding the deployment of salespersons and sales made in three zones of its target market. There is evidence that sales are directly dependent on the number of salespersons in each zone as indicated by the collected data shown in the table below. If the company has decided to retain 9 salespersons during next year determine the allocation plan for these salespersons to the three zones so as to maximize sales.

NO. OF SALESPERSONS	PROFITS IN THOUSANDS OF NAIRA		
	ZONE 1	ZONE2	ZONE3
0	30	35	40
1	35	45	45
2	40	60	55
3	55	70	65
4	65	80	75
5	75	90	85
6	85	95	95
7	100	100	105
8	95	95	115
9	85	100	95

(*14 marks*)