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NATIONAL OPEN UNIVERSITY OF NIGERIA
91, Cadastral Zone, NnamdiAzikiwe Express Way, Jabi-Abuja
FACULTY OF MANAGEMENT SCIENCES
Month 2017 EXAMINATION

Course Code: PAD 813
Course Title: Quantitative Methods
Credit Unit: 2
Instructions: 1. Attempt Question 1 and any other two (2) questions
2. Question 1 is compulsory and carries 30marks while the other 2 questions carry 20marks each
3. Present all your points in coherent and orderly manner
Time Allowed: 2 Hours

Solve for the unknowns in the following linear equations:

1ai. $15_X - 12 = 6_X$

1aii. $\frac{12_X + 6 - 18_X - 6}{3 \quad 6} = 24$ **6 marks**

1b. Explain the relevance of the quantitative techniques to the business organization and critically explain the tools of quantitative analysis. **6 marks**

1c. Solve for x in the quadratic equation:
i. $X^2 + 8X - 48 = 0$

Solve for x in:
ii. $2x^2 - 18x + 6 = 0$ **6 marks**

1d. XYZ Company produces product A for which cost (including labour and material) is N3/unit. Fixed cost is N60, 000. Each unit is sold for N12. Determine the number of units which must be sold for the company to earn a profit of N60, 000.
6 marks

1e. A total of N20, 000 was invested in two business ventures, A and B. At the end of the first year, A and B yielded returns on the original investments of 5 percent and 3.75 percent respectively. How was the original amount allocated if the total amount earned was N788.75? **6 marks**

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2a. A publishing company finds that the cost of publishing each copy of a magazine is N0.40K. The revenue from dealers of the magazine is N0.45K per copy. The advertising revenue is 10% of the revenue received from dealers for all copies sold beyond 18,000 units. What is the least number of copies which must be sold so as to have a positive profit? **8 marks**

2bi. Let $P = 90 - q^2$ represent a demand function. Find the rate of change of price, P, with respect to unit changes in q. How fast is the price changing with respect to q, when q = 4, assuming that P is in naira?

2bii The demand equation for a manufacturer's product is given by:

$$P = \frac{150 - X}{5}$$

At what value of X will there be a maximum revenue? What is the maximum revenue?

6 marks

2c Suppose the prices in N per unit for products A,B, and C are

represented by the price matrix:

	A	B	C	
Price of	[1,	2	3]	P = (1 x 3)

The quantities purchased are given by the quantity matrix:

$$Q\ (3 \times 1) = \begin{bmatrix} 4 \\ 7 \\ 2 \end{bmatrix}$$

4 unit A
7 unit B
2 unit C

Compute the total expenditure on the products.

6 marks

3a A display of 25 T-shirts in a Sports shop contains three different sizes: small, medium and large. Of the 25 T-shirts:
8 are small
12 are medium
5 are large.
If two T-shirts are randomly selected from the T-shirts, what is the probability of selecting both a small Tshirt and a large T-shirt, the first not being replaced before the second is selected? **4 marks**

3b. Consider a set of data on monthly sales of a company's product, the mean of which was found to be N440, 000; the mode found to be N125, 000; and the standard deviation found to be N80, 000. Calculate the Pearson's No. 1 Coefficient of skewness. **4 marks**

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3c. The purchasing department of a big company has analysed the number of orders placed by each of the 5 departments in the company by type as follows:

Type of Order	DEPARTMENTS					
	Sales	Purchasing	Production	Account	Maintenance	Total
Consumables	12	12	5	8	7	44
Equipment	1	5	12	3	2	23
Special	5	3	4	5	1	18
Total	18	20	21	16	10	85

An error has been found in one of these orders. What is the probability that the incorrect order:

i. came from maintenance?
ii. came from production?
iii. came from maintenance or production?
Iv came from neither maintenance nor production? **4 marks**

3d. Example: A sample of 12 auto mechanics was ranked by the supervisor regarding their mechanical abilityand their social compatibility. The results are as follows:

Worker	Mechanical Ability	Social compatibility
1	1	4
2	2	3
3	3	2
4	4	6
5	5	1
6	6	5
7	7	8

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Compute the coefficient of rank correlation can we conclude that there is a positive association in the population between the ranks of mechanical ability and social compatibility?

6 marks

3e. Explain the limitations of the theory of linear correlation **2 marks**

4a. The average consumer prices, in naira per Kg, for some staple food items in 2000 and 2006 are given in the following table below. you are required to find the Aggregate Price Index for 2006, using 2000 as the base year.

Average Consumer Prices for Selected Staple Food Items

Item	**2002**	**2008**
Wheat Flour	20	45
Sugar	18	28
Ground beef	102	175
Frying Chicken	45	80

8 marks

4b. The following data are in respect to a set of commodities used in a given production process. You are required to compute the Laspeyres and Paasche price indices for the year 2006: 2003 (base Year)

2003 (based year) Commodity	Units Purchased	Price (Po) Naira	Quantity (Qo) Units	Price (Pn) (Naira)	2006 Quantity (Qn) Units
A	2 Drums	35	100	50	95
B	1ton	75	12	120	10
C	10 Kg	40	16	49	18
D	100 metres	8	1100	11	1200

8 marks

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4c. what are the limitations index numbers in measuring price level.

4 marks

5a. write notes on the followings

i. Ordering (Replacement) Costs
ii. Holding (Carrying) Costs
iii. Stock out Costs
iv. Economic Ordering Quantity (EOQ)
v. Lead Time
vi. Safety Stock **8 marks**

5b The managing director of a large manufacturing company is considering three potential locations as sites at which to build a subsidiary plant. To decide which location to select for the subsidiary plant, the managing director will determine the degree to which each location satisfies the company's objectives of minimising transportation costs, minimising the effect of local taxation, and having access to an ample pool of available semi-skilled workers. Construct a payoff table and payoff measures that effectively rank each potential location according to the degree to which each satisfies the company's objectives. **6 marks**

5c A commodity has a steady rate of demand of 5,000 units per year.
Placing an order costs N250 and it costs N80 to hold a unit for a year:

i. Estimate the Economic Order Quantity (EOQ)
ii. Find the number of orders placed per year
iii. What is the length of the inventory circle?

6 marks