UNIVERSITY OF GHANA
FIRST SEMESTER EXAMINATIONS: 2014/ 2015
LEVEL 200: BACHELOR OF SCIENCE IN ENGINEERING
BMEN 309: RESEARCH METHODS
TIME ALLOWED: 1 HOUR (1 CREDIT)

Answer ALL questions.

1. Explain and illustrate the procedure for selecting a random sample.

    (12 pts)

2. "A systematic bias results from errors in the sampling procedures".
    - (a) What is systematic bias?   (8 pts)
    - (b) Describe the important causes responsible for such a bias.

    (10 pts)

3. The following are the number of hospitals in 10 cities: 35, 27, 24, 32, 42, 30, 34, 40, 29 and 38. If we want to select a sample of 15 hospitals using cities as clusters and selecting within clusters proportional to size, how many hospitals from each city should be chosen? (Use a starting point of 4)

    (12 pts)

4. A certain population is divided into five strata so that $N1 = 2000$, $N2 = 2000$, $N3 = 1800$, $N4 = 1700$, and $N5 = 2500$. Respective standard deviations are: $\lceil 1 = 1.6$, $\lceil 2 = 2.0$, $\lceil 3 = 4.4$, $\lceil 4 = 4.8$, $\lceil 5 = 6.0$. The expected sampling cost in the first two strata is 4 Ghana Cedis per interview and in the remaining three strata the sampling cost is 6 Ghana Cedis per interview. How should a sample of size $n = 226$ be allocated to five strata if:
    - (a) we adopt proportionate sampling design   (10 pts)
    - (b) we adopt disproportionate sampling design considering
        - (i)   only the differences in stratum variability   (10 pts)
        - (ii) differences in both stratum variability and stratum sampling costs.

    (16 pts)

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5. List the sequence of events you will use to identify an irresistible research question.
(6 pts)

6. The miniature proposal is very important and allows you to measure your strengths in executing the project.
   (a) What is the name given to the miniature proposal? (2 pts)
   (b) What are the elements of this miniature proposal? (12 pts)
   (c) What follows the miniature proposal? (2 pts)

7. There are two types of statements you make to assess the success of a proposed research.
   (a) What are they? (2 pts)
   (b) Which of them is preferred in the scientific community? (2 pts)
   (c) Explain the difference between significance and innovation. (8 pts)

The end of the test

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