



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2015/2016

SECOND SEMESTER EXAMINATION FOR THE DEGREE OF MASTER OF PUBLIC  
POLICY AND ADMINISTRATION

APP 801: QUANTITATIVE TECHNIQUES FOR PUBLIC POLICY

DATE: THURSDAY 7<sup>TH</sup> APRIL 2016

TIME: 5.30 P.M. - 8.30 P.M.

---

**Instructions:**

- Attempt ALL questions
- Time Allowed – 3 hours

**Question One**

- a) State any four application areas of linear programming in business decisions making. [4marks]
- b) A company produces three products P, Q and R using raw materials A,B and C. One unit of P requires 1, 2 and 3 units of A,B, and C respectively. One unit of Q requires 2, 3 and 2 units of A,B, and C respectively. One unit of R requires 1, 2 and 2 units of A,B, and C respectively. The number of units available for raw materials A,B and C are 8, 14 and 13 units respectively. Using matrix approach, determine the number of units of each product to produce in order to utilize completely the available resources. [6marks]
- c) An auditor from the Ministry of Education claims that 10% of invoices for a certain secondary school are incorrect. To test this claim a sample of 100 invoices were checked and 12 were found to be incorrect. Test, at the 5% significance level, if the auditor's claim is supported by the sample evidence. [7marks]
- d) The total cost and total revenue functions for a product are:
- $C(q) = 40,000 + 25q + 0.025q^2$  and  $R(q) = 75q - 0.008q^2$
- i) Using the marginal approach, determine the profit-maximizing level of output. [5marks]
- ii) What is the maximum profit? [3marks]

### Question Two

The following data relate to a typical project:

| Activity | Duration in Weeks | Preceding activities |
|----------|-------------------|----------------------|
| A        | 3                 | -                    |
| B        | 4                 | A                    |
| C        | 4                 | A                    |
| D        | 2                 | C                    |
| E        | 4                 | A                    |
| F        | 6                 | C                    |
| G        | 3                 | D,B                  |
| H        | 1                 | E                    |
| I        | 12                | F,G                  |
| J        | 2                 | I,H                  |

#### Required:

- Briefly explain three main functions in project management (6marks)
- Set up the network showing the various activities and duration (5marks)
- Determine the critical path of the project (5marks)
- What is the longest period that the project can take to complete? (4marks)
- Suppose the progress status of the project on the 10<sup>th</sup> week is as given in the table below. Establish whether the project is on schedule. (5marks)

| Activity | Percentage completed |
|----------|----------------------|
| A        | 100                  |
| B        | 100                  |
| C        | 100                  |
| D        | 75                   |
| E        | 100                  |
| F        | 60                   |
| G        | 0                    |
| H        | 20                   |
| I        | 0                    |
| J        | 0                    |

### Question Three

- State and explain the procedure for hypothesis testing [6marks]
- Assume you are the marketing director of Matriks daily newspaper and the results of a study on relationship between the type of community the reader lives in and the portion of the paper he or she reads first is as given below.

|       | National news | Sports | Comics |
|-------|---------------|--------|--------|
| Urban | 170           | 124    | 90     |
| Rural | 120           | 112    | 100    |
| Farm  | 130           | 90     | 88     |

- i) At the 0.1 significance level, can we conclude there is a relationship between the type of community where the person resides and the portion of paper read first?

(9 marks)

- c) Differentiate between the following concepts

- |       |                                            |           |
|-------|--------------------------------------------|-----------|
| (i)   | One tail and two tail tests                | [3marks]  |
| (ii)  | Confidence level and level of significance | [4marks]  |
| (iii) | Estimator and Estimate                     | [3 marks] |

#### Question Four

- a. One hundred Kenyatta University bachelor of commerce students were asked about their readership of three Newspaper; KU weekly K.M Times and Sirikali. The following results were obtained. 1 student reads all the three, 6 read Sirikali and KU weekly, 10 read K.M Times and KU weekly, 20 read Sirikali and K.M Times, 15 read KU weekly, 40 read K.M times and 25 read the Sirikali.

- How many read none of these?
- How many read Sirikali?
- How many read neither the Sirikali nor times?
- What percentage read Sirikali if and only if they read the K.U weekly?  
(4marks each )

- b. A community which is located in a resort area is trying to decide on the parking fee to charge at the town-owned beach. There are other beaches in the area, and there is competition for bathers among different beaches. The Town has determined the following function which expresses the average number of cars per day  $q$  as a function of the parking fee  $p$  stated in shillings

$$q = 6,000 - 12p$$

- i. Determine the fee which should be charged to maximize daily beach revenues

(3marks)

- ii. What is the maximum daily beach revenue expected to equal (3marks)
- iii. How many cars are expected on an average day? (3marks)

**Question five**

- a) Ten job applicants were ranked by an interviewer in order of preference from 1 (lowest) to 10(highest). The ten applicants also sat an aptitude test. The interviewer's rankings, the aptitude scores and the applicants' ages are shown below:

|           |     |     |    |     |     |    |     |     |     |     |
|-----------|-----|-----|----|-----|-----|----|-----|-----|-----|-----|
| Applicant | A   | B   | C  | D   | E   | F  | G   | H   | I   | J   |
| Ranking   | 5.5 | 7   | 2  | 10  | 9   | 1  | 3   | 8   | 5.5 | 4   |
| Aptitude  | 105 | 110 | 90 | 120 | 125 | 95 | 100 | 120 | 110 | 110 |
| Age       | 35  | 24  | 45 | 20  | 20  | 40 | 30  | 18  | 35  | 22  |

- i) Find the Pearson correlation coefficient between aptitude and age and comment on the results. [5 marks]
- ii) Find the equation of the least squares regression line, assuming that aptitude is the dependent variable (Y) and age is the independent variable (X). [5marks]
- iii) Comment on the usefulness of the regression equation estimated in part (b). [3marks]
- iv) Rank the aptitude scores giving 1 to the lowest score and 10 the highest. [2marks]
- v) Calculate Spearman's rank correlation coefficient between the interview's rankings and the aptitude rankings, and interpret the results. [5marks]
- b) The mean and standard deviation in a CAT marked out of 15 for a group of 10 APP 801 students were calculated as 9.5 and 2.5 respectively. Later on, an additional script became available. The score on it was 15 and was thus included in the original batch. Find the new mean and standard deviation for the 11 students. [5marks]

\*\*\*\*\*