



# UGANDA MANAGEMENT INSTITUTE

POSTGRADUATE DIPLOMA IN MANAGEMENT (DIMA); HUMAN RESOURCE MANAGEMENT (DHRM);  
PROJECT PROCUREMENT & MANAGEMENT (DPPM); PUBLIC ADMINISTRATION AND  
MANAGEMENT (DPAM); FINANCIAL MANAGEMENT (DFM); PROCUREMENT & SUPPLY CHAIN  
MANAGEMENT (PSCM); MARKETING MANAGEMENT (DMM); INFORMATION SYSTEMS  
MANAGEMENT (DISM); PUBLIC POLICY AND GOVERNANCE (DPPG); MONITORING AND  
EVALUATION (DME), MANAGEMENT INFORMATION SECURITY (DISEM)(EVE)

## FIRST SEMESTER EXAMS 2017/2018

**MODULE: QUANTITATIVE METHODS**

**Date: Monday 22 January 2018**

**Time: 04.00 PM – 07.00 PM**

### INSTRUCTIONS

1. Answer FOUR Questions.
2. Question ONE of Section A is compulsory and carries 40 marks.
3. Answer any other THREE Questions from Section B. Each question carries 20 marks.
4. Write clearly and legibly.
5. Do not write anything on the question paper.
6. Do not take Mobile Phones into the examination room.
7. Follow the instructions of the Examination Supervisor.
8. Indicate questions answered on the Answer Sheet in the column of Questions.

This paper consists of 6 printed pages.

*-GOOD LUCK-*

## SECTION A:

## COMPULSORY

(40 MARKS)

**QUESTION ONE**

You are a project manager and you hope that after teaching a project management class, performance has significantly improved from the baseline score of 50% (before the teaching). To test this claim call it hypothesis data was collected about performance of participants after the teaching and below is the performance of 60 participants of the project planning class in a project cost management examination.

These are % scores in an examination of February 2013.

Assume that this is a representative sample of project cost management class, and the entire class is normally distributed:

|    |    |    |    |    |    |
|----|----|----|----|----|----|
| 63 | 74 | 53 | 60 | 39 | 80 |
| 63 | 50 | 39 | 60 | 87 | 80 |
| 71 | 46 | 49 | 35 | 59 | 75 |
| 74 | 73 | 42 | 83 | 43 | 62 |
| 33 | 71 | 51 | 64 | 70 | 86 |
| 56 | 44 | 64 | 51 | 35 | 79 |
| 68 | 66 | 60 | 46 | 49 | 63 |
| 67 | 56 | 77 | 50 | 75 | 69 |
| 62 | 50 | 71 | 60 | 64 | 62 |
| 63 | 51 | 74 | 57 | 78 | 68 |

**Required:**

- Using classes starting from 30-39, etc. construct a frequency distribution; **[5 marks]**
- From a) compute the mean, median, mode and the standard deviation; **[12 marks]**
- Compute skewness of distribution and comment on the class performance. **[5 marks]**
- Test the hypothesis at 5% level of significance that participants benefit from teaching in project cost management. **[8 marks]**
- Comment on the relevance of quantitative methods in project /business decision making. **[10 marks]**

**SECTION B: ANSWER ANY THREE QUESTIONS FROM THIS SECTION****QUESTION TWO**

A public policy maker and human welfare activist for the urban communities in Uganda theorized that there is positive relationship between household size and average daily food expenditure for urban households. In order to prove that relationship and come up with some appropriate welfare improvement public policy intervention for urban households, some data were collected from a randomly selected sample of ten (10) households in an urban area on household size (X) and average daily food expenditure (Y) (in \$) per urban household in Kampala central region of Uganda as indicated below:

|  |   |    |   |    |   |   |   |   |    |   |
|--|---|----|---|----|---|---|---|---|----|---|
| Household size (X)                                   | 1 | 3  | 2 | 4  | 3 | 4 | 2 | 4 | 5  | 1 |
| Household average daily food expenditure (\$)<br>(Y) | 6 | 10 | 5 | 10 | 7 | 9 | 5 | 8 | 12 | 4 |

**Required:**

- Using the least squares method on the above data, determine the “regression equation for estimating the “line of best fit” for predicting the relationship between average food expenditure (Y) and household size (X). Hence, estimate the daily food expenditure when household size is 10. **[10 marks]**
- Find the correlation coefficient and coefficient of determination and state the degree of relationship between household size and average daily food expenditure and comment on your findings. **[5 marks]**
- State any five applications of the measures of relationships in management. **[5 Marks]**

**QUESTION THREE**

Togikwatako Ltd.-a manufacturing company has received a special order for a number of units of a special product that consists of two component parts, X and Y. The product is a nonstandard item that the firm has never produced before, and scheduling personnel have decided that the application of PERT/CPM is warranted. A team of manufacturing engineers has prepared the following table:

| Activity | Description                  | Immediate predecessors | Expected time (days) |
|----------|------------------------------|------------------------|----------------------|
| A        | Plan production              | -                      | 5                    |
| B        | Procure materials for part X | A                      | 14                   |
| C        | Manufacture part X           | B                      | 9                    |
| D        | Procure materials for part Y | A                      | 15                   |
| E        | Manufacture part Y           | D                      | 10                   |
| F        | Assemble parts X and Y       | C,E                    | 4                    |
| G        | Inspect assemblies           | F                      | 2                    |
| H        | Completed                    | G                      | 0                    |

**Required:**

- i. Construct a graphical representation of the CPM network. **[5 marks]**
- ii. Identify the critical path. What is its length? How do you know it is the critical path? **[5 marks]**
- iii. Draw the Gantt chart **[3 marks]**
- iv. What are the uses of critical path method to a manager? **[5marks]**
- v. What are the limitations of the CPM model? **[2 marks]**

**QUESTION FOUR**

A company produces 2 products x and y. Product x requires 30 minutes of labour while y requires 15 minutes of labour. Product x consumes 2 kilograms of raw materials and y consumes 4 kilograms of raw materials. Product x requires 3 minutes of testing while y requires 4 minutes of testing. In any week, only 30 hours of labour and 280 kilograms of raw materials are available. The testing machine can only be used for 4 hours a week.

In whatever situation, at least 20 units of x must be produced. Each unit of x generates a profit of 12,000/= and y generates 9,000/= per unit.

**Required**

- (a) Formulate the objective function for the above company **[3 Marks]**
- (b) Formulate the constraints to the above function **[4 Marks]**

- (c) Determine the weekly production that maximizes profits and calculate the profit at this level [9 Marks]
- (d) Determine the percentage utilization of labour when profits are maximized. [4 Marks]

### QUESTION FIVE

**Lubongo** manufacturing Company has been presented with a new product development proposal. The cost of the development project is \$400,000. The probability of successful development is projected to be 70%. If the development is unsuccessful, the project will be terminated. If it is successful, the manufacturer must then decide whether to begin manufacturing the product using the new staff or pay over- time to existing staff. If the demand for the new product is high, the incremental revenue using the new staff is \$1,600,000, and the incremental revenue using existing staff \$800,000. If the demand is low, the incremental revenue using the new staff is \$900,000, and the incremental revenue using existing staff is \$700,000. All of these incremental revenue values are gross figures, i.e., before subtracting the \$400,000 development cost, \$250,000 for recruitment process of new staff and \$50,000 adjusting contracts of existing staff to allow them work overtime. The probability of high demand is estimated as 60%, and of low demand as 40%.

#### Required:

- a) Draw a decision tree include the figures for costs, loss or profit on the appropriate branches of the tree. [10 marks]
- b) Give the final decision on whether to develop the product or to abandon. [5 marks]
- c) As a manager how would you use the above findings? [5 marks]

### QUESTION SIX

- a) Comment on index numbers as a tool for business decision making [5 marks]
- b) In context of index numbers briefly explain the following:
- i. Consumer price Index [2 Marks]
  - ii. Base year and Current year [2 Marks]
- c) Comment on the challenges of constructing index numbers. [3 Marks]

- d) The table below shows the prices (\$) and quantities of four different commodities for the years 2000 and 2005.

| Commodity | Base Year 2015  |                    | Year 2016       |                    |
|-----------|-----------------|--------------------|-----------------|--------------------|
|           | Price ( $P_o$ ) | Quantity ( $q_o$ ) | Price ( $P_n$ ) | Quantity ( $q_n$ ) |
| A         | 20              | 8                  | 40              | 6                  |
| B         | 50              | 10                 | 60              | 5                  |
| C         | 40              | 15                 | 50              | 15                 |
| D         | 20              | 20                 | 20              | 25                 |

Using the above data for the year 2016 with 2015 as Base year;

- i. Calculate both the Laspeyre's price index and Paasche's price index numbers for the year 2016 using 2015 as base year; **[4 marks]**
- ii. Using the Laspeyre's price index above what should be the 2016 Mr. Mugabe salary if his 2015 salary was UGX2, 000,000 to and we want him to remain at 2015 purchasing level? **[4 Marks]**

**END**