
SEMESTER 1 EXAMINATIONS 2015-16

MANAGEMENT ANALYSIS

DURATION: 120 MINUTES (2 HOURS)

This paper contains **FOURTEEN** questions.

Answer **TWELVE** questions in total.

Answer **ALL TEN** questions from **SECTION A** and **TWO** questions from **SECTION B**.

Section A carries 40% of the marks.

Section B carries 60% of the marks.

An outline marking scheme is shown in brackets to the right of each question.

Only University approved calculators may be used.

A foreign language word to word translation dictionary (paper version) is permitted provided it contains no notes, additions or annotations.

Normal Distribution Tables will be provided.

A formula sheet will be provided.

Graph paper will be provided

SECTION A

You must answer **ALL TEN** questions from this section.

A1. Solve for x and y :

$$8x - 12y = 28$$

$$y = 3x - 5$$

[3 marks]

A2. If the interest rate is 5% per annum compounded monthly, is it better to receive £200 now or £250 in three years?

[3 marks]

A3. A sum of £200 is invested at the interest rate of 7% per annum compounded annually. How many years will it take for the total to exceed £500?

[5 marks]

A4. Twelve areas in the North Sea become available for oil exploration, and government policy of encouraging competition limits the allocation to at most one area for any exploration company.

(a) Initial forecasts show that each area is equally likely to produce oil so they can be considered equally attractive. Twenty different companies put in bids for the areas. How many ways are there of allocating areas to companies?

[2 marks]

(b) Assume that four companies withdraw their bids. If the areas are now allocated randomly, in how many ways can this allocation be done?

[2 marks]

- A5.** A Normal distribution has a mean of 950 and a standard deviation of 150.
- (a) What proportion of values are greater than 1250?
[2 marks]
- (b) What proportion of values are between 1100 and 1250?
[3 marks]
- A6.** Given the numbers;1,3,4,4,7,10,11,11,11,18.
- Calculate the mean, the mode, the median and the standard deviation.
[4 marks]
- A7.**
- (a) Name three things that a linear programming model contains.
[2 marks]
- (b) What are the main assumptions you make when modelling a problem using linear programming?
[3 marks]
- A8.** In regression, what is meant by the total sum of the squared errors and the explained sum of the squared errors? How do these relate to the coefficient of correlation?
[4 marks]
- A9.** The total cost of a manufacturing process can be represented as an algebraic expression (or a function) in the form $3x^2 - 12x + 30$, where x represents the number of units produced each week. How many units should be produced each week in order to minimize the total cost?
[4 marks]
- A10.** List the assumptions of the Economic Order Quantity Model (EOQ).
[3 marks]

TURN OVER

SECTION B

You must answer TWO questions from this section.

B1.

(a) By providing either a linear programming formulation or a graph describing the feasible region, give examples in which:

- (i) There is no feasible solution
- (ii) The feasible region is unbounded.
- (iii) The solution is unique.
- (iv) There is more than one solution.

[15 marks]

(b) Find the optimal solution for the following linear programming model by using the graphical method.

Minimize $x+2y$

Subject to:

$$x + y \leq 12 \quad (1)$$

$$x + 3y \leq 30 \quad (2)$$

$$x \leq 6 \quad (3)$$

Where x and y are greater than or equal to zero.

[15 marks]

B2.

(a) In what circumstances can a Poisson distribution be used?

[5 marks]

(b) On a North Sea oil rig a total of 40 accidents were reported in the past 50 weeks.

(i) What is the proportion of weeks in which you would expect zero accidents?

(ii) What is the proportion of weeks in which you would expect more than four accidents?

[25 marks]

- B3.** Let x be the total quantity produced of a given product, which could take fractional values. Let TC the total cost and TR the total revenue for this product. The relationship between TC , TR and x is described by:

$$TC = x^3 - 15x^2 + 1000$$

$$TR = 14x - x^2 + 2000$$

How many units should the company make to:

- (a) Maximize the total revenue [10 marks]
 (b) Minimize the total cost [10 marks]
 (c) Maximize the profit [10 marks]

B4.

- (a) Explain the following concepts:
- (i) fixed order cost; [2 marks]
 (ii) holding cost; [2 marks]
 (iii) unit purchasing cost [4 marks]
- (iv) Which of the concepts (i) to (iii) above does NOT appear in the EOQ formula? [2 marks]
- (b) A fashion store purchases 100 designer handbags from an Italian manufacturer each year, at a purchase cost of £20 per item. There is a delivery charge of £100 for each order, no matter how small. The inventory holding cost is 2.5% of the purchase price per handbag per year.
- (i) Calculate the total holding cost per year. [5 marks]
 (ii) Hence find the optimal number of orders to place each year, how much to order each time and how much the whole process costs per year. [15 marks]

END OF PAPER