

W1-2-60-1-6

 **JOMO KENYATTA UNIVERSITY**

 **OF AGRICULTURE AND TECHNOLOGY**

 **University Examinations 2012/2013**

**SEMESTER II EXAMINATION FOR THE DIPLOMA IN INFORMATION TECHNOLOGY**

**DIT 0205: ELEMENTARY MATHEMATICS AND DECISION MAKING TECHNIQUES**

## DATE: AUGUST 2012 TIME: 1½ HOURS

**INSTRUCTIONS: ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS**

**QUESTION 1**

 a) Give the sets:

 G = {2, 4, 6, 8, 10, 12}

 H = {1, 2, 3, 45}

 State:

 i) G H (1 mark)

 ii) G H (2 marks)

 b) Solve the following simultaneous equations by elimination:

 3x + 4y = 10

 2x – 3y = 1 (3 marks)

 c) Factorize:

 6x2 – 13 + 6 = 0 (3 marks)

 d) Find y’ if:

 y = 4t4 - + 7t + 10 (2 marks)

 e) Find the number of terms in the sequence -3, 0, 3 ---54 (2 marks)

 f) Calculate the rate of interest if Shs.4,500 earns Shs.500 after 1½ years. (2 marks)

 g) Which of the following criteria does not apply to decision making under

 uncertainity

 i) Maximim return

 ii) Maximix return

 iii) Minimax return

 iv) Maximize regret (1 mark)

 h) Determine using expected return method the polynomial P2(x) of degree

 2 which satisfies P2(1) = 1.5709 P2(4) = 1.5722 P2(6) = 1.5751 (4 marks)

**QUESTION 2**

 a) Use the quandratic form to solve 2x2 – 5x + 3 = 0 (5 marks)

 b) Solve using competing the square method 6x2 – 13x + 6 = 0 (5 marks)

 c) Use the graph of the function y = x2 + 3x + 1 to sole x2 + 3x – 4 = 0. (10 marks)

**QUESTION 3**

 a) A trader offers a christmas sale with a discounts of 10% on all her

 merchandise if John buy goods worth Shs.9,500, how much does she

 actually pay to the trader. (3 marks)

 b) What would Shs.15,-000 amount to after 3 years at 16% p.a. compounded

 quarterly. (3 marks)

 c) The sum of the first three terms of a geometr5ic series is 26. If the common

 ratio is 3, find the sum of the first six terms. (4 marks)

 d) A contractor intends to transport 1,000 tags of cement using a lorry and a

 pickup. The lorry can carry a maximum of 80 bags while the pickup can

 carry a maximum of 20 bags . The pick-up has to make more than twice

 the number of trips the lorry makes and the total number of trips has to

 be less than 30. The cost per trip is Shs.2,000 for the lorry and Shs.900

 for the pick up. Find the minimum expenditure. (10 marks)

**QUESTION 4**

 a) Olive branch is a writer of romance novels. A movie company and a

 TV network both want excessive right to one of her most popular works.

 If she signs with the network, she will receive a single lump sum, but if

 she signs with the movie company the amount she will receive depends

 on the market response to the movie. Olives pay offs are summarited

 below:

 STATE OF NATURE:

|  |  |  |  |
| --- | --- | --- | --- |
| Decision | Small box office | Medium box office | Large Box Office |
| Sign with movie Co. | $200,000 | $1,000,000 | $3,000,000 |
| Sign with TV network | $900,000 | $900,000 | $900,000 |

 i) If the probability estimates for the states of nature are P(small) = 0.3,

 P (medium) = 0.6 P(large) = 0.1, to whom should Olive sell the rights?(4 marks)

 ii) What is the most Olive should be willing to pay to earn what the size

 of the box office would be before she decides with whom to sign. (4 marks)

 b) Maspute manufacturing is planning the introduction of a new product. The

 cost to set up to manufacture one of the products component is very high,

 so marple is considering purchasing that component rather than manufacturing

 it once set up to manufacture the component, however, marpte variable cost

 per unit would be low in comparison to purchase price of the components

 marples materials manager has calculated the net profit in thousands of dollars

 for three different level of demand as follows:

 DEMAND

|  |  |  |  |
| --- | --- | --- | --- |
| Decision | Low | Medium  | High |
| Make component | 11 | 32 | 53 |
| Boy component | 15 | 32 | 45 |

 The states of nature have probabilities P(low) = 0.4 P (medium) = 0.3

 P(high) = 0.3 Draw a decision tree and use it to decide whether marple

 would make or buy the components. (6 marks)

 c) Consider the pay off table shown below in which the entries are next dollar

 returns. Assume that this is a decision with no knowledge about the

 states of nature.

|  |
| --- |
|  STATE OF NATURE |
| Decision | 1 | 2 | 3 | 4 |
| 1 | 35 | 22 | 25 | 12 |
| 2 | 27 | 25 | 20 | 18 |
| 3 | 22 | 25 | 25 | 28 |
| 4 | 20 | 25 | 28 | 33 |

 i) What is the optimal decision if the Laplace criterion is used? (1 mark)

 ii) What is the optimal decision if the maximum criterion is used? (1 mark)

 iii) What is the optimum decision if the maximax criterion is used? (1 mark)

 iv) Create the pay off table in which the entries are regret. (3 marks)

**QUESTION 5**

 a) At what point is the gradient of y = x2 + 3x + 2 equal to 9. (3 marks)

 b) Determine the nature of the stationary point on y = x3 + 5x2 + 3x – 9 (5 marks)

 c) A food processing plant has a particular problem with delivery and

 processing of perishable goods with a short life. All deliveries must

 be processed in a single day and although there are a number of processing machines available, they are very expensive to run. A researcher had

 developed the function (y = 12x – 29 + 9x2 to describe the profit

 (y in £000) given the number of machines used 9x) and the number

 of deliveries (a) in a day .

 i) Show that the system is uneconomical if 4 deliveries are

 made in one day. (7 marks)

 ii) If 3 deliveries are made in a day, find the number of processing.

 Machines that should be used in order that the profit is

 maximized in this case, what is the maximum profit? (5 marks)