



TECHNICAL UNIVERISTY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

DIPLOMA IN INFORMATION TECHNOLOGY

AMA 2115: MATHEMATICS

END OF SEMESTER EXAMINATION

SERIES: DECEMBER 2013

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*

This paper consists of **FIVE** questions. Attempt question **ONE** and any other **TWO** questions

Maximum marks for each part of a question are as shown

This paper consists of **THREE** printed pages

Question One (Compulsory)

$$ax^2 + bx + c = 0,$$

a) Given that solve for x. **(7 marks)**

$$2x^2 = 16^{x-1}$$

b) Solve for x **(5 marks)**

c) A fixed charge is made for each car carried across Likoni Ferry and additional charge is made for each person carried. If 10 cars containing 30 people are carried, shs 950- is collected. If 12 cars containing 40 people are carried, shs 1200/- is collected. What is the charge for each car and each person? **(5 marks)**

d) If a train travelled 10km/hr faster it would take an hour less to cover 500km. What is the speed of the train? **(5 marks)**

Question Two

a) Two computers A and B, are being used to process certain data. The cost function for each computer is:

$$y = 15 + 3x$$

Computer A

$$y = 18 - x + x^2$$

Computer B

Where:

Y = cost of produce x data items (£) and

X = number of data items processed per hour (in hundreds)

If the maximum speed at which both computers can run is 400 data items per hour:

- Plot the graphs of the two cost functions of the same diagram
- Use the graphs to find the range of production for which each data items is produced more cheaply using computer A.
- Use the graphs to find the total cost during one hour of producing 150 data items on computer B. **(12 marks)**

$$y = 4x^3 - 12x^2 - 2x + 30 \quad x = 2$$

b) Plot the graph of from to x = 4. Find the turning points. **(8 marks)**

Question Three

$$A = \begin{pmatrix} 0 & 2 & 1 \\ 3 & 0 & 1 \\ 1 & 1 & 1 \end{pmatrix}$$

a) The coding matrix find A^{-1} and use it decode the message 47, 22, 34, 28, 87, 46, 63, 66, 55, 56, 44, 43, 17, 14, 15 **(10 marks)**

b) Solve for, y and z using Crammers Rule in:

$$3x - 4y - 2z = 4$$

$$5x - 2y + 3z = 10$$

$$4x - 3y - 4z = 15$$

(10 marks)

Question Four

- a) An IT Manager stays at a hostel for 3 days. His menu for breakfast each day is a choice of one of 3 types of egg dishes or one of two types of fish, or one type of meat. In how many ways can he arrange his breakfast if he doesn't have an egg for two consecutive days nor repeat any dish?
(6 marks)
- b) A project management team consist of three assessors, five co-ordinations and 6 project supervisors. A committee of 4 is to be selected. How many committees can be formed consisting of:
- (i) At most two assessors
 - (ii) All for project supervisors
 - (iii) At least two co-coordinators are among the four.
- c) The ICT department of Technical University of Mombasa assigned a code consisting of five characters. Neither I and 0 as letters nor 1 and 0 as digits used. The code consists of two letters, then two digits and then a letter. Codes ending with letter A are reserved for the management staff. How many code numbers are available if the first two letters are different:
- (i) For non-management staff?
 - (ii) for management staff
 - (iii) for all employees if no restrictions are imposed?
- (7 marks)

Question Five

$$\sqrt{\frac{27-3x}{8-2x}}$$

$$\sqrt{5}$$

- a) Expand $\sqrt{\frac{27-3x}{8-2x}}$ as far as the forth term. By using a suitable value of x find $\sqrt{5}$ correct to four decimal places.
(9 marks)
- b) (i) How much will kshs 100,000 amount to at 8% p.a. compound interest over 15 years.
(3 marks)
- (ii) What compound rate of interest will be required to produce kshs 50,000 after five years with an initial investment of kshs 40,000?
(3 marks)
- (iii) Nabil bought a computer for kshs 25,000 on 1/1/2007. He estimates it depreciates at 20% on book value per year. Find:
- Its value after 3 years
 - The worth of service he derives in that period
- (5 marks)