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University Examinations 2013/2014

STAGE II, SEMESTER EXAMINATIONS FOR DIPLOMA IN INFORMATION TECHNOLOGY

DIT 0205: ELEMENTARY MATHEMATICS & DECISION MAKING THEORY

DATE: APRIL 2014 **TIME: 1 ½ HOURS**

INSTRUCTIONS: *Answer question **one** and any other **two** questions.*

QUESTION ONE – (30 MARKS)

(a) Define the following terms as applied in Mathematics:
- (i) A set (1 Mark)
- (ii) A linear expression (1 Mark)

(b) Evaluate $\int_0^2 (3x-2)\,dx$ (3 Marks)

(c) Given $y = \frac{2}{3}x^3 - 2x^2 + 2x - 2$, find $\frac{dy}{dx}$. (2 Marks)

(d) On the grind provided, draw the graphs of $x + y = 8$ and $x - 2y = 6$, hence state the co-ordinates of the point where the two equations intersect. (5 Marks)

(e) Solve and represent the solutions on a number line $2x - 3 < 5x + 1 \leq 3x + 9$ (3 Marks)

(f) Find the percentage error in calculating the perimeter of triangle whose sides re 8cm by 6cm by 10cm. (5 Marks)

(g) Given sets $A = \{2, 5, , 7\}, B = \{6, 7, 8, 9\}$ *and* $C = \{9, 10, 11\}$, find;
- (i) $A \cup B \cap C$ (2 Marks)
- (ii) $A \cap C$ (1 Mark)
- (iii) $A \cap B \cup C$ (1 Mark)

(h) Solve the quadratic equation below using any suitable method.

$x^2 - 3x - 28 = 0$ (3 Marks)

(i) Expand and simplify

(i) $3(x-3)-2(2x+5)$ (1 Mark)

(ii) $(3x-2)(5x-4)$ (2 Marks)

QUESTION TWO – (15 MARKS)

(a) Find the sum of 10 terms in the series below $2 + 4 + 8 + \cdots$ (3 Marks)

(b) Show the following sets using Venn diagrams.

(i) $A \cup B$ (1 Mark)

(ii) $A|B$ (1 Mark)

(iii) $A \cap B$ (1 Mark)

(c) Show to region described by the following in equalities

$x \geq 1,\ y \geq -2$ and $x + y \leq 7$ (4 Marks)

(d) Find the accumulated amount and interest if Ksh15,500 is invested for 3 years at 10% compound interest p.a and the amount is compounded semi-annually. (3 Marks)

(e) Define the following terms as applied in Mathematics

(i) Probability (1 Mark)

(ii) An error (1 Mark)

QUESTION THREE – (15 MARKS)

(a) Draw the graph of $y = 2x^2 - 3x - 4 - 3 \leq x \leq 3$ on the grid provided, hence use your graph to solve the equations;

(i) $2x^2 - 3x - 4 = 0$ (6 Marks)

(ii) $2x^2 + 2x - 1 = 0$ (3 Marks)

(b) A bag contains 3 red, 4 white and six black marbles of the same kind. Two marbles are picked randomly from the bag without replacement.

(i) Draw a tree .diagram to represent the above information. (3 Marks)

(ii) Find the probability of picking 2 marbles of different colours. (3 Marks)

QUESTION FOUR – (15 MARKS)

(a) Find the stationary point of the curve $y = 2x^3 + 3x^2 - 12x - 5$, distinguish. Between the maximum and minimum values and sketch the graph. (10 Marks)

(b) The third term of a G.P is $\frac{1}{32}$. Find the sum of the first six terms. (3 Marks)

(c) Solve for x in: $\frac{(x-2)}{3} - \frac{(x+1)}{2} = \frac{1}{4}$ (2 Marks)