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(Knowledge for Development)

KIBABII UNIVERSITY
UNIVERSITY EXAMINATIONS
2015/2016 ACADEMIC YEAR
FIRST YEAR SECOND SEMESTER
MAIN EXAMINATION
FOR DIPLOMA IN EDUCATION
MATHEMATICS

COURSE CODE: EDM 101

COURSE TITLE: NUMBER SYSTEMS

DATE: 6/5/16

TIME: 9AM -11AM

INSTRUCTIONS TO CANDIDATES

Answer Question One and Any other TWO Questions

TIME: 2 Hours

- iv) Show that the points A(1,2,3), B(3,8,1), C(7,20,-3) are collinear (3marks)
- v) In a triangle XYZ ,XY=7cm,YZ=9cm and XZ=6.5CM.Calculate to 2 decimal places (3 marks)
- a) the size of the largest angle (2 marks)
- b)the area of the triangle (2 marks)

QUESTION THREE (20 MARKS)

- a) The sum of a number of consecutive terms of an arithmetic progression is $-19\frac{1}{2}$, the first term is $16\frac{1}{2}$ and the common difference is -3 . Find the number of terms (4mkr)
- b) Find the coefficient of x^{10} in the expansion of $(2x-3)^{14}$ (5mrks)
- c) In triangle PQR, $r=5.75$ and the size of angles P and Q are 42° and 65° respectively. Calculate the length of PR. (3mrks)
- d) In triangle ABC, $BR=3.5$, $CB=4$ and $AC=5$. Calculate the size of angle A and hence find the area of the triangle (5mrks)
- e) Given that A(1,2,1), B(4,7,8), c(6,4,12) and D(3,-1,5) are the vertices of a parallelogram, determine the area of the parallelogram (3mrks)

QUESTION FOUR (20 MARKS)

- a) The roots of the equation $3x^2+4x-5=0$ are α and β . Find the values of
- i) $\frac{1}{\alpha} + \frac{1}{\beta}$ (3mrks)
- ii) $\alpha^2 + \beta^2$ (3mrks)
- b) Factorize the expression $2x^3+3x^2-32x+15$ (5mrks)
- c) When the expression $x^5 + 4x^2 + ax+b$ is divided by x^2-1 , the remainder is $2x+3$. find the values of a and b (5mrks)
- d) Rationalize the denominator of $\frac{-4-3\sqrt{2}}{3-2\sqrt{2}}$ (4marks))

QUESTION FIVE(20 MARKS)

- a) If $x = \sin Q$, Simplify $\sqrt{1-x^2}$ (2mrks)
- b) Use the graph of the function $y = x^2 + 3x + 1$ to solve the quadratic equation $x^2 + 2x - 2 = 0$ for the range $-5 \leq x \leq 3$ (6mrks)
- c) Solve the following equations
- i) $\sin^2 Q = \frac{1}{4}$ for $0^\circ \leq Q \leq 360^\circ$ (4mrks)
- ii) $2\cos^2 Q - \cos^2 Q = 0$ for $0^\circ \leq Q \leq 360^\circ$ (4mrks)
- d) Draw the graph of $y = \cos x$ for $x = 0$ to 360 (4marks)

QUESTION ONE (30 MARKS)

- a) Evaluate
- i) $|x+y|$ ii) $|x-y|$ iii) $|x|+|y|$ iv) $|x|-|y|$
where $x=0.5, y=0.75$ (3mrks)
- b) Simplify
- i) i^4 ii) $(3+i) + (1+2i)$ iii) $(2-3i)-(1+2i)$ iv) $(2-i)(3+2i)$
(4mrks)
- c) i) Express as a single logarithm
 $2\log a + 3\log b - \log c$ (3mrks)
- ii) Simplify $\frac{\log 125}{\log 25}$ (3mrks)
- ii) Evaluate $(2+3i)(5-2i)$ (3Mrks)
- iii) Evaluate $\frac{2+3i}{5-2i}$ (3marks)
- d) i) Solve the equation z^3-1
- ii) Solve the equation $3-2x \leq \frac{2x+5}{3}$ and show the solution on a number line
(3Mrks)
- iii) Find the sum of the even numbers upto and including 100
- iv) Show that ${}^n C_r = {}^n C_{n-r}$ (3Mrks)

QUESTION TWO (20 MARKS)

- a) i) In a geometrical progression, the sum of the second and third terms is 6, and the sum of the third and fourth terms is -12. find the first term and the common ratio
(5mrks)
- i) Simplify $\frac{15!}{11!4!} + \frac{15!}{12!3!}$ (3mrks)
- ii) A mixed hockey team containing 5 men and 6 women is to be chosen from 7 men and 9 women. In how many ways can this be done? (3mrks)
- iii) If A and B are the points (1,1,1) and (13,4,5) respectively, find, in terms of **i,j,k** the displacement vector **AB** (2mrks)