MURANG'A UNIVERSITY COLLEGE

(*A Constituent College of Jomo Kenyatta University of Agriculture and Technology*)

University examinations

School of Pure and Applied Sciences

End of Semester Examinations Bridging Certificate In Mathematics

UNIT CODE; SMB 0105 UNIT TITLE: GRAPHS

DATE: 11TH DECEMBER, 2015 TIME: 2 HRS

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

QUESTION ONE (30 MARKS)

a) The gradient of a line PQ is 3. The co-ordinates of P and Q are (5, 2) and (6, y) respectively. Find the value of y (2mks)

b) Solve the following simultaneous equations graphically

(i) $2y + 2x = 3$, $5x + y = 7$ (5mks)

(ii) $y = x$, $3x + 2y = 42$ (5mks)

c) (i) Draw the graph of $y = x^2 + 4x - 5$ for the range $-7 \leq x \leq 3$ (5mks)

(ii) Find the line of symmetry (3mks)

d) If Z varies directly as the cube root of x and inversely as the square of Y,

(i) Express Z in terms of X and Y given that Z = 24 when X = 27 and Y = 2. (3mks)

(ii) Hence find Z when X = 8 and Y = 3. (3mks)

e) Solve the following inequality

$$\frac{3x}{2} - \frac{x-1}{3} < \frac{3x-2}{2}$$ (4mks)

QUESTION TWO (20 MARKS)

(a) Plot the following linear inequalities and indicate the wanted region;

(I) $x \geq 10$ (2mks)

(ii) $4x + 3y \leq 120$ (3mks)

(iii) $y \geq 3x - 45$ (3mks)

(iv) $y \geq 5$ (2mks)

(b) If **v** varies inversely as the cube of **x** and directly as the cube root of **z**.

(i) find the relationship between **z, v** and x if **v** = 15 when **x** = 6 and **z** = 64 (4mks)

(ii) find **z** when **v** = 50 and **x** = 25 (2mks)

(iii) find **x,** when **v** =55 and **z** = 64 (2mks)

(iv) find **v**, when **z** = 8 and **x** = 2 (2mk)

QUESTION THREE (20 MARKS)

(a) A car park is to be laid for x matatus and y buses. Matatus are allowed $10m^2$ and buses are allowed $20m^2$ of space and there is only $500m^2$ of space available. Not more than 40 vehicles are allowed at a time. There are always both type of vehicles parked and at the most 15 buses are allowed at a time.

(i) Write down all the inequalities based on these facts. (4mks)

(ii) Represent these inequalities on the xy-plane and show the region that satisfy all the inequalities. (4mks)

(iii) The parking charge for a matatu is shs. 5 and that of a bus is shs. 20 per day. Find how many vehicles of each type must be parked on the lot in order to obtain maximum income. (2mks)

(b) (i) Draw the graph of the function ; $y = 4x^2 - 9x - 8$ for values of x from -3 to 5 (5mks)

(ii) (ii) use your graph to solve the equation **;** $4x^2 - 9x - 8 = 0$ (5mks)

QUESTION FOUR (20 MARKS)

(a)On the same axis and scale draw the graphs of

(i) $y = 3 - 4 \sin x$ (3mks)

(ii) and $y=(x/160)-1.5$, for $\mathbf{0^0 \leq x \leq 360^0}$ at intervals of 30^0. (3mks)

Hence use your graph to solve the following trigonometric equations

(iii) $3- 4\sin x=0$ (2mks)

(iv) $3- 4 \sin x = (x/160)-1.5$ (2mks)

(b) For an in service course in mathematics at least four but not more than nine teachers are to be chosen. The ratio of the number of male teachers to the number of female teachers must be less than **2: 1** and there must be more males than females. If x and y represent the number of male and female teachers respectively,

(i) Write down in the simplest form the inequalities which x and y must satisfy. (3mks)

(ii) Represent these inequalities on a graph (4mks)

(iii) Find the composition of the in service group of;

(a) The largest size (2mks)

(b) The smallest size. (1mk)