(*Knowledge for Development*)

KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS

ACADEMIC YEAR

FIRST YEAR FIRST SEMESTER

SPECIAL/SUPPLEMENTARY EXAMINATIONS

FOR THE COMMON COURSES

COURSE CODE: ESM 101

COURSE TITLE: QUANTITATIVE SKILLS I

DATE: 15/10/2018 **TIME:** 8:00 – 10:00 a.m

INSTRUCTIONS TO CANDIDATES

Answer question **ONE** and any other **THREE** questions.

TIME: 2 Hours

Question 1

a) Distinguish between an odd number and a composite number (2mks)

b) A piece of wire can form a square of side 33cm. if this wire can be wrapped around
a cylinder exactly two times, find the diameter of the cylinder. (take $\pi = \frac{22}{7}$) (5mks)

c) Find the inverse of; (2mks)

$$\begin{bmatrix} 4 & 6 \\ 3 & 4 \end{bmatrix}$$

Hence or otherwise solve the following simultaneous equations:

$$4x + 6y = 15$$
$$3y + 4y = 11$$ (3mks)

d) Simplify $\dfrac{3x^2 - 5x + 2}{7x - 2x^2 - 5}$ (5mks)

e) By use of graphical method, find the maximum possible value of y given that;

$$y = 7x - x^2$$ (5mks)
$$\text{Take } -1 \leq x \leq 8$$

f) Given $\quad A = \begin{bmatrix} 4 & 1 & -4 \\ 2 & 4 & 7 \end{bmatrix}$ and $\quad B = \begin{bmatrix} 2 & 1 \\ 0 & 5 \\ 3 & -3 \end{bmatrix}$

Determine $A^T \times B^T$ (3mks)

Question 2

Given the matrix; $\quad \begin{bmatrix} 2 & 2 & 4 \\ 4 & 2 & 2 \\ 2 & 4 & 2 \end{bmatrix}$

i) Determine its inverse (8mks)

ii) Hence or otherwise solve the following system of simultaneous equations.

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

$4x + 2y + 2z = 4$

$2x + 4y + 2z = 6$ (7mks)

QUESTION TWO (15 MARKS)

(a) Let $A = \{VO, TX, FR, JK, TA, DA, ZT, BN\}$, $B = \{FR, JK, BN\}$ and $Q = \{TX, VO, TA, ER\}$, find:
   (i) $B \cup A$ (2 marks)
   (ii) $A - B$ (2 marks)
   (iii) $n\{A \cap Q\}$ (2 marks)
   (iv) $A \cap \{B \cup Q\}$ (3 marks)

(b) If $S = \{Elected\ members\ of\ the\ national\ assembly\}$,
   $G = \{Members\ of\ County\ Assembly\}$ and
   $D = \{Elected\ officials\ of\ University\ Students'union\}$
   Using Venn diagrams, represent:
   (i) $S \cup G$ (1 marks)

   (ii) $\{S \cup G\}'$ (1 marks)

(c) There are 60 undergraduate students in an ESM 101 Class. Given that 10 of them drink alcohol but do not smoke, and 5 of them smoke but do not drink alcohol, how many smoke and drink alcohol?   (4 marks)

Question 4

A farm wished to employ a computer expert whose age was to be between 30 and 50 years. The ages of the following 40 applicants were recorded.

37	40	42	40	41	40	39	40	39	43
39	43	40	39	37	41	41	38	42	38
44	40	37	36	39	37	45	40	43	41
38	41	36	40	42	38	37	41	42	37

i) Make a frequency distribution table using class intervals 35 – 37, 38 – 40...   (3mks)

ii) Calculate the mean age.   (4mks)

iii) Calculate the medium age.   (3mks)

iv) Calculate the standard deviation.   (5mks)

QUESTION TWO (15 MARKS)

(d) Let $A = \{VO, TX, FR, JK, TA, DA, ZT, BN\}$, $B = \{FR, JK, BN\}$ and $Q = \{TX, VO, TA, ER\}$, find:

   (v) $B \cup A$ (2 marks)

   (vi) $A - B$ (2 marks)

   (vii) $n\{A \cap Q\}$ (2 marks)

   (viii) $A \cap \{B \cup Q\}$ (3 marks)

(e) If $S = \{Elected\ members\ of\ the\ national\ assembly\}$,

   $G = \{Members\ of\ County\ Assembly\}$ and

   $D = \{Elected\ officials\ of\ University\ Students'union\}$

Using Venn diagrams, represent:

   (iii) $S \cup G$ (1 marks)

   (iv) $\{S \cup G\}^{/}$ (1 marks)

(f) There are 60 undergraduate students in an ESM 101 Class. Given that 10 of them drink alcohol but do not smoke, and 5 of them smoke but do not drink alcohol, how many smoke and drink alcohol?   (4 marks)